Saddlebrook Solar and Storage Project Connection Engineering Connection Assessment

Date: August 18, 2022

Alberta Electric System Operator

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The AESO's *Engineering Connection Assessment – TCE Saddlebrook Solar Storage* assesses the transmission system performance prior to and following the connection of the Proposed Transmission Development. As part of the AESO Connection Process, the AESO defined the study scope, and provided the system models and study assumptions to the market participant who engaged a consultant to conduct the connection assessment studies. The AESO reviewed the results of the connection assessment studies prepared by the consultant and found the results acceptable for the purposes of assessing the impacts of the Proposed Transmission Development on the transmission system.

At the time the scope of the engineering studies was defined, the scheduled In-Service Date (ISD) for the project was March 21, 2023, and the STS contract capacity of the Saddlebrook Solar facilities was 102.5 MW. Since completion of the studies, the ISD of the Project has postponed to Aug 31, 2023, and the STS contract capacity of the Saddlebrook Solar facilities has been reduced to 87.5 MW. AESO has reviewed the impact of the changes on the completed engineering study results and confirmed that the findings still remain valid, and no material change is expected.

Public

APPENDIX A CONNECTION ASSESSMENT

Engineering Connection Assessment

P2334 TCE Saddlebrook Solar Storage

TransCanada Energy Ltd. (TCE)

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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 a third party consultant in accordance with the AESO Connection Process.

The AESO has reviewed the *Engineering Connection Assessment: Study Results*, and finds it acceptable for the purpose of assessing the potential impacts of the proposed connection on the performance of the Alberta interconnected electric system.

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Attachment A: Engineering Connection Assessment Results

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

TransCanada Energy Ltd (Market Participant) has submitted a request for system access service to the Alberta Electric System Operator (AESO) to connect its approved Saddlebrook Solar and Storage Project (Facility) to the AIES.

The Market Participant's request includes: a request for a new system access service in the area, with a Rate STS, *Supply Transmission Service*, contract capacity of 102.5 MW (for the solar asset) and 6.5 MW (for the battery storage asset) and a Rate DTS, *Demand Transmission Service*, contract capacity of 0.2 MW; and a request for transmission development (collectively, the Project).

The scheduled in-service date (ISD) for the Project is March 21, 2023. The operation of the Facility is phased, Phase 1 includes the solar component with a commercial operation date of July 1, 2023. Phase 2 includes the storage component with a commercial operation date of February 1, 2024.

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 High River (Area 46), which is part of the AESO South planning region. High River (Area 46) is surrounded by the planning areas of Calgary (Area 6), Seebe (Area 44), Strathmore / Blackie (Area 45), Stavely (Area 49) and Fort Macleod (Area 53).

From a transmission system perspective, High River (Area 46) consists primarily of a 138 kV and 240 kV transmission system. High River (Area 46) is connected to Strathmore / Blackie (Area 45) through 850L and 753L, to Calgary (Area 6) through 1106L and 1107L, and to Fort Macleod (Area 53) through 1037L and 1038L.

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

2.3 Study Area

The Study Area for the Project consists of the AESO Planning areas of Strathmore/Blackie (Area 45) and High River (Area 46), including the tie lines connecting these planning areas to the rest of the AIES. All transmission facilities within the Study Area will be studied and monitored for violations of the Reliability Criteria (defined in Section 3.1 of Attachment A1).

3 Connection Alternatives

3.1 Overview

The AESO, in consultation with the TFO in the Study Area and the MP, examined 6 transmission alternatives to meet the MP's request for system access service, as detailed in Section 3.2.

3.2 Connection Alternatives Examined

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

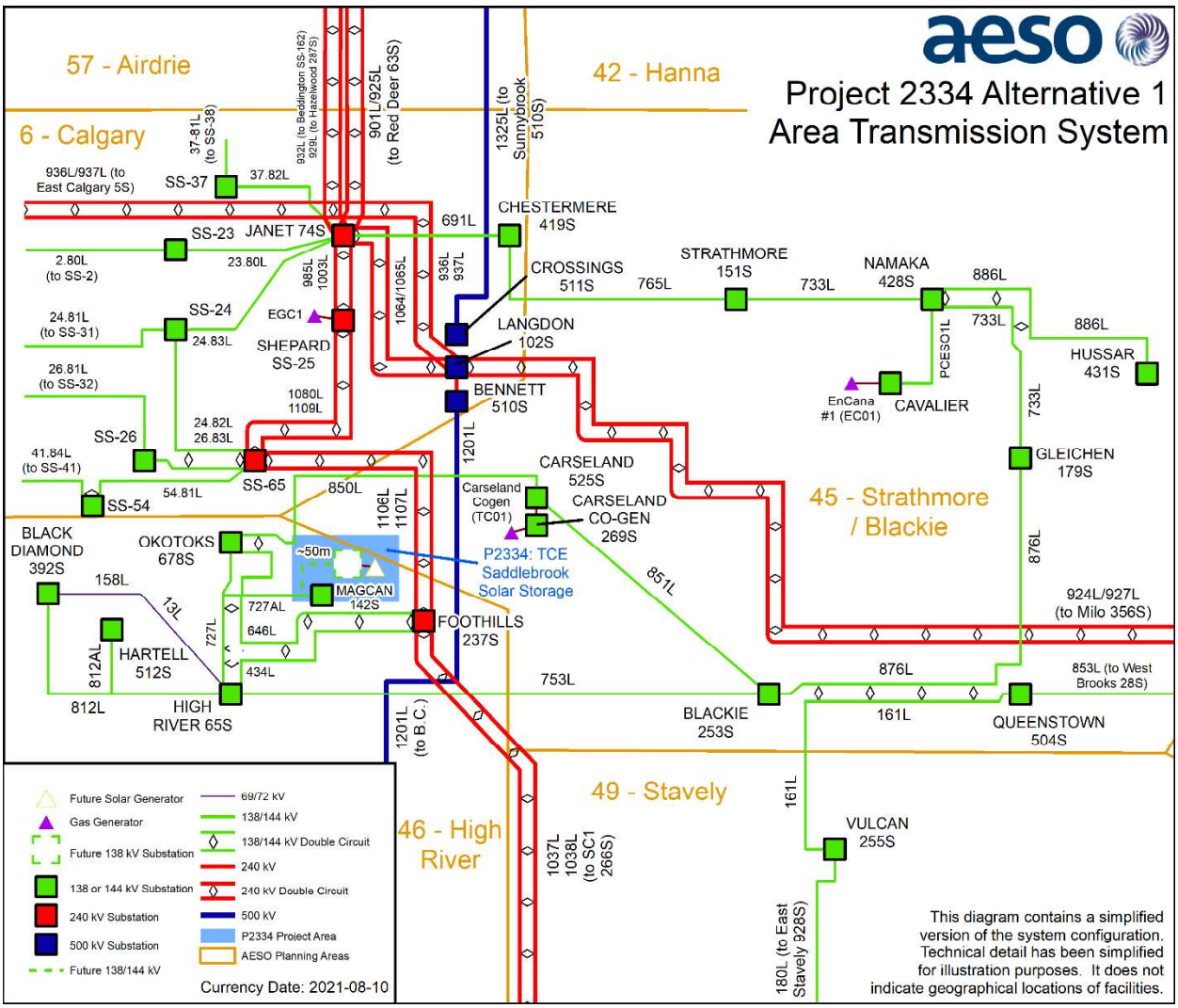
Alternative 1 –T-tap connection to the existing 138 kV transmission line 727AL

This alternative includes the following developments:

- Add a 138 kV circuit, approximately 50 meters in length, to connect the Facility to the existing transmission line 727AL (between existing Magcan 142S and existing 727L T-tap) using a T-tap connection configuration; and
- Add or modify associated equipment as required for the above transmission developments.

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

Figure 3-1: Connection Alternative 1



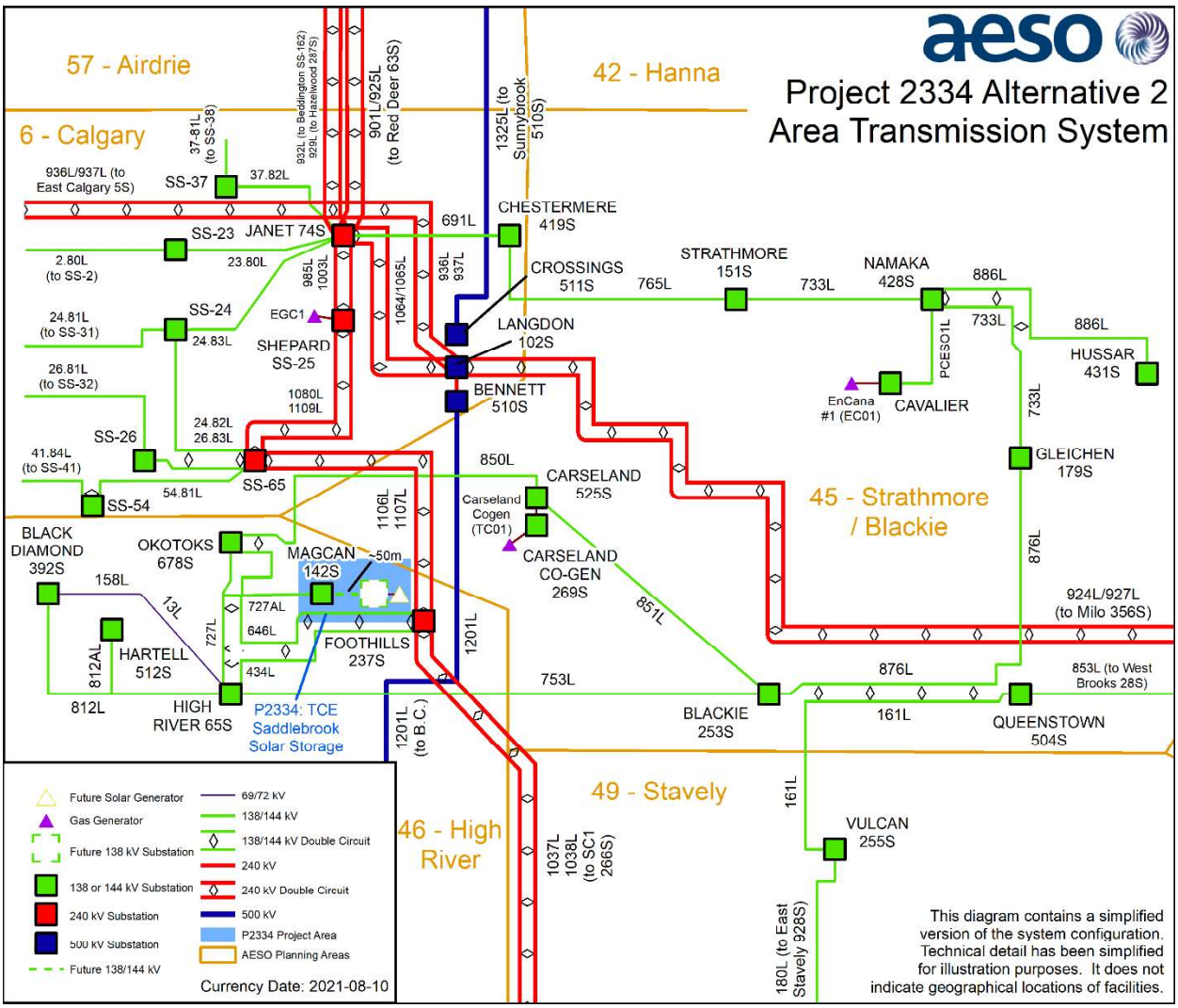
Alternative 2 – Radial connection to the existing Magcan 142S substation

This alternative includes the following developments:

- Add a 138 kV circuit, approximately 50 meters in length, to connect the Facility to the existing Magcan 142S substation using a radial configuration; and
- Add or modify associated equipment as required for the above developments.

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

Figure 3-2: Connection Alternative 2



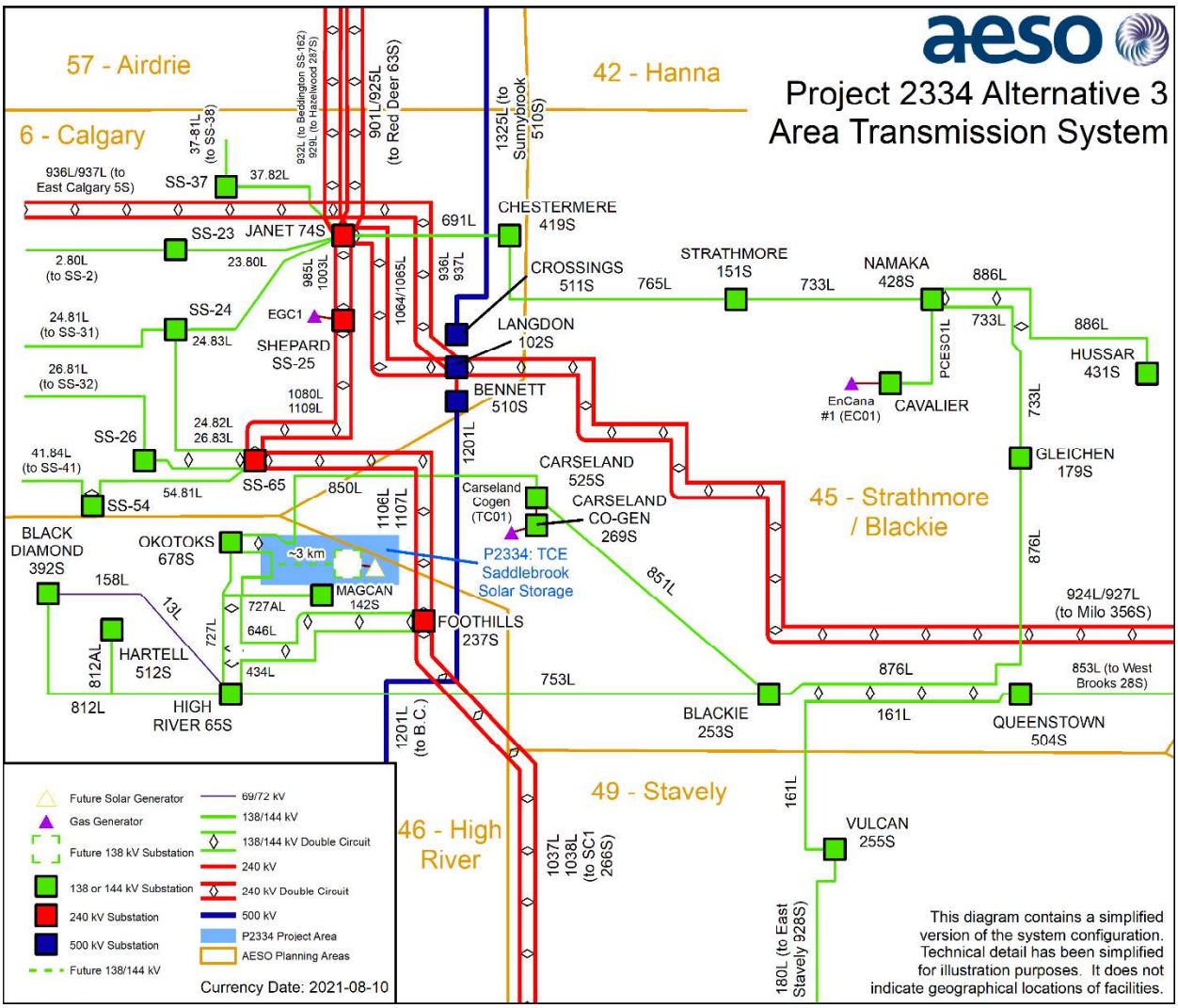
Alternative 3 – T-tap connection to the existing 138 kV transmission line 646L

This alternative includes the following developments:

- Add a 138 kV circuit, approximately 3 km in length, to connect Facility to the existing transmission line 646L (between existing Okotoks 678S and Foothills 237S substations) using a T-tap connection configuration; and
- Add or modify associated equipment as required for the above developments.

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

Figure 3-3: Connection Alternative 3



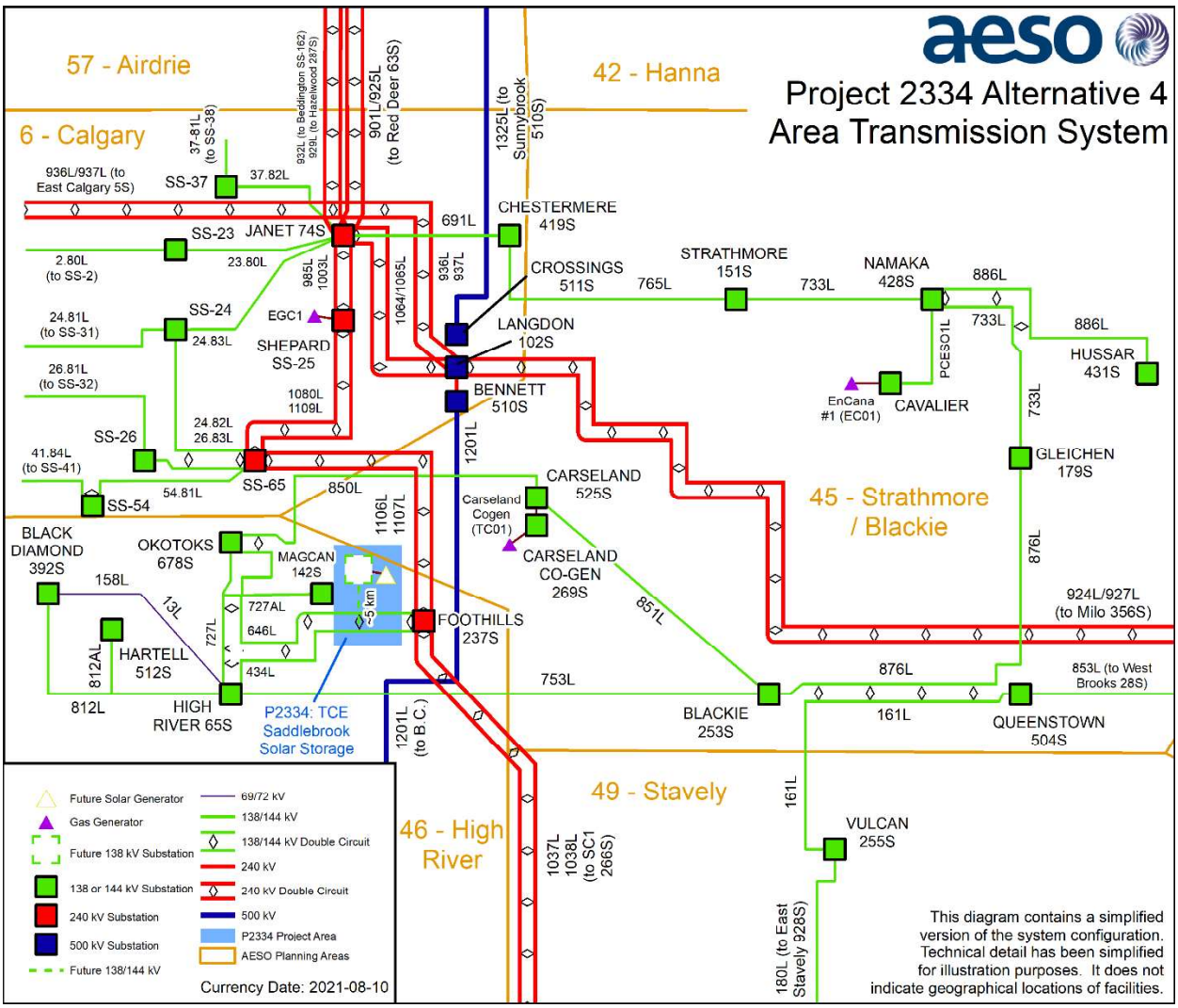
Alternative 4 – T-tap connection to the existing 138 kV transmission line 434L

This alternative includes the following developments:

- Add a 138 kV circuit, approximately 5 km in length, to connect the Facility to the existing transmission line 434L (between existing High River 65S and Foothills 237S substations) using a T-tap connection configuration; and
- Add or modify associated equipment as required for the above developments.

The proposed connection configuration is shown in Figure 3-4.

Figure 3-4: Connection Alternative 4



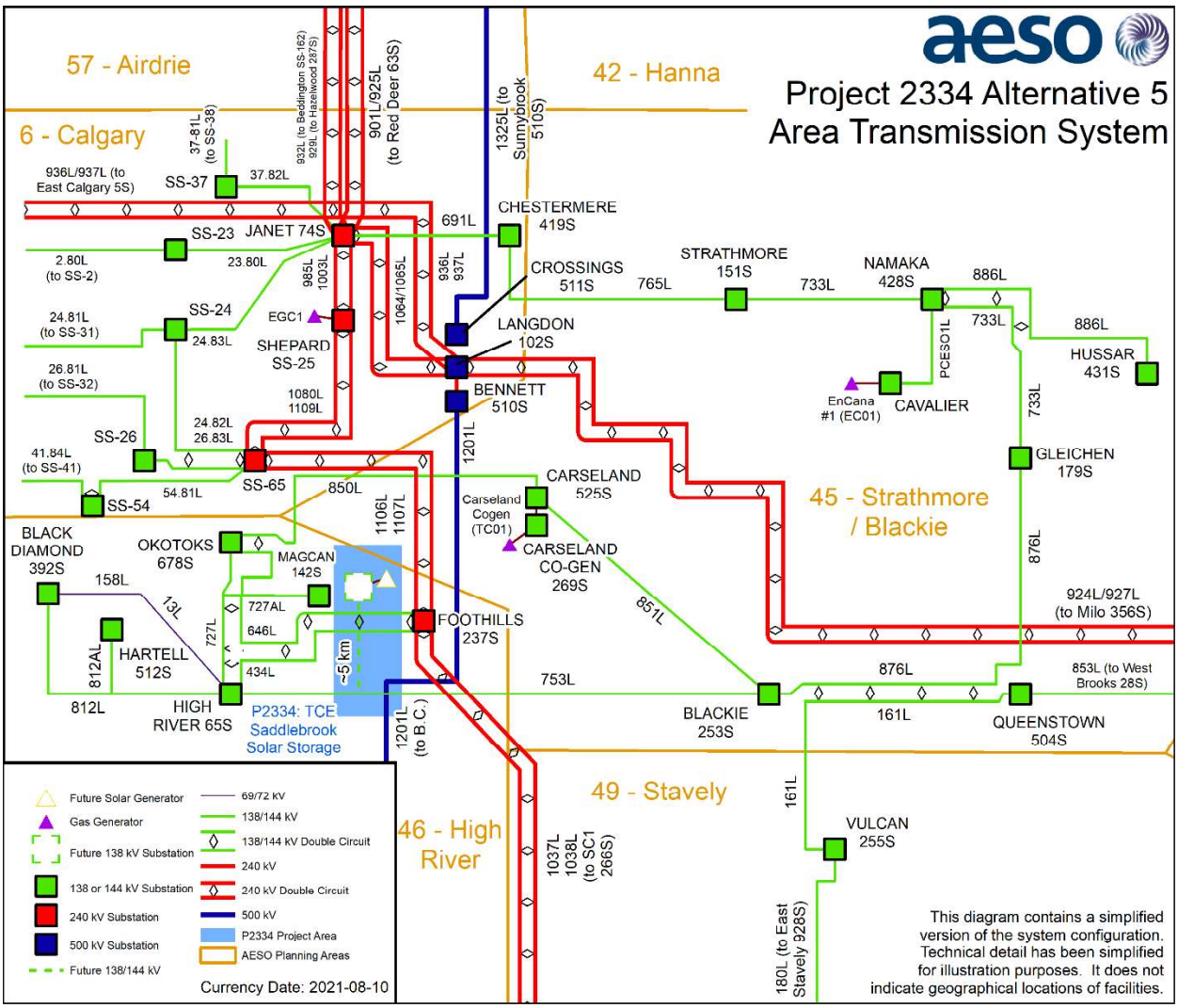
Alternative 5 – T-tap connection to the existing 138 kV transmission line 753L

This alternative includes the following developments:

- Add a 138 kV circuit, approximately 5 km in length, to connect the Facility to the existing transmission line 753L (between existing High River 65S and Blackie 253S substations) using a T-tap connection configuration; and
- Add or modify associated equipment as required for the above developments.

The proposed connection configuration is shown in Figure 3-5.

Figure 3-5: Connection Alternative 5



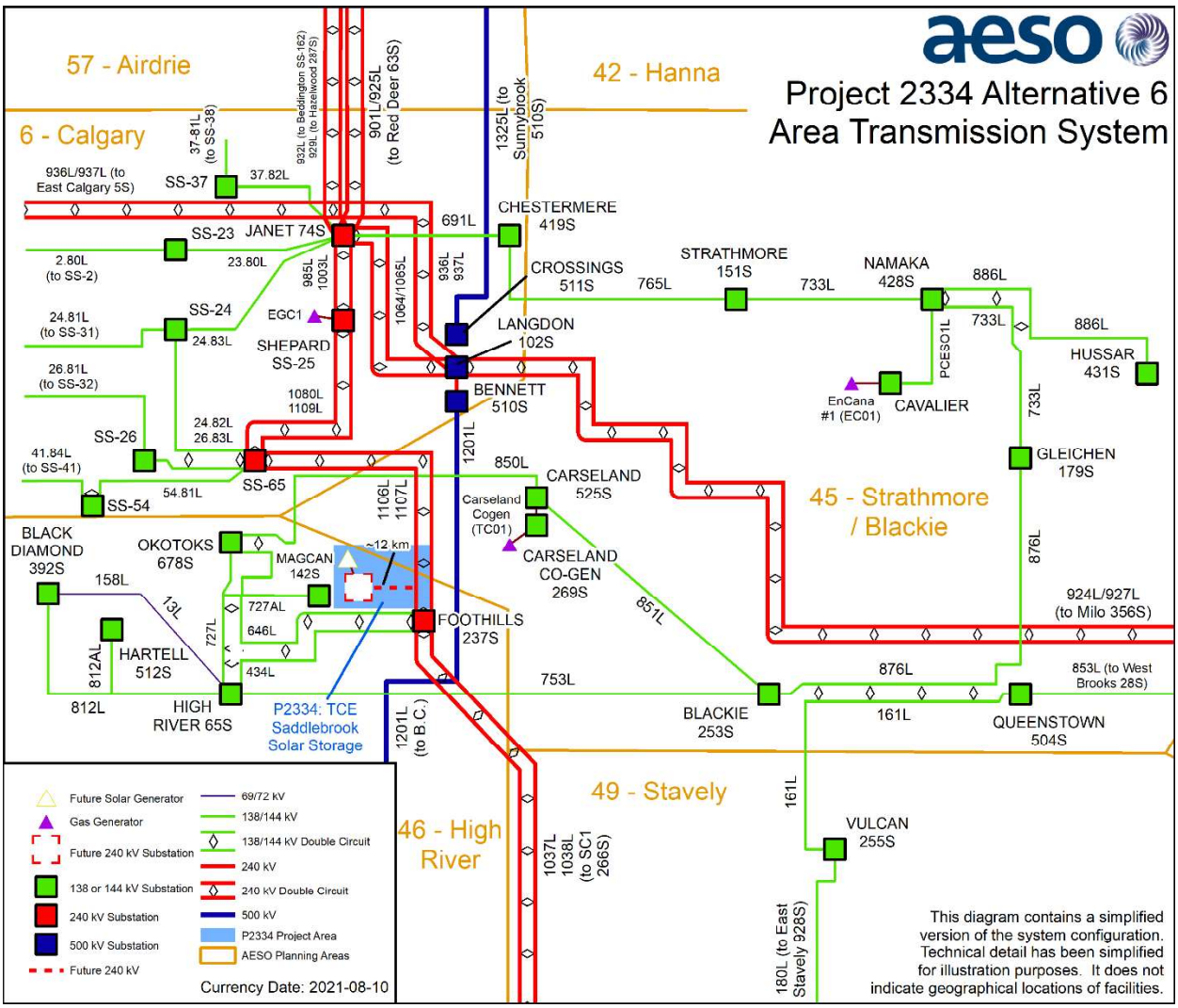
Alternative 6 – T-tap connection to the existing 240 kV transmission line 1106L

This alternative includes the following developments:

- Add a 240 kV circuit, approximately 12 km in length, to connect the Facility to the existing transmission line 1106L (between existing Foothills 237S and ENAMX SS-65 substations) using a T-tap connection configuration; and
- Add or modify associated equipment as required for the above developments.

The proposed connection configuration is shown in Figure 3-6.

Figure 3-6: Connection Alternative 6



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 would involve similar transmission development and system performance compared to Alternative 1. However, there is currently no other existing or planned customers connected to Magcan 142S substation, and the TFO has indicated that it plans to salvage the Magcan 142S substation. Due to the planned salvaging of Magcan 142S substation, Alternative 2 was ruled out.

Alternative 3, 4, 5, and 6 would involve increased transmission development and hence, increased cost, compared to Alternative 1. Therefore, Alternative 3, 4, 5, and 6 were 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 21, 2023. The Project Phase 1 commercial operation date is July 1, 2023. The Project Phase 2 commercial operation date is February 1, 2024. Therefore, studies were performed using scenarios for 2024 SL and 2024 SP.

Short-circuit studies were performed using the 2031 WP scenario.

Table 4-1 lists the study scenarios. Post-Project scenarios reflect the requested Rate STS contract capacity increase of 109 MW at the proposed Saddlebrook 303S substation. P1984 FortisAlberta Gleichen DG Solar is added to create the sensitivity scenarios, as its connection will exacerbate potential Reliability Criteria violations in the Strathmore area.

Table 4-1: Connection Study Scenarios

Scenario No.	Year/Season	System Generation Dispatch Conditions	Scenario Name	Project Load (MW)	Project Generation (MW)
Pre-Project					
1	2024 Summer Light (SL)	High Solar (HS)	2024 SL HS Pre-Project	0	0
2	2024 Summer Peak (SP)	HS	2024 SP HS Pre-Project	0	0
Post-Project					
3	2024 SL	HS	2024 SL HS Post-Project	0	109
4	2024 SP	HS	2024 SP HS Post-Project	0	109
5	2031 Winter Peak (WP)	All Study Area Generators In-Service	2031 WP Post-project	0	109
Pre-Project Sensitivity with P1984					
6	2024 SL	HS	2024 SL HS Pre-Project Sensitivity	0	0
7	2024 SP	HS	2024 SP HS Pre-Project Sensitivity	0	0
Post-Project Sensitivity with P1984					
8	2024 SL	HS	2024 SL HS Post-Project Sensitivity	0	109
9	2024 SP	HS	2024 SP HS Post-Project Sensitivity	0	109

The AESO Planning Region load forecasts used for the connection studies were based on the *AESO's 2021 Long-term Outlook (2021 LTO)*.

4.2.1 Power Flow Studies

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

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.[1]

Power flow studies were performed for 2024 SL and 2024 SP pre-Project scenarios, and for 2024 SL and 2024 SP 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 2024 SL and 2024 SP post-Project scenarios.

4.2.3 Short-Circuit Current Level Studies

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

Short circuit studies were performed for the 2024 SP pre-Project scenario and for 2024 SP and 2031 WP post-Project scenarios.

4.3 Mitigation Measure Development and Evaluation

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

4.3.1 Post-Mitigation Studies

Power flow 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.

[1] 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					
2024 SL	Thermal - above normal rating	Thermal - above normal rating	Category A Condition (No contingency)	765L (Strathmore 151S - Chestermere 419S)	Materially increased violation	765L line rating restoration	765L line rating restoration
	Thermal - above normal rating	Thermal - above normal rating		691L (Chestermere 419S - Janet 74S)	Materially increased violation	Real Time Operation Practice	691L line rating restoration
	None	Thermal - above normal rating		727AL (727L T-tap - Magcan 142S)	New violation	None	727AL line rating restoration
	None	Thermal - above normal rating	65S High River T1	765L (Strathmore 151S - Chestermere 419S)	New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	678S Okotoks T1		New violation	None	Real Time Operation Practice
	Thermal - above normal rating	Thermal - above normal rating	733L (Gleichen 179S - Namaka 428S)		No impact	Real Time Operation Practice	Real Time Operation Practice
	Thermal - above normal rating	Thermal - above normal rating	179S Gleichen T1		No impact	Real Time Operation Practice	Real Time Operation Practice
	None	Thermal - above normal rating	434L (Foothills 237S - High River 65S)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	753L (High River 65S - Blackie 253S)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	850L (Carseland 525S - Okotoks 678S)		New violation	None	Real Time Operation Practice
	Thermal - above normal rating	Thermal - above normal rating	765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)	No impact	Real Time Operation Practice	Real Time Operation Practice
	None	Thermal - above normal rating	65S High River T1	691L (Chestermere 419S - Janet 74S)	New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	646L (Okotoks 678S - Foothills 237S)	727L (High River 65S - JCT. 727AL)	New violation	None	Real Time Operation Practice
	Thermal - above normal rating	Thermal - above normal rating	765L (Strathmore 151S - Chestermere 419S)	733L (Gleichen 179S - Namaka 428S)	No impact	Real Time Operation Practice	Real Time Operation Practice
2024 SP	Thermal - above normal rating	Thermal - above normal rating	Category A Condition (No contingency)	765L (Strathmore 151S - Chestermere 419S)	Materially increased violation	765L line rating restoration	765L line rating restoration
	None	Thermal - above normal rating		691L (Chestermere 419S - Janet 74S)	New violation	None	691L line rating restoration
	None	Thermal - above normal rating		727AL (727L T-tap - Magcan 142S)	New violation	None	727AL line rating restoration
	None	Thermal - above normal rating	65S High River T1	765L (Strathmore 151S - Chestermere 419S)	New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	678S Okotoks T1		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	1106L (Foothills 237S - ENMAX No. 65 Substation)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	1107L (Foothills 237S - ENMAX No. 65 Substation)		New violation	None	Real Time Operation Practice
2024 SL Sensitivity	Thermal - above normal rating	Thermal - above normal rating	Category A Condition (No contingency)	765L (Strathmore 151S - Chestermere 419S)	Materially increased violation	765L line rating restoration	765L line rating restoration
	Thermal - above normal rating	Thermal - above normal rating		691L (Chestermere 419S - Janet 74S)	Materially increased violation	Real Time Operation Practice	691L line rating restoration
	None	Thermal - above normal rating		727AL (727L T-tap - Magcan 142S)	New violation	None	727AL line rating restoration
	Thermal - above emergency rating	Thermal - above emergency rating	765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)	No impact	Planned RAS 154	Planned RAS 154
	Thermal - above normal rating	Thermal - above normal rating	691L (Chestermere 419S - Janet 74S)		No impact	Real Time Operation Practice	Real Time Operation Practice
	Thermal - above normal rating	Thermal - above emergency rating	65S High River T1	765L (Strathmore 151S - Chestermere 419S)	Materially increased violation	Real Time Operation Practice	New RAS 194
	None	Thermal - above normal rating	678S Okotoks T1		New violation	None	Real Time Operation Practice
	Thermal - above normal rating	Thermal - above normal rating	876L (Blackie 253S - Gleichen 179S)		No impact	Real Time Operation Practice	Real Time Operation Practice
	None	Thermal - above normal rating	434L (Foothills 237S - High River 65S)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	753L (High River 65S - Blackie 253S)		New violation	None	Real Time Operation Practice

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					
	None	Thermal - above normal rating	850L (Carseland 525S - Okotoks 678S)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	1106L (Foothills 237S - ENMAX No. 65 Substation)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	1107L (Foothills 237S - ENMAX No. 65 Substation)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	646L (Okotoks 678S - Foothills 237S)		New violation	None	Real Time Operation Practice
	Thermal - above normal rating	Thermal - above normal rating	179S Gleichen T1		No impact	Real Time Operation Practice	Real Time Operation Practice
	Thermal - above normal rating	Thermal - above normal rating	733L (Gleichen 179S - Namaka 428S)		No impact	Real Time Operation Practice	Real Time Operation Practice
	None	Thermal - above normal rating	Foothills 237S T1		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	Foothills 237S T2		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	65S High River T1	691L (Chestermere 419S - Janet 74S)	New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	678S Okotoks T1		New violation	None	Real Time Operation Practice
	Thermal - above normal rating	Thermal - above normal rating	876L (Blackie 253S - Gleichen 179S)		No impact	Real Time Operation Practice	Real Time Operation Practice
	None	Thermal - above normal rating	434L (Foothills 237S - High River 65S)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	753L (High River 65S - Blackie 253S)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	850L (Carseland 525S - Okotoks 678S)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	646L (Okotoks 678S - Foothills 237S)	727L (High River 65S - JCT. 727AL)	New violation	None	Real Time Operation Practice
	Thermal - above normal rating	Thermal - above normal rating	765L (Strathmore 151S - Chestermere 419S)	733L (Gleichen 179S - Namaka 428S)	No impact	Real Time Operation Practice	Real Time Operation Practice
2024 SP Sensitivity	Thermal - above normal rating	Thermal - above normal rating	Category A Condition (No contingency)	765L (Strathmore 151S - Chestermere 419S)	Materially increased violation	765L line rating restoration	765L line rating restoration
	Thermal - above normal rating	Thermal - above normal rating		691L (Chestermere 419S - Janet 74S)	Materially increased violation	Real Time Operation Practice	691L line rating restoration
	None	Thermal - above normal rating		727AL (727L T-tap - Magcan 142S)	New violation	None	727AL line rating restoration
	Thermal - above normal rating	Thermal - above emergency rating	65S High River T1	765L (Strathmore 151S - Chestermere 419S)	Materially increased violation	Real Time Operation Practice	New RAS 194
	None	Thermal - above normal rating	678S Okotoks T1		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	1106L (Foothills 237S - ENMAX No. 65 Substation)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	1107L (Foothills 237S - ENMAX No. 65 Substation)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	850L (Carseland 525S - Okotoks 678S)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	753L (High River 65S - Blackie 253S)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	434L (Foothills 237S - High River 65S)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	646L (Okotoks 678S - Foothills 237S)		New violation	None	Real Time Operation Practice
	None	Thermal - above normal rating	Namaka 428S T2		New violation	None	Real Time Operation Practice
	Thermal - above normal rating	Thermal - above normal rating	765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)	No impact	Real Time Operation Practice	Real Time Operation Practice
	None	Thermal - above normal rating	65S High River T1	733L (Namaka 428S - Strathmore 151S)	New violation	None	Real Time Operation Practice

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%).

- RAS 154 is an existing RAS (see Section 1.2.2 of Attachment A1). Modifications to RAS 154 are proposed for the planned P1984 FortisAlberta Gleichen DG Solar and P1932 FortisAlberta Namaka DER Solar. This modified version of RAS 154 is referred to hereafter as "planned RAS 154"
- RAS 194 (Chestermere 419S Overload Mitigation and Generation Tripping Scheme) is a RAS proposed for multiple planned connection and distribution DER projects including P1984 FortisAlberta Gleichen DG Solar, P1932 FortisAlberta Namaka DER Solar, P2029 and P2030 FortisAlberta Strathmore 151S DER Solar 1 and 2 and the Project.
- In this table, "Modify" refers to adding the Project to the logic of the respective RAS

5.2 Pre-Project Study Results

Reliability Criteria violations on similar transmission facilities were observed for the pre-Project base and sensitivity scenarios under Category A and Category B conditions, but increased thermal criteria violations in the Strathmore area, e.g. thermal criteria violations on 691L and 765L, were observed for sensitivity scenarios.

5.2.1 Category A Conditions

With existing line ratings of 765L and 691L, thermal criteria violations were observed under the Category A condition (i.e., all elements in service) for the pre-Project scenarios. With line ratings of 765L and 691L assumed to be restored to no less than 120 MVA, no thermal criteria violations were observed under the Category A conditions 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 a number of thermal violations under Category B conditions (i.e., loss of a single system element).

No 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

Reliability Criteria violations on similar transmission facilities were observed for the post-Project base and sensitivity scenarios under Category A and Category B conditions, but increased thermal criteria violations in the Strathmore area, e.g. thermal criteria violations on 691L and 765L, were observed for sensitivity scenarios.

5.3.1 Category A Conditions

With existing line ratings of 765L, 691L and 727AL, thermal criteria violations were observed under the Category A condition for the post-Project scenarios. With line ratings of 765L and 691L restored to no less than 120 MVA, and the line rating of 727AL restored to no less than 121 MVA, no Reliability Criteria violations were observed under the Category A condition for any post-Project scenario.

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

5.3.2 Category B Conditions

Post-Project power flow studies identified a number of system performance issues under Category B conditions, namely: thermal criteria violations.

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

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

Existing thermal ratings for the 138 kV line transmission lines 765L and 691L are presently limited by underbuilt distribution line. Prior to the connection of the project, thermal criteria violations were observed on 765L and 691L under the Category A condition when additional new power generation in the Strathmore area exceeds 60 MW. To mitigate the observed thermal criteria violation on 765L, TFO is currently working with the legal owner of a distribution system to restore the thermal ratings on 765L. The observed thermal criteria violation on 691L will be managed by using real-time operational practices.

Most of the remaining observed thermal criteria violations under Category B conditions can be managed by using real-time operational practices. Any remaining thermal criteria violations not mitigated by real-time operational practices can be mitigated with the planned RAS 154.

5.4.2 Post-Project

Following the connection of the Project, and similar to the pre-connection study results, thermal criteria violations were observed on 765L and 691L under the Category A condition. To mitigate the observed thermal criteria violations, the thermal ratings of 765L and 691L need to be restored to no less than 120 MVA normal rating and 132 MVA emergency rating. When the Project and more than 60 MW additional generation in the Strathmore area that have met the AESO's project inclusion criteria , the AESO will inform the TFO to collaborate with the legal owner of a distribution system to restore the thermal ratings on the 138 kV line transmission lines 765L and 691L.

Post-project thermal criterial violations were also observed on the 138 kV transmission line 727AL under Category A conditions. The 138 kV transmission line 727AL thermal rating is currently de-rated by the TFO. The TFO advised it intends to restore the thermal rating of 727AL to no less than 121 MVA through its Transmission Capital Maintenance (TCM) project before the ISD of the Project.

After connection of the Project and the above line rating restorations, most of the thermal criteria violations observed under Category B conditions can be mitigated by using real-time operational practices. The remaining thermal criteria violations observed under Category B conditions can be mitigated by the planned RAS 154 and by addition of a new RAS, referred to as "RAS 194."

5.4.3 Post-Project Mitigation Study Results

Under Category B conditions, all of the observed Reliability Criteria violations requiring RAS were mitigated.

6 Project Dependencies

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

To mitigate the observed thermal criteria violations, the thermal ratings of 765L and 691L would need to be restored to no less than 120 MVA normal rating and 132 MVA 10-minute emergency rating.

Existing line rating of 138 kV line 727AL is currently de-rated by the TFO. The AESO was informed by the TFO that the line rating restoration of 727AL to no less than 121 MVA will be implemented through its Transmission Capital Maintenance (TCM) project before the ISD of the Project.

7 Conclusions and Recommendations

A summary of the connection alternatives considered and the AESO's rationale for its selection of the preferred alternative is provided in Table 7.1 below.

Table 7-1: Connection Alternatives Considered

Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Alternative Name	138 kV T-tap connection to 727AL	138 kV radial connection to Magcan 142S	138 kV T-tap connection to 646L	138 kV T-tap connection to 434L	138 kV T-tap connection to 753L	240 kV T-tap connection to 1106L
Scope	50 m 138 kV circuit; One 138 kV breaker	50 m 138 kV circuit; One 138 kV breaker	3 km 138 kV circuit; One 138 kV breaker	5 km 138 kV circuit; One 138 kV breaker	5 km 138 kV circuit; One 138 kV breaker	12 km 240 kV circuit; One 240 kV breaker
Studied	Yes	No	No	No	No	No
Technical	Technically acceptable	Not studied	Not studied	Not studied	Not studied	Not studied
Cost	$3.3 M	Similar to Alternative 1	Significantly higher than Alternative 1	Significantly higher than Alternative 1	Significantly higher than Alternative 1	Significantly higher than Alternative 1
Additional Considerations	None	Magcan 142S substation is planned to be salvaged	None	None	None	None
Benefit	Magcan142S substation can be salvaged as planned	not significant	not significant	not significant	not significant	not significant
Selection Decision	Preferred	Ruled out	Ruled out	Ruled out	Ruled out	Ruled out

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

These issues can be mitigated through line rating restorations, the use of the planned RAS 154, new RAS 194 and real-time operational practices, alone or in combination, as appropriate. With implementation of these mitigation measures, connecting the project with the preferred alternative does not adversely affect the performance of the AIES.

The AESO recommends proceeding with the Project using Alternative 1 as the preferred alternative to respond to the Market Participant's request for system access service. Real-time operational practices and the RAS mentioned above are recommended to mitigate the identified system performance issues.

Alternative 1 involves addition of a 138 kV circuit, approximately 50 meters, to connect the Facility to the existing transmission line 727AL (between existing Magcan 142S and existing 727L T-tap) using a T-tap connection configuration. The conductor used for the 138 kV circuit should have a minimum thermal rating of 121 MVA.

Attachment A:
Engineering Connection Assessment Results

Engineering Connection Assessment: Study Results

P2334 TCE Saddlebrook Solar Storage

TC Energy Corporation (TCE)

Date: January 10, 2022

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Classification: Public

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Attachment A7 Constraint Effective Factors Table

1 Introduction

This report presents the results of the engineering studies that were completed by CF Power LTD. (the Studies Consultant) 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 tool that was used for the studies in this connection assessment was PSS/E version 33.

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: 2024 Summer Light High Solar Pre-Project

Category A Conditions

With existing line ratings of 765L, 691L and 727AL, thermal criteria violations were observed under the Category A condition for Scenario 1. No Reliability Criteria (as defined in Section 3.1 of Attachment A1) violations were observed under Category A conditions, after the post-restoration ratings on the two 138 kV transmission lines 765L (Strathmore 151S - Chestermere 419S) and 691L (Chestermere 419S - Janet 74S) (Summer Normal Rating: 120 MVA / Summer Emergency Rating: 132 MVA) were adopted. Thermal loadings that exceed the existing line normal ratings under Category A conditions were observed as shown in Table 2-1.

Table 2-1: Thermal Loadings Exceed the Existing Normal Ratings under Category A Conditions for Scenario 1

Contingency (System Element Lost)	Violation Location Details	Existing Thermal Normal Ratings (MVA)	Post-Restoration Thermal Normal Ratings (MVA)	Power Flow[a] (MVA)	% Loading[b] of Existing Ratings	% Loading[b, c] of Post-Restoration Ratings
No Outage	765L (Strathmore 151S - Chestermere 419S)	85.00	120.00	102.54	120.64	85.45
	691L (Chestermere 419S - Janet 74S)	85.00	120.00	95.38	112.21	79.48

Notes:

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

[b] 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.

[c] Post-restoration ratings for 765L and 691L were adopted per the AESO's direction.

Category B Conditions

Thermal Criteria Violations

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

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

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow[a] (MVA)	% Loading[b, c]
765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)	110.00	121.00	118.07	107.34
733L (Gleichen 179S - Namaka 428S)	765L (Strathmore 151S - Chestermere 419S)	120.00	132.00	123.47	102.89
179S Gleichen T1		120.00	132.00	123.46	102.89
765L (Strathmore 151S - Chestermere 419S)	733L (Gleichen 179S - Namaka 428S)	120.00	132.00	122.43	102.02

Notes:

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

[b] 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.

[c] Post-restoration ratings for 765L and 691L were adopted per the AESO's direction.

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: 2024 Summer Peak High Solar Pre-Project

Category A Conditions

With existing line ratings of 765L, 691L and 727AL, thermal criteria violations were observed under the Category A condition for Scenario 2. No Reliability Criteria violations were observed under Category A conditions, after the post-restoration ratings on the two 138 kV transmission lines 765L (Strathmore 151S - Chestermere 419S) and 691L (Chestermere 419S - Janet 74S) (Summer Normal Rating: 120 MVA / Summer Emergency Rating: 132 MVA) were adopted. Thermal loadings that exceed the existing line normal ratings under Category A conditions were observed as shown in Table 2-3.

Table 2-3: Thermal Loadings Exceed the Existing Normal Ratings under Category A Conditions for Scenario 2

Contingency (System Element Lost)	Violation Location Details	Existing Thermal Normal Ratings (MVA)	Post-Restoration Thermal Normal Ratings (MVA)	Power Flow[a] (MVA)	% Loading[b] of Existing Ratings	% Loading[b, c] of Post-Restoration Ratings
No Outage	765L (Strathmore 151S - Chestermere 419S)	85.00	120.00	102.38	120.45	85.31

Notes:

[a] Power flow (MVA) is current expressed as MVA (i.e., S = √3 x V_{base} x I_{actual})

[b] Reported as a percentage of the power flow (in MVA, i.e., S = √3 x V_{base} x I_{actual}) relative to the transmission line's Normal Rating (also in MVA), as shown in Attachment A1.

[c] Post-restoration ratings for 765L and 691L were adopted per the AESO's direction.

Category B Conditions

No Reliability Criteria violations were observed under Category B conditions, after the post-restoration ratings on the two 138 kV transmission lines 765L (Strathmore 151S - Chestermere 419S) and 691L (Chestermere 419S - Janet 74S) (Summer Normal Rating: 120 MVA / Summer Emergency Rating: 132 MVA) were adopted.

2.1.3 Scenario 6: 2024 Summer Light High Solar Pre-Project with P1984 Sensitivity

Category A Conditions

With existing line ratings of 765L, 691L and 727AL, thermal criteria violations were observed under the Category A condition for Scenario 6. No Reliability Criteria violations were observed under Category A conditions, after the post-restoration ratings on the two 138 kV transmission lines 765L (Strathmore 151S - Chestermere 419S) and 691L (Chestermere 419S - Janet 74S) (Summer Normal Rating: 120 MVA / Summer Emergency Rating: 132 MVA) were adopted. Thermal loadings that exceed the existing line normal ratings under Category A conditions were observed as shown in Table 2-4.

Table 2-4: Thermal Loadings Exceed the Existing Normal Ratings under Category A Conditions for Scenario 6

Contingency (System Element Lost)	Violation Location Details	Existing Thermal Normal Ratings (MVA)	Post-Restoration Thermal Normal Ratings (MVA)	Power Flow[a] (MVA)	% Loading[b] of Existing Ratings	% Loading[b, c] of Post-Restoration Ratings
No Outage	765L (Strathmore 151S - Chestermere 419S)	85.00	120.00	107.68	126.68	89.74
	691L (Chestermere 419S - Janet 74S)	85.00	120.00	100.60	118.35	83.84

Notes:

[a] Power flow (MVA) is current expressed as MVA (i.e., S = √3 x V_{base} x I_{actual})

[b] Reported as a percentage of the power flow (in MVA, i.e., S = √3 x V_{base} x I_{actual}) relative to the transmission line's Normal Rating (also in MVA), as shown in Attachment A1.

[c] Post-restoration ratings for 765L and 691L were adopted per the AESO's direction.

Category B Conditions

Thermal Criteria Violations

Thermal criteria violations were observed under certain Category B conditions as shown in Table 2-5.

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

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow[a] (MVA)	% Loading [b, c]
765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)	110.00	121.00	127.39	115.81
691L (Chestermere 419S - Janet 74S)		110.00	121.00	119.21	108.38
876L (Blackie 253S - Gleichen 179S)	765L (Strathmore 151S - Chestermere 419S)	120.00	132.00	128.46	107.05
179S Gleichen T1		120.00	132.00	123.50	102.92
733L (Gleichen 179S - Namaka 428S)		120.00	132.00	123.46	102.88
65S High River T1		120.00	132.00	123.13	102.61
765L (Strathmore 151S - Chestermere 419S)	733L (Gleichen 179S - Namaka 428S)	120.00	132.00	122.22	101.85
876L (Blackie 253S - Gleichen 179S)	691L (Chestermere 419S - Janet 74S)	120.00	132.00	121.56	101.30

Notes:

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

[b] 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.

[c] Post-restoration ratings for 765L and 691L were adopted per the AESO's direction.

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

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

2.1.4 Scenario 7: 2024 Summer Peak High Solar Pre-Project with P1984 Sensitivity

Category A Conditions

With existing line ratings of 765L, 691L and 727AL, thermal criteria violations were observed under the Category A condition for Scenario 7. No Reliability Criteria violations were observed under Category A conditions, after the post-restoration ratings on the two 138 kV transmission lines 765L (Strathmore 151S - Chestermere 419S) and 691L (Chestermere 419S - Janet 74S) (Summer Normal Rating: 120 MVA / Summer Emergency Rating: 132 MVA) were adopted. Thermal loadings that exceed the existing line normal ratings under Category A conditions were observed as shown in Table 2-6.

Table 2-6: Thermal Loadings Exceed the Existing Normal Ratings under Category A Conditions for Scenario 7

Contingency (System Element Lost)	Violation Location Details	Existing Thermal Normal Ratings (MVA)	Post-Restoration Thermal Normal Ratings (MVA)	Power Flow[a] (MVA)	% Loading[b] of Existing Ratings	% Loading[b, c] of Post-Restoration Ratings
No Outage	765L (Strathmore 151S - Chestermere 419S)	85.00	120.00	108.56	127.72	90.47
	691L (Chestermere 419S - Janet 74S)	85.00	120.00	90.30	106.24	75.25

Notes:

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

[b] 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.

[c] Post-restoration ratings for 765L and 691L were adopted per the AESO's direction.

Category B Conditions

Thermal Criteria Violations

Thermal criteria violations were observed under certain Category B conditions as shown in Table 2-7.

Table 2-7: Thermal Criteria Violations under Category B Conditions for Scenario 7

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow[a] (MVA)	% Loading[b, c]
765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)	110.00	121.00	120.40	109.46
65S High River T1	765L (Strathmore 151S - Chestermere 419S)	120.00	132.00	120.92	100.76

Notes:

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

[b] 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.

[c] Post-restoration ratings for 765L and 691L were adopted per the AESO's direction.

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

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

3 Post-Project Study Results

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

As described in Section 2 of Attachment A1, the post-Project studies were performed using Alternative 1.

3.1 Power Flow Studies

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

3.1.1 Scenario 3: 2024 Summer Light High Solar Post-Project

Category A Conditions

With existing line ratings of 765L, 691L and 727AL, thermal criteria violations were observed under the Category A condition for Scenario 3. No Reliability Criteria violations were observed under Category A conditions, after the post-restoration ratings on the three 138 kV transmission lines 765L (Strathmore 151S - Chestermere 419S) and 691L (Chestermere 419S - Janet 74S) (Summer Normal Rating: 120 MVA / Summer Emergency Rating: 132 MVA) as well as 727AL (Summer Normal Rating: 121 MVA / Summer Emergency Rating: 133 MVA) were adopted. Thermal loadings that exceed the existing line normal ratings under Category A conditions were observed as shown in Table 3-1.

Table 3-1: Thermal Loadings Exceed the Existing Normal Ratings under Category A Conditions for Scenario 3

Contingency (System Element Lost)	Violation Location Details	Existing Thermal Normal Ratings (MVA)	Post-Restoration Thermal Normal Ratings (MVA)	Power Flow[a] (MVA)	% Loading[b] of Existing Ratings	% Loading[b, c] of Post-Restoration Ratings
No Outage	765L (Strathmore 151S - Chestermere 419S)	85.00	120.00	113.47	133.49	94.56
	727AL (JCT. 727L - Saddlebrook 303S/Magcan 142S)	94.00	121.00	111.61	118.73	92.24
	691L (Chestermere 419S - Janet 74S)	85.00	120.00	106.43	125.21	88.69

Notes: Post-restoration ratings for 727AL, 765L, and 691L were adopted per the AESO's direction.

Category B Conditions

Thermal Criteria Violations

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

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	
65S High River T1	765L (Strathmore 151S - Chestermere 419S)	120.00	132.00	116.95	97.46	131.05	109.20	11.74
678S Okotoks T1		120.00	132.00	113.58	94.65	126.05	105.04	10.39
733L (Gleichen 179S - Namaka 428S)		120.00	132.00	123.47	102.89	123.41	102.84	-0.04
179S Gleichen T1		120.00	132.00	123.46	102.89	123.41	102.84	-0.04
434L (Foothills 237S - High River 65S)		120.00	132.00	103.15	85.96	122.22	101.85	15.89
753L (High River 65S - Blackie 253S)		120.00	132.00	112.48	93.73	121.54	101.29	7.55
850L (Carseland 525S - Okotoks 678S)		120.00	132.00	111.76	93.14	121.52	101.26	8.13
765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)	110.00	121.00	118.07	107.34	117.73	107.03	-0.31
65S High River T1	691L (Chestermere 419S - Janet 74S)	120.00	132.00	109.92	91.60	124.15	103.46	11.86
646L (Okotoks 678S - Foothills 237S)	727L (High River 65S - JCT. 727AL)	119.00	131.00	22.97	19.30	121.36	101.98	82.68
765L (Strathmore 151S - Chestermere 419S)	733L (Gleichen 179S - Namaka 428S)	120.00	132.00	122.43	102.02	122.12	101.76	-0.26

Notes: Post-restoration ratings for 727AL, 765L, and 691L were adopted per the AESO's direction.

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

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

3.1.2 Scenario 4: 2024 Summer Peak High Solar Post-Project

Category A Conditions

With existing line ratings of 765L, 691L and 727AL, thermal criteria violations were observed under the Category A condition for Scenario 4. No Reliability Criteria violations were observed under Category A conditions, after the post-restoration ratings on the three 138 kV transmission lines 765L (Strathmore 151S - Chestermere 419S) and 691L (Chestermere 419S - Janet 74S) (Summer Normal Rating: 120 MVA / Summer Emergency Rating: 132 MVA) as well as 727AL (Summer Normal Rating: 121 MVA /

Summer Emergency Rating: 133 MVA) were adopted. Thermal loadings that exceed the existing line normal ratings under Category A conditions were observed as shown in Table 3-3.

Table 3-3: Thermal Loadings Exceed the Existing Normal Ratings under Category A Conditions for Scenario 4

Contingency (System Element Lost)	Violation Location Details	Existing Thermal Normal Ratings (MVA)	Post-Restoration Thermal Normal Ratings (MVA)	Power Flow[a] (MVA)	% Loading[b] of Existing Ratings	% Loading[b, c] of Post-Restoration Ratings
No Outage	765L (Strathmore 151S - Chestermere 419S)	85.00	120.00	113.06	133.01	94.22
	727AL (JCT. 727L - Saddlebrook 303S/Magcan 142S)	94.00	121.00	109.18	116.15	90.23
	691L (Chestermere 419S - Janet 74S)	85.00	120.00	95.25	112.06	79.38

Notes: Post-restoration ratings for 727AL, 765L, and 691L were adopted per the AESO's direction.

Category B Conditions

Thermal Criteria Violations

Thermal criteria violations were observed under certain Category B conditions as shown in Table 3-4.

Table 3-4: 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	
65S High River T1	765L (Strathmore 151S - Chestermere 419S)	120.00	132.00	113.44	94.53	127.14	105.95	11.42
678S Okotoks T1		120.00	132.00	112.51	93.76	124.70	103.92	10.16
1106L (Foothills 237S - ENMAX No. 65 Substation)		120.00	132.00	111.35	92.79	123.47	102.89	10.10
1107L (Foothills 237S - ENMAX No. 65 Substation)		120.00	132.00	111.35	92.79	123.47	102.89	10.10

Notes: Post-restoration ratings for 727AL, 765L, and 691L were adopted per the AESO's direction.

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

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

3.1.3 Scenario 8: 2024 Summer Light High Solar Post-Project with P1984 Sensitivity

Category A Conditions

With existing line ratings of 765L, 691L and 727AL, thermal criteria violations were observed under the Category A condition for Scenario 8. No Reliability Criteria violations were observed under Category A conditions, after the post-restoration ratings on the three 138 kV transmission lines 765L (Strathmore 151S - Chestermere 419S) and 691L (Chestermere 419S - Janet 74S) (Summer Normal Rating: 120 MVA / Summer Emergency Rating: 132 MVA) as well as 727AL (Summer Normal Rating: 121 MVA / Summer Emergency Rating: 133 MVA) were adopted. Thermal loadings that exceed the existing line normal ratings under Category A conditions were observed as shown in Table 3-5.

Table 3-5: Thermal Loadings Exceed the Existing Normal Ratings under Category A Conditions for Scenario 8

Contingency (System Element Lost)	Violation Location Details	Existing Thermal Normal Ratings (MVA)	Post-Restoration Thermal Normal Ratings (MVA)	Power Flow[a] (MVA)	% Loading[b] of Existing Ratings	% Loading[b, c] of Post-Restoration Ratings
No Outage	765L (Strathmore 151S - Chestermere 419S)	85.00	120.00	118.62	139.55	98.85
	691L (Chestermere 419S - Janet 74S)	85.00	120.00	111.65	131.35	93.04
	727AL (JCT. 727L - Saddlebrook 303S/Magcan 142S)	94.00	121.00	111.49	118.61	92.14

Notes: Post-restoration ratings for 727AL, 765L, and 691L were adopted per the AESO's direction.

Category B Conditions

Thermal Criteria Violations

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

Table 3-6: Thermal Criteria Violations under Category B Conditions for Scenario 8

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	
765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)	110.00	121.00	127.39	115.81	127.00	115.46	-0.36
691L (Chestermere 419S - Janet 74S)		110.00	121.00	119.21	108.38	118.76	107.96	-0.41
65S High River T1	765L (Strathmore 151S - Chestermere 419S)	120.00	132.00	123.13	102.61	137.23	114.36	11.75
678S Okotoks T1		120.00	132.00	119.12	99.26	131.59	109.66	10.39
876L (Blackie 253S - Gleichen 179S)		120.00	132.00	128.46	107.05	128.40	107.00	-0.05
434L (Foothills 237S - High River 65S)		120.00	132.00	108.67	90.56	127.74	106.45	15.89
753L (High River 65S - Blackie 253S)		120.00	132.00	118.54	98.78	127.60	106.33	7.55
850L (Carseland 525S - Okotoks 678S)		120.00	132.00	117.24	97.70	127.00	105.83	8.13
1106L (Foothills 237S - ENMAX No. 65 Substation)		120.00	132.00	112.79	93.99	125.19	104.33	10.34
1107L (Foothills 237S - ENMAX No. 65 Substation)		120.00	132.00	112.79	93.99	125.19	104.32	10.33
646L (Okotoks 678S - Foothills 237S)		120.00	132.00	108.79	90.66	123.49	102.91	12.25
179S Gleichen T1		120.00	132.00	123.50	102.92	123.41	102.84	-0.07
733L (Gleichen 179S - Namaka 428S)		120.00	132.00	123.46	102.88	123.41	102.84	-0.04
Foothills 237S T1		120.00	132.00	108.13	90.11	121.96	101.63	11.52
Foothills 237S T2		120.00	132.00	108.13	90.11	121.95	101.62	11.51
65S High River T1	691L (Chestermere 419S - Janet 74S)	120.00	132.00	116.18	96.82	130.40	108.67	11.85
678S Okotoks T1		120.00	132.00	112.14	93.45	124.74	103.95	10.50
876L (Blackie 253S - Gleichen 179S)		120.00	132.00	121.56	101.30	121.48	101.24	-0.07
434L (Foothills 237S - High River 65S)		120.00	132.00	101.63	84.69	120.87	100.73	16.04
753L (High River 65S - Blackie 253S)		120.00	132.00	111.55	92.96	120.69	100.57	7.61
850L (Carseland 525S - Okotoks 678S)		120.00	132.00	110.24	91.87	120.09	100.08	8.21

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	
646L (Okotoks 678S - Foothills 237S)	727L (High River 65S - JCT. 727AL)	119.00	131.00	24.28	20.40	122.61	103.03	82.63
765L (Strathmore 151S - Chestermere 419S)	733L (Gleichen 179S - Namaka 428S)	120.00	132.00	122.22	101.85	121.99	101.66	-0.19

Notes: Post-restoration ratings for 727AL, 765L, and 691L were adopted per the AESO's direction.

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

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

3.1.4 Scenario 9: 2024 Summer Peak High Solar Post-Project with P1984 Sensitivity

Category A Conditions

With existing line ratings of 765L, 691L and 727AL, thermal criteria violations were observed under the Category A condition for Scenario 9. No Reliability Criteria violations were observed under Category A conditions, after the post-restoration ratings on the three 138 kV transmission lines 765L (Strathmore 151S - Chestermere 419S) and 691L (Chestermere 419S - Janet 74S) (Summer Normal Rating: 120 MVA / Summer Emergency Rating: 132 MVA) as well as 727AL (Summer Normal Rating: 121 MVA / Summer Emergency Rating: 133 MVA) were adopted. Thermal loadings that exceed the existing line normal ratings under Category A conditions were observed as shown in Table 3-7.

Table 3-7: Thermal Loadings Exceed the Existing Normal Ratings under Category A Conditions for Scenario 9

Contingency (System Element Lost)	Violation Location Details	Existing Thermal Normal Ratings (MVA)	Post-Restoration Thermal Normal Ratings (MVA)	Power Flow[a] (MVA)	% Loading[b] of Existing Ratings	% Loading[b, c] of Post-Restoration Ratings
No Outage	765L (Strathmore 151S - Chestermere 419S)	85.00	120.00	119.27	140.32	99.39
	727AL (JCT. 727L - Saddlebrook 303S/Magcan 142S)	94.00	121.00	109.15	116.12	90.21
	691L (Chestermere 419S -	85.00	120.00	101.49	119.40	84.57

	Janet 74S)					

Notes: Post-restoration ratings for 727AL, 765L, and 691L were adopted per the AESO's direction.

Category B Conditions

Thermal Criteria Violations

Thermal criteria violations were observed under certain Category B conditions as shown in Table 3-8.

Table 3-8: Thermal Criteria Violations under Category B Conditions for Scenario 9

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	
65S High River T1	765L (Strathmore 151S - Chestermere 419S)	120.00	132.00	120.92	100.76	134.64	112.20	11.43
678S Okotoks T1		120.00	132.00	119.20	99.33	131.41	109.50	10.17
1106L (Foothills 237S - ENMAX No. 65 Substation)		120.00	132.00	117.63	98.03	129.76	108.13	10.10
1107L (Foothills 237S - ENMAX No. 65 Substation)		120.00	132.00	117.63	98.03	129.76	108.13	10.10
850L (Carseland 525S - Okotoks 678S)		120.00	132.00	116.09	96.74	125.74	104.79	8.05
753L (High River 65S - Blackie 253S)		120.00	132.00	116.49	97.07	125.37	104.48	7.40
434L (Foothills 237S - High River 65S)		120.00	132.00	105.14	87.62	123.93	103.27	15.65
646L (Okotoks 678S - Foothills 237S)		120.00	132.00	107.64	89.70	122.05	101.71	12.01
Namaka 428S T2		120.00	132.00	110.93	92.44	121.65	101.37	8.93
765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)	110.00	121.00	120.40	109.46	120.35	109.41	-0.05
65S High River T1	733L (Namaka 428S - Strathmore 151S)	120.00	132.00	107.54	89.62	121.86	101.55	11.93

Notes: Post-restoration ratings for 727AL, 765L, and 691L were adopted per the AESO's direction.

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

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

3.2 Transient Stability Studies

Transient stability studies were completed for Scenario 3 and Scenario 4.

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 3-9 and Table 3-10. 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 3-9: Transient Stability Study Results under Category B Conditions for Scenario 3

Studied Contingency	Fault Description and Location	Results
727L (High River 65S - Okotoks 678S)	3-phase fault at High River 65S	Stable
	3-phase fault at Okotoks 678S	Stable
850L (Carseland 525S - Okotoks 678S)	3-phase fault at Carseland 525S	Stable
	3-phase fault at Okotoks 678S	Stable
753L (High River 65S - Blackie 253S)	3-phase fault at High River 65S	Stable
	3-phase fault at Blackie 253S	Stable
434L (Foothills 237S - High River 65S)	3-phase fault at Foothills 237S	Stable
	3-phase fault at High River 65S	Stable
646L (Okotoks 678S - Foothills 237S)	3-phase fault at Okotoks 678S	Stable
	3-phase fault at Foothills 237S	Stable
1106L (Foothills 237S - ENMAX SS-65)	3-phase fault at Foothills 237S	Stable
	3-phase fault at ENMAX SS-65	Stable

Table 3-10: Transient Stability Study Results under Category B Conditions for Scenario 4

Studied Contingency	Fault Description and Location	Results
727L (High River 65S - Okotoks 678S)	3-phase fault at High River 65S	Stable
	3-phase fault at Okotoks 678S	Stable
850L (Carseland 525S - Okotoks 678S)	3-phase fault at Carseland 525S	Stable
	3-phase fault at Okotoks 678S	Stable
753L (High River 65S - Blackie 253S)	3-phase fault at High River 65S	Stable
	3-phase fault at Blackie 253S	Stable
434L (Foothills 237S - High River 65S)	3-phase fault at Foothills 237S	Stable
	3-phase fault at High River 65S	Stable
646L (Okotoks 678S - Foothills 237S)	3-phase fault at Okotoks 678S	Stable
	3-phase fault at Foothills 237S	Stable

Studied Contingency	Fault Description and Location	Results
1106L (Foothills 237S - ENMAX SS-65)	3-phase fault at Foothills 237S	Stable
	3-phase fault at ENMAX SS-65	Stable

4 Short Circuit Studies

4.1 Pre-Project Results

4.1.1 Scenario 2: 2024 Summer Peak High Solar 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)
Black Diamond 392S	138	137.87	2.89	0.0511668+0.1385663j	1.82	0.1061824+0.3957388j
Okotoks 678S	138	138.91	7.99	0.0104938+0.0527551j	5.83	0.0275878+0.1109639j
Magcan 142S	138	138.81	6.83	0.0150078+0.0610621j	4.90	0.0348073+0.1332967j
High River 65S	138	138.70	8.61	0.0095307+0.0489480j	6.93	0.0193889+0.0845243j
Hartell 512S	138	138.07	3.38	0.0419723+0.1192258j	2.17	0.0873425+0.3281611j
Blackie 253S	138	140.40	5.44	0.0233727+0.0759561j	5.06	0.0259797+0.0949068j
Foothills 237S	240	249.90	13.53	0.0030274+0.0186935j	9.22	0.0116139+0.0443864j
Foothills 237S	138	139.50	13.88	0.0038459+0.0309076j	10.93	0.0117723+0.0556387j

4.2 Post-Project Results

4.2.1 Scenario 4: 2024 Summer Peak High Solar Post-Project

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

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)
Black Diamond 392S	138	136.98	2.87	0.0512282+0.1385922j	1.88	0.0995091+0.3688227j
Okotoks 678S	138	138.08	7.94	0.0105447+0.0528141j	7.12	0.0147280+0.0715409j
Magcan 142S	138	138.33	6.80	0.0150867+0.0611590j	6.86	0.0099529+0.0613323j

[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.

High River 65S	138	137.82	8.55	0.0095787+0.0489994j	8.09	0.0127751+0.0577136j
Hartell 512S	138	137.17	3.36	0.0420300+0.1192591j	2.26	0.0806720+0.3012500j
Blackie 253S	138	139.84	5.42	0.0234004+0.0759839j	5.31	0.0242210+0.0823234j
Foothills 237S	240	249.39	13.50	0.0030368+0.0187035j	9.49	0.0110140+0.0419529j
Foothills 237S	138	138.81	13.81	0.0038653+0.0309309j	11.31	0.0111716+0.0510954j
Saddlebrook 303S	138	138.33	7.27	0.0134416+0.0574038j	7.73	0.0063926+0.0487294j

4.2.2 Scenario 5: 2031 Winter Peak High Solar 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)
Black Diamond 392S	138	137.47	2.85	0.0518094+0.1375985j	1.87	0.0994874+0.3686954j
Okotoks 678S	138	138.73	7.93	0.0107689+0.0522610j	7.09	0.0147275+0.0714638j
Magcan 142S	138	138.45	6.76	0.0152881+0.0605608j	6.80	0.0099568+0.0612905j
High River 65S	138	138.44	8.56	0.0097718+0.0483471j	8.07	0.0127537+0.0575869j
Hartell 512S	138	137.70	3.34	0.0424852+0.1183999j	2.24	0.0806504+0.3011228j
Blackie 253S	138	140.50	5.40	0.0235964+0.0756377j	5.28	0.0242169+0.0822581j
Foothills 237S	240	249.86	13.92	0.0027823+0.0179054j	9.66	0.0107768+0.0410490j
Foothills 237S	138	139.37	13.96	0.0037471+0.0302466j	11.40	0.0109324+0.0502867j
Saddlebrook 303S	138	138.45	7.23	0.0136430+0.0568056j	7.67	0.0063962+0.0486867j

5 Mitigation Measure Development and Evaluation

The Studies Consultant, in consultation with 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

Existing line ratings of 138 kV line 765L and 691L are currently limited by underbuilt distribution line. Prior to the connection of the project, thermal criteria violations were observed on 765L and 691L under the Category A condition when additional new power generation in the Strathmore area exceeds 60 MW. To mitigate the observed thermal criteria violation on 765L, TFO is currently working with the legal owner of a distribution system to restore the thermal ratings on 765L. The observed thermal criteria violation on 691L will be managed by using real-time operational practices. Pre-Project mitigation measures for the observed Category B criteria violations are summarized in Table 5-1.

Table 5-1: Pre-Project Mitigation Measures

Mitigation Measure	Location of Observed Violation	Contingency
Planned RAS 154[a]	876L (Blackie 253S - Gleichen 179S)	765L (Strathmore 151S - Chestermere 419S)
Real time operational practices	765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)
		179S Gleichen T1
		733L (Gleichen 179S - Namaka 428S)
		65S High River T1
	876L (Blackie 253S - Gleichen 179S)	765L (Strathmore 151S - Chestermere 419S)
		691L (Chestermere 419S - Janet 74S)
	733L (Gleichen 179S - Namaka 428S)	765L (Strathmore 151S - Chestermere 419S)
	691L (Chestermere 419S - Janet 74S)	876L (Blackie 253S - Gleichen 179S)

Notes:

[a] RAS 154 is an existing RAS (see Section 1.2.2 of Attachment A1). Modifications to RAS 154 are proposed for the planned P1984 FortisAlberta Gleichen DG Solar and P1932 FortisAlberta Namaka DER Solar. This modified version of RAS 154 is referred to hereafter as "planned RAS 154".

5.2 Post-Project

Following the connection of the Project, and similar to the pre-connection study results, thermal criteria violations were observed on 765L and 691L under the Category A condition. To mitigate the observed thermal criteria violations, the thermal ratings of 765L and 691L need to be restored to no less than 120 MVA normal rating and 132 MVA emergency rating. When the Project and more than 60 MW additional generation in the Strathmore area that have met the AESO's project inclusion criteria, the AESO will

inform the TFO to collaborate with the legal owner of a distribution system to restore the thermal ratings on the 138 kV line transmission lines 765L and 691L.

Existing line rating of 138 kV line 727AL is currently de-rated by the TFO. The AESO was informed by the TFO that the line rating restoration of 727AL to no less than 121 MVA will be implemented through its Transmission Capital Maintenance (TCM) project before the ISD of the Project.

Post-Project mitigation measures for the observed Category B violations are summarized in Table 5-2.

Table 5-2: Post-Project Mitigation Measures

Mitigation Measure	Location of Observed Violation	Contingency
Planned RAS 154[a]	876L (Blackie 253S - Gleichen 179S)	765L (Strathmore 151S - Chestermere 419S)
Planned New RAS 194[b]	765L (Strathmore 151S - Chestermere 419S)	65S High River T1
Real time operational practices	765L (Strathmore 151S - Chestermere 419S)	65S High River T1
		179S Gleichen T1
		Foothills 237S T1
		Foothills 237S T2
		Namaka 428S T2
		678S Okotoks T1
		434L (Foothills 237S - High River 65S)
		646L (Okotoks 678S - Foothills 237S)
		733L (Gleichen 179S - Namaka 428S)
		753L (High River 65S - Blackie 253S)
		850L (Carseland 525S - Okotoks 678S)
		876L (Blackie 253S - Gleichen 179S)
		1106L (Foothills 237S - ENMAX No. 65 Substation)
		1107L (Foothills 237S - ENMAX No. 65 Substation)
	876L (Blackie 253S - Gleichen 179S)	765L (Strathmore 151S - Chestermere 419S)
		691L (Chestermere 419S - Janet 74S)
	691L (Chestermere 419S - Janet 74S)	65S High River T1
		678S Okotoks T1
		434L (Foothills 237S - High River 65S)
		753L (High River 65S - Blackie 253S)
		850L (Carseland 525S - Okotoks 678S)
		876L (Blackie 253S - Gleichen 179S)
	727L (High River 65S - JCT. 727AL)	646L (Okotoks 678S - Foothills 237S)
	733L (Gleichen 179S - Namaka 428S)	765L (Strathmore 151S - Chestermere 419S)

	733L (Namaka 428S - Strathmore 151S)	65S High River T1

Notes:

[a] RAS 154 is an existing RAS (see Section 1.2.2 of Attachment A1). Modifications to RAS 154 are proposed for the planned P1984 FortisAlberta Gleichen DG Solar and P1932 FortisAlberta Namaka DER Solar. This modified version of RAS 154 is referred to hereafter as "planned RAS 154".

[b] Planned New RAS 194 (Chestermere 419S Overload Mitigation and Generation Tripping Scheme) is a RAS proposed for multiple planned connection and DER projects including P1984 FortisAlberta Gleichen DG Solar, P1932 FortisAlberta Namaka DER Solar, P2029 and P2030 FortisAlberta Strathmore 151S DER Solar 1 and 2 and the Project.

5.3 Evaluation of Mitigation Measures

This section describes the results of the power flow and transient stability 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 6, 8, and 9 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 those post-Project contingencies that result in thermal criteria violations that require RAS mitigation. Post-Project contingencies that result in thermal criteria violations that can be mitigated by real-time operational practices or TFO capital maintenance projects were not studied.

5.3.1 Scenario 6: 2024 Summer Light High Solar Pre-Project

Category B Conditions

The thermal criteria violations observed under certain Category B conditions in the pre-Project studies were mitigated by RASs as shown in Table 5-3.

After RAS actions were complete, no Reliability Criteria violations were observed under Category B conditions.

Table 5-3: Post-RAS Power Flow Study Results for Scenario 6

Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Seasonal Continuous Rating (MVA)	Short-term (Emergency) Rating (MVA)	Pre-Project Results		Post-RAS Action Results	
				Power Flow (MVA)	% Loading	Power Flow (MVA)	% Loading
765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)	110.00	121.00	127.39	115.81	104.42	94.93

5.3.2 Scenario 8: 2024 Summer Light High Solar 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 5-4.

After RAS actions were complete, no Reliability Criteria violations were observed under Category B conditions.

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

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
765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)	110.00	121.00	127.00	115.46	104.03	94.57
65S High River T1	765L (Strathmore 151S - Chestermere 419S)	120.00	132.00	137.23	114.36	117.10	97.58

5.3.3 Scenario 9: 2024 Summer Peak High Solar 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.

After RAS actions were complete, no Reliability Criteria violations were observed under Category B conditions.

Table 5-5: Post-RAS Power Flow Study Results for Scenario 9

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
65S High River T1	765L (Strathmore 151S - Chestermere 419S)	120.00	132.00	134.64	112.20	113.32	94.43

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% (i.e., for all of the contingencies that resulted in thermal criteria violations). The results of the constraint effective factor studies are provided in Attachment A7.

Attachment A1
Engineering Connection Assessment: Study Scope

Engineering Connection Assessment: Study Scope

P2334 TCE Saddlebrook Solar Storage

TransCanada Energy Ltd. (TCE)

Date: Jan 10, 2022

Version: Final

Classification: Public

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Attachments

Attachment A: Transmission Planning Criteria – Basis and Assumptions

1 Introduction

This Study Scope provides an overview of the engineering studies to be completed by CF Power Ltd (the Studies Consultant) 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

TransCanada Energy Ltd (Market Participant) has submitted a request for system access service to the Alberta Electric System Operator (AESO) to connect its proposed TCE Saddlebrook Solar Storage (Facility) to the AIES.

The Facility includes a proposed collector substation, to be designated the Saddlebrook 303S.

The Market Participant's request includes: a request for a new system access service in the area, with a Rate STS, *Supply Transmission Service*, contract capacity of 102.5 MW (Solar) in Phase 1 and 6.5 MW (Battery Energy Storage System) in Phase 2 and a Rate DTS, *Demand Transmission Service*, contract capacity of 0.2 MW; and a request for transmission development (collectively, the Project).

The scheduled in-service date (ISD) for the transmission development of this Project is September 20, 2022. The Project Phase 1 commercial operation date is November 30, 2022. The Project Phase 2 commercial operation date is February 1, 2024.

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	0.2 MW
	Type	station service
	Motors (number and size)	Not Applicable
	Power factor	Not Applicable
	Future load expansion plans	No
Generation	Generation type	Solar and Battery Energy Storage System (BESS)
	Existing Rate STS, *Supply Transmission Service,* contract capacity	No existing contract
	Requested Rate STS	Phase 1: 102.5 MW Solar Phase 2: 6.5 MW BESS
	Number and size of generating units	No yet determined.
	Maximum authorized real power (MARP)	Phase 1: 102.5 MW Solar Phase 2: 6.5 MW BESS

Project Component		Description
	Maximum capability (MC)	Phase 1: 102.5 MW Solar Phase 2: 6.5 MW BESS
	Reactive power capability	Phase 1: 36.7 MVar Solar (0.95 pf absorbing) Phase 2: 2.1 MVar BESS (0.95 pf absorbing)
		Phase 1: 49.6MVar Solar (0.9 pf producing) Phase 2: 3.1 MVar BESS (0.9 pf producing)
	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 High River (Area 46).

The Study Area consists of the AESO planning areas of Strathmore/Blackie (Area 45) and High River (Area 46), including the tie lines connecting these planning areas to the rest of the AIES.

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

1.2.2 Existing Constraints

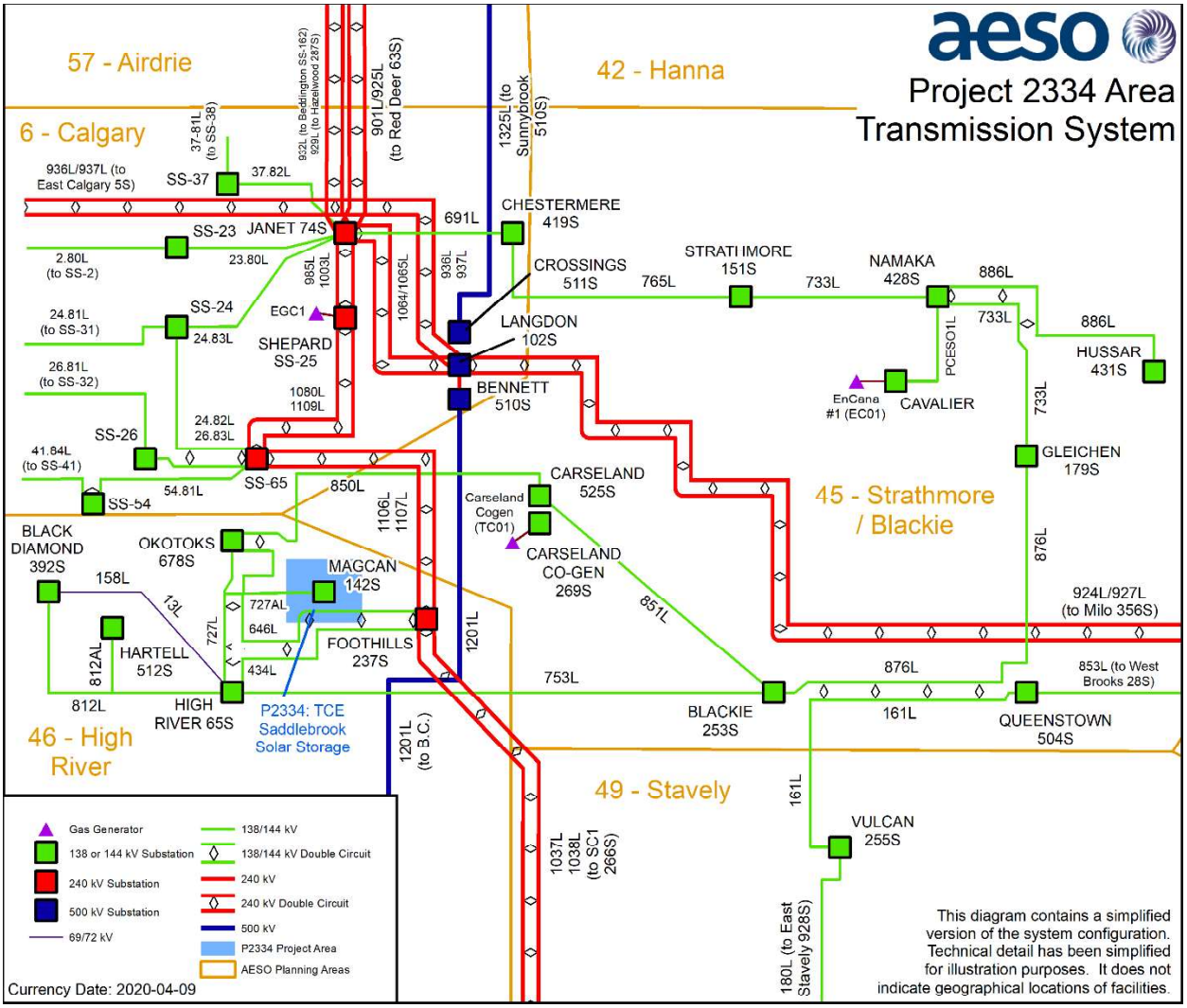
Existing constraints in the Study Area are managed in accordance with the procedures set out in Section 302.1 of the ISO rules, *Real Time Transmission Constraint Management* (TCM Rule).

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

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

- RAS 154: 876L Overload Mitigation
- RAS 157: Chestermere 419S Overload and Voltage Stability Mitigation

Figure 1-1: Transmission System in the Study Area



2 Connection Alternative to be Studied

The following alternative will be studied:

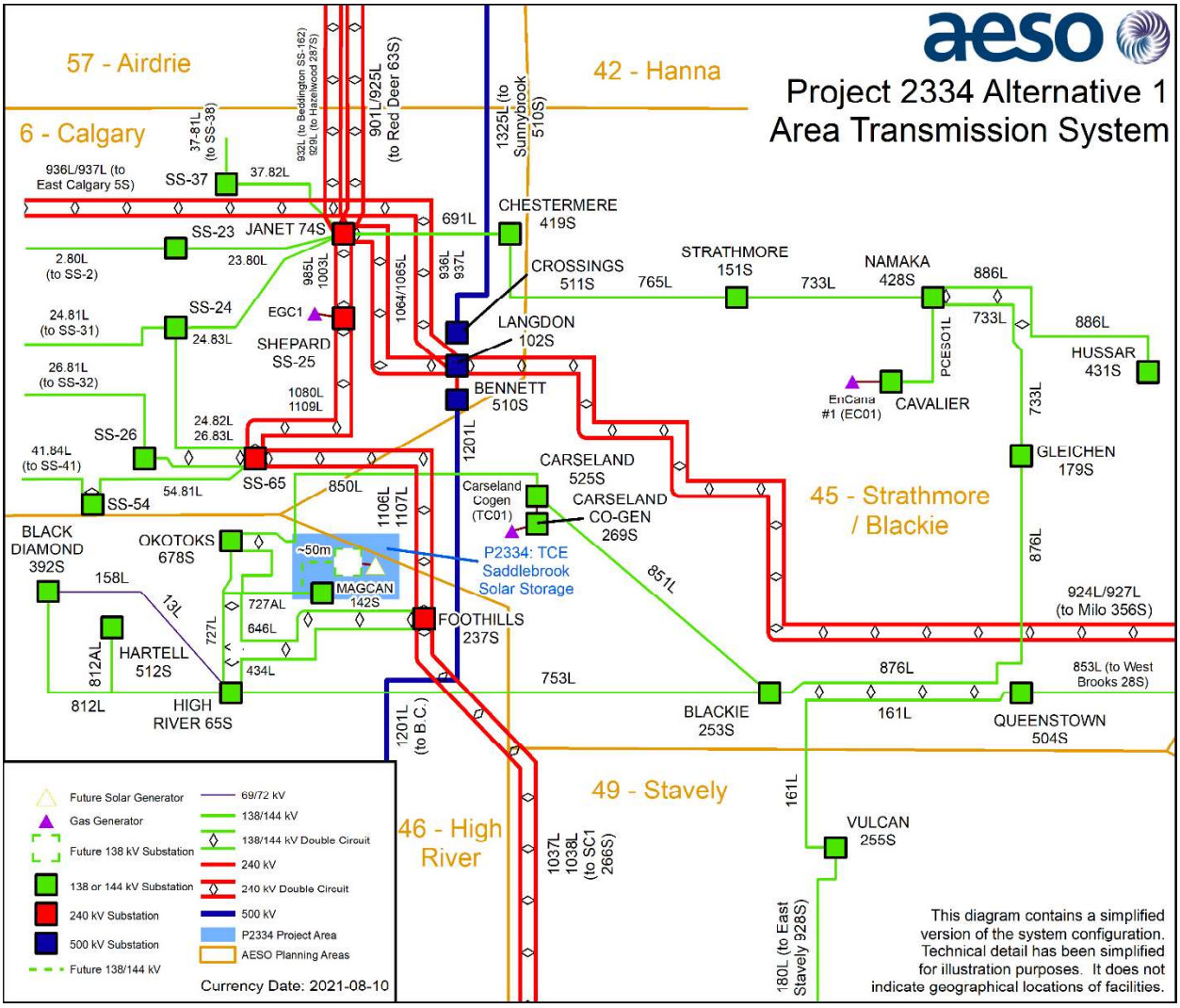
2.1 Alternative 1 – T-tap connection to the existing 138 kV transmission line 727AL

This alternative included the following developments:

- Add a 138 kV circuit, approximately 50 meters to connect the Market Participant's proposed facility to the existing transmission line 727AL (between existing Magcan 142S and existing 727L T-tap) using a T-tap connection configuration; 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 following:

- The AESO's *Connection Study Requirements*;
- Section 502.1 of the ISO rules, *Aggregated Generating Facilities Technical Requirements*;
- Section 502.16 of the ISO rules, *Aggregated Generating Facilities Operating Requirements*;
- Section 502.13 of the ISO rules, *Battery Energy Storage Facility Technical Requirements*; and
- Section 502.14 of the ISO rules, *Battery Energy Storage Facility Operating Requirements*.

4 Scenarios and Assumptions

4.1 Scenarios

The following section describes the scenarios to be studied and the assumptions to be used in the studies.

Connection scenarios must be studied as outlined in Table 4-1.

Table 4-1: Connection Study Scenarios

Scenario No.	Year/Season	System Generation Dispatch Conditions	Scenario Name	Project Load (MW)	Project Generation (MW)
Pre-Project					
1	2024 Summer Light (SL)	High Solar (HS)	2024 SL HS Pre-Project	0	0
2	2024 Summer Peak (SP)	HS	2024 SP HS Pre-Project	0	0
Post-Project					
3	2024 SL	HS	2024 SL HS Post-Project	0	109
4	2024 SP	HS	2024 SP HS Post-Project	0	109
5	2031 Winter Peak (WP)	All Study Area Generators In-Service	2031 WP Post-project	0	109
Pre-Project – Sensitivity with P1984					
6	2024 Summer Light (SL)	High Solar (HS)	2024 SL HS Pre-Project Sensitivity	0	0
7	2024 Summer Peak (SP)	HS	2024 SP HS Pre-Project Sensitivity	0	0
Post-Project – Sensitivity with P1984					
8	2024 SL	HS	2024 SL HS Post-Project Sensitivity	0	109
9	2024 SP	HS	2024 SP HS Post-Project Sensitivity	0	109

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.
P1932	FortisAlberta Namaka DER Solar	45	20.1	0	Sep 3,2021	-
P2029	FortisAlberta Strathmore 151S DER Solar 1	45	18	0	Nov 8,2021	-
P2030	FortisAlberta Strathmore 151S DER Solar 2	45	22.5	0	Nov 8,2021	-
P1984	FortisAlberta Gleichen DG Solar	45	17	0	July 31, 2022	-

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 South Planning Region peak based on the *AESO's 2021 Long-term Outlook (2021 LTO)*[1] with modifications to incorporate the latest forecast intelligence. For the post-Project studies, when the Study Area loads are modified to align with the regional load forecast, the active power to reactive power ratio in the base case scenarios shall be maintained.

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

AESO Planning Region Name	Forecast Peak Load by Year/Season (MW)	
	2024 SL	2024 SP
South Planning Region[1]	898	1,569

Note:
[1] The South Region comprises the following AESO planning areas: 4, 43, 44, 45, 46, 47, 48, 49, 52, 53, 54 and 55

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 2021 LTO with modifications to incorporate the latest forecast intelligence. The generation assumptions for the studies will assume high generation dispatch conditions for the South region. Additional studies may be required in the event of changes to the AESO's corporate forecast.

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

[1] The [e.g., 2017 LTO] is available on the AESO website.

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

Facility Name	Unit No.	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation[a] (MW) by Scenario	
					2024 SL	2024 SP
Carseland Cogen (TC01)	1	3251,4251	95	45	75	76
Cavalier (EC01)	1	3247,4247	120	45	95	91

Notes:
[a] "Unit Net Generation" refers to gross generating unit output (MW) less unit service load.
[b] "N-G" indicates the critical generating unit that is assumed by the AESO to be offline to test the N-G contingency condition
[c] "Not in merit" means that the generating unit has operating blocks whose prices are above the system marginal price.

The wind and solar generation facilities will be dispatched to yield the credible worst-case power flow conditions for the Study Area. Pre-Project dispatch levels for the existing, under-construction and contracted wind and solar generation facilities are shown in Table 4-5 and Table 4-6

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

Facility Name and Code	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation (MW)	
				High Solar	
				2024 SL	2024 SP
Ardenville Wind (ARD1)	4735, 4740	68	53	13.6	40.8
Blue Trail Wind (BTR1)	66328, 67328	66	53	13.2	39.6
Castle River #1 (CR1)	2234, 3234	39	53	7.8	23.4
Castle Rock Wind Farm (CRR1)	67221	77	53	15.4	46.2
Cowley Ridge (CRE3)	4264	20	53	4.0	12.0
Enmax Taber (TAB1)	15343, 16343	81	52	16.2	48.6
Kettles Hill (KHW1)	2402, 3402	63	53	12.6	37.8
McBride Lake Windfarm (AKE1)	2901, 3901, 4901	73	53	14.6	43.8
Soderglen Wind (GWW1)	12358, 13358	71	53	14.2	42.6
Summerview 1 (IEW1)	2338, 3338	66	53	13.2	39.6
Summerview 2 (IEW2)	4339, 5337	66	53	13.2	39.6
Suncor Chin Chute (SCR3)	2389	30	54	6.0	18.0
Suncor Magrath (SCR2)	11002	30	53	6.0	18.0
Suncor Wintering Hills (SCR4)	60789, 60791, 60793, 60846, 60848, 60850	88	43	17.6	52.8
Old Man River(OWF1)	61543	46	53	9.2	27.6
Blackspring Ridge(BSR1)	61736, 61737	300	49	60.0	180.0

Facility Name and Code	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation (MW)	
				High Solar	
				2024 SL	2024 SP
Castle Rock Ridge 2 (CRR2)	567221	30.6	53	6.1	18.4
Enel Riverview Wind Farm (RIV1)	69221	105	53	21	63
Capital Power Whitla Wind Power Facility (WHT1)	60990	201.6	4	40.3	121.0
Ghost Pine (NEP1)	2621, 2622, 2623, 2624, 2625	82	42	16.4	49.2
Halkirk (HAL1)	66435, 67435	150	42	30.0	90.0
Fortis Bull Creek Phases 1 and 2(Bul1 & BUL2)	550003, 550004	29	37	5.8	17.4

Note:
[a] "Unit Net Generation" refers to gross generating unit output (MW) less unit service load.

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

Facility Name and Code	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation (MW)	
				High Solar	
				2024 SL	2024 SP
Brooks Solar (BSC1)	553257	15	47	10.5	14.3
Hull DER Solar (HUL1)	2401	24.5	52	17.2	23.3
Vauxhall Solar (VXH1)	4274	22	52	15.4	20.9
Claresholm 1 (CLR1)	60894	58	49	40.6	55.1
Clareshom 2 (CLR2)	61894	75	49	52.5	71.3
Suffield (SUF1)	3270	23	52	16.1	21.9
Burdett (BRD1)	2269	10.5	52	7.4	10.0
Burdett (BUR1)	557269	20	52	14.0	19.0
Westfield Yellow Lake (WEF1)	557277	19	52	13.3	18.1
Innisfail Solar (INF1)	557120	22	39	15.4	20.9

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

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

Project Number	Project Name	Planned ISD	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation (MW)
						High Solar

						2024 SL	2024 SP
P1892	Fortis Buffalo Atlee Cluster 3 WAGF (REP #2)	2-Dec-22	552260	17.25	48	3.5	10.4
P1853	Fortis Buffalo Atlee Cluster 1 WAGF (REP #2)	2-Dec-22	553260	17.25	48	3.5	10.4
P2199	Buffalo Atlee Wind Farm 2 (REP #2)	2-Dec-22	557261	13.8	48	2.8	8.3
P1719	Stirling WAGF Project	1-Aug-22	61630	113	54	22.6	67.8
P2122	EDF Cypress Wind (REP #2)	1-Nov-22	560003	201.6	4	40.3	121.0
P1533	Joss MPC WAGF (REP #3)	31-Aug-22	60798, 60799	122.4	47	24.5	73.4
P1698	Joss Jenner WAGF - Phase 2 (REP #3)	31-Aug-22	61798, 61799	71.4	47	14.3	42.8
P2041	TransAlta Windrise MPC Wind (REP #3)	1-Apr-21	56703	207	53	41.4	124.2
P1812	Suncor Forty Mile Granlea WAGF	16-Nov-21	61994, 62994	200	4	40.0	120.0
P1800	Capital Power Whitla Wind Power Facility	1-Aug-21	61990	97.2	4	19.4	58.3
P2212	RESC Rattlesnake Ridge MPC Wind	30-Jul-21	60873	115.9	4	23.2	69.5
P1718	Wheatland WAGF	30-Sep-22	61632, 60632	120	43	24.0	72.0
P1567	EDPR Sharp Hills Wind Farm (REP #1)	1-Apr-22	60831, 60832	248.4	42	49.7	149.0
P1909	TransAlta Garden Plain Wind	1-Jul-22	565002	130	42	26	78
P2338	Capital Power Whitla Wind Phase 3	15-Sep-21	64990	54	4	10.8	32.4

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

Project Number	Project Name	Planned ISD	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation (MW)	
						High Solar	
						2024 SL	2024 SP
P2009 & P2341	Greengate Travers MPC Solar & Travers Solar Phase 2	1-Apr-21 & Apr. 1, 2022	560026, 561026, 562026	465	49	325.5	441.8
P1839	Fortis 421S Hays DG PV	Feb. 15, 2021	554401	23	52	16.1	21.9
P1831	Fortis 255S Vulcan Faribault Farms DG PV	24-May-21	4244	22	49	15.4	20.9
P1850	Fortis Coaldale 254S DER Solar 3	24-May-21	554691	22	54	15.4	20.9
P1851	Fortis Monarch 492S DER Solar	24-May-21	2005	23.6	54	16.5	22.4

Project Number	Project Name	Planned ISD	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation (MW)	
						High Solar	
						2024 SL	2024 SP
P1862	Fortis Spring Coulee 385S Solar DG	Oct. 15, 2021	553246, 554246	29.5	55	20.7	28.0
P1870	Fortis Stavely 349S DER Solar	24-May-21	2004	16.5	49	11.6	15.7
P1918	FortisAlberta Conrad DER Solar 1	Aug. 15, 2021	554291	23.4	52	16.4	22.2
P1959	FortisAlberta Conrad DER Solar 2	Aug. 15, 2021	553291	22.5	52	15.8	21.4
P1932	FortisAlberta Namaka DER Solar	Sep 3,2021	552340	20.1	45	14.1	19.1
P2029	FortisAlberta Strathmore 151S DER Solar 1	Aug. 15, 2021	557259	18	45	12.6	17.1
P2030	FortisAlberta Strathmore 151S DER Solar 2	Aug. 15, 2021	558259	22.5	45	15.8	21.4
P2195	FortisAlberta Bassano 435S DER Solar	Feb 1, 2023	557399	9.25	47	6.48	8.8
Sensitivity Study							
P1984	P1984 FortisAlberta Gleichen DG Solar	July 31, 2022	554254	13.3	45	9.3	12.6

The post-Project scenario wind and solar generation dispatch levels were identical to the pre-Project scenario dispatch levels shown in Table 4-5, Table 4-6, Table 4-7 and Table 4-8. The Facility was dispatched to 109 MW in all post-Project scenarios.

4.2.5 Intertie Flow Assumptions

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

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

Table 4-9: Intertie Flows by Scenario

Scenario Number	Scenario Name	Import (-) / Export (+) (MW) by Intertie		
		AB-BC	AB-SK	MATL
1 / 6	2024 SL HS Pre-Project	+377	0	0
2 / 7	2024 SP HS Pre-Project	+333	0	0
3 / 8	2024 SL HS Post-Project	+377	0	0
4 / 9	2024 SP HS Post-Project	+333	0	0

4.2.6 HVDC Power Order Assumptions

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

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

Table 4-10: HVDC Power Order by Scenario

Scenario Number	Scenario Name	WATL (MW)*	EATL (MW)*
1 / 6	2024 SL HS Pre-Project	100 S → N	350 S → N
2 / 7	2024 SP HS Pre-Project	200 S → N	700 S → N
3 / 8	2024 SL HS Post-Project	100 S → N	350 S → N
4 / 9	2024 SP HS Post-Project	200 S → N	700 S → N

Notes:
N → S: HVDC flow direction is North to South
S → N: HVDC flow direction is South to North

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

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

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

4.2.7 Transmission Facility Ratings

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

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

Line ID	Line Description	Voltage Class (kV)	Normal Rating (MVA)		Emergency Rating (MVA)	
			Summer	Winter	Summer	Winter
924L	Milo 356S – Langdon 102S	240	547	676	656	811
927L	Milo 356S – Langdon 102S	240	576	711	691	853

Line ID	Line Description	Voltage Class (kV)	Normal Rating (MVA)		Emergency Rating (MVA)	
			Summer	Winter	Summer	Winter
1037L	Foothills 237S – Windy Flats 138S	240	973	1208	1071	1330
1038L	Foothills 237S – Windy Flats 138S	240	973	1208	1071	1330
161L	Vulcan 255S - Queenstown 504S	138	117	120	129	160
434L	Foothills 237S – High River 65S	138	279	287	307	373
753L	High River 65S – Blackie 253S	138	121	143	133	143
812L	Black Diamond 392S – JCT. 812AL	138	85	90	94	99
812L	JCT. 812AL – High River 65S	138	48	48	72	72
812AL	JCT. 812L – Hartell 512S	138	98	132	108	145
158L	High River 65S – Black Diamond 392S	69	16	20	18	22
13L	High River 65S – Black Diamond 392S	69	16	20	18	22
646L	Okotoks 678S – Foothills 237S	138	280	287	308	373
727L	High River 65S - JCT. 727AL	138	119	143	131	161
727L	Okotoks 678S - JCT. 727AL	138	119	146	131	161
727AL	JCT. 727L – Magcan 142S	138	94	104	103	114
850L	Carseland 525S - Okotoks 678S	138	89	109	98	120
851L	Carseland 525S - Blackie 253S	138	85	90	94	99
876L	Blackie 253S – Gleichen 179S	138	110	121	121	121
733L	Gleichen 179S – Namaka 428S	138	120	148	132	163
733L	Namaka 428S – Strathmore 151S	138	120	143	132	163
886L	Namaka 428S – Hussar 431S	138	119	147	131	162
765L[a]	Strathmore 151S – Chestermere 419S	138	85	90	94	99
691L	Chestermere 419S – Janet 74S	138	85	90	94	99
1106L	Foothills 237S – ENMAX No. 65 Substation	240	971	1207	1071	1330
1107L	Foothills 237S – ENMAX No. 65 Substation	240	971	1207	1071	1330

Note:
[a] The TFO is currently working with the legal owner of a distribution system to restore 765L to a minimum thermal rating of 105 MVA.

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

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

Substation Name and Number	Transformer ID	Transformer Voltages (kV)	Transformer Rating (MVA)

Substation Name and Number	Transformer ID	Transformer Voltages (kV)	Transformer Rating (MVA)
Foothills 237S	T1	240/138 kV	400
	T2	240/138 kV	400

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

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

Substation Name and Number	Voltage Class (kV)	Capacitors		Reactors	
		Number of Switched Shunt Blocks	Total at Nominal Voltage (MVAr)	Number of Switched Shunt Blocks	Total at Nominal Voltage (MVAr)
Strathmore 151S	138	1	24.35	-	-
Blackie 253S	138	1	24.46	-	-
Hussar 431S	138	1	9.17	-	-
Magcan 142S	138	1	24.46	-	-

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

Table 4-15: Protection Fault Clearing Times

Contingency (System Element Lost)	Fault Location	Clearing Times (Cycles)	
		Near End	Far End
727L (High River 65S - Okotoks 678S)	High River 65S	9.00	30.00
	Okotoks 678S	9.00	30.00
850L (Carseland 525S - Okotoks 678S)	Carseland 525S	9.00	30.00
	Okotoks 678S	9.00	30.00
753L (High River 65S – Blackie 253S)	High River 65S	9.00	30.00
	Blackie 253S	9.00	30.00
434L (Foothills 237S – High River 65S)	Foothills 237S	9.00	30.00

	High River 65S	9.00	30.00
646L (Okotoks 678S – Foothills 237S)	Okotoks 678S	9.00	30.00
	Foothills 237S	9.00	30.00
1106L (Foothills 237S – ENMAX SS-65)	Foothills 237S	5.00	6.00
	ENMAX SS-65	5.00	6.00

4.2.9 Project Dynamic Data

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

4.2.10 Voltage Profile Assumption

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

5 Study Methodology

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

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

Scenario No. and Name		Power Flow		Voltage Stability		Transient Stability		Motor Starting		Short Circuit
		Category		Category		Category		Category		Category A
		A	B	A	B	A	B	A	B	
Pre-Project										
1	2024 SL	X	X				X			
2	2024 SP	X	X				X			X
Post-Project										
3	2024 SL	X	X				X			
4	2024 SP	X	X				X			X
5	2031 WP									X
Pre-Project Sensitivity										
6	2024 SL	X	X							
7	2024 SP	X	X							
Post-Project Sensitivity										
8	2024 SL	X	X							
9	2024 SP	X	X							

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

5.1 Power Flow Studies

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

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

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

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

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

5.1.1 Contingencies to be Studied

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

5.2 Transient Stability Studies

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

The report presenting the results of the transient stability studies must provide response plots for several variables, including rotor angle, and active and reactive power output for the for the proposed generation facility and generators listed below will be provided:

- Carseland Cogen (TC01)
- Cavalier (EC01)
- P1932 FortisAlberta Namaka DER Solar
- P2029 FortisAlberta Strathmore 151S DER Solar 1
- P2030 FortisAlberta Strathmore 151S DER Solar 2

The results report must also provide the following 240 kV and 138 kV bus voltage levels for substations near the point of connection:

- Foothills 237S substation 240 kV bus and 138kV bus
- Magcan 142S substation 138kV bus
- Okotoks 678S substation 138kV bus
- High River 65S substation 138kV bus

Other busses will be monitored and will be reported as determined by the results. The results report must also provide the key branch active and reactive power flow surrounding the Facility.

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

5.2.1 Contingencies to be Studied

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

5.3 Short-Circuit Current Level Studies

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

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

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

- The proposed POD substation by the Project, Saddlebrook 303S
- High River 65S
- Black Diamond 392S
- Okotoks 678S
- Magcan 142S
- Foothills 237S
- Blackie 253S

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

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

6 Mitigation Measures

6.1 Development

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

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

- Develop tables showing the constraint effective factors[2] for generation or load based on thermal criteria violations that are observed.
- Collaborate with the AESO to propose changes, if any, to the connection alternatives that could remove the requirement for a RAS.
- Collaborate with the AESO to study modifications to existing and/or planned RASs, proposed by the AESO, to ensure the coordination of existing protection schemes with the addition of any proposed protection schemes.
- Collaborate with the AESO to identify and study new RASs, if any, that may be required to ensure system reliability is maintained after connecting the Project to the AIES.

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

6.2 Evaluation

6.2.1 Post-Mitigation Studies

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

6.2.2 Constraint Effective Factor Studies

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

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

Attachment A: Transmission Planning Criteria – Basis and Assumptions

Transmission Planning Criteria – Basis and Assumptions

Date: July 9, 2019

Version: V1.2

Alberta Electric System Operator

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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	150
72	65	68.5	75.5	79
69	62	65.5	72.5	76

Table 2-2: Voltage Stability Criteria

Performance Level	Disturbance (1)(2)(3)(4) Initiated by: Fault 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

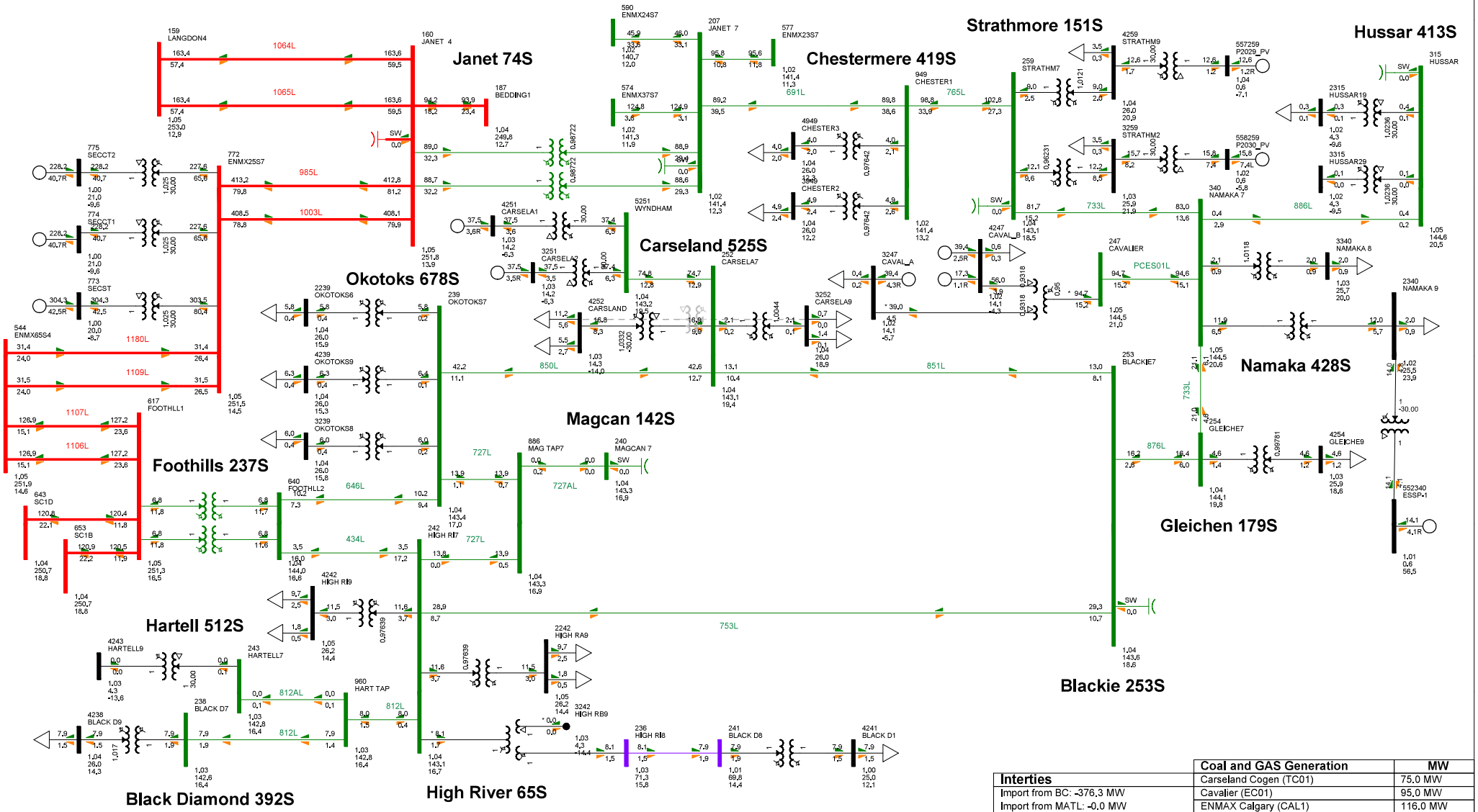
Table 2-4: Stuck Breaker Clearing Times for Lines

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



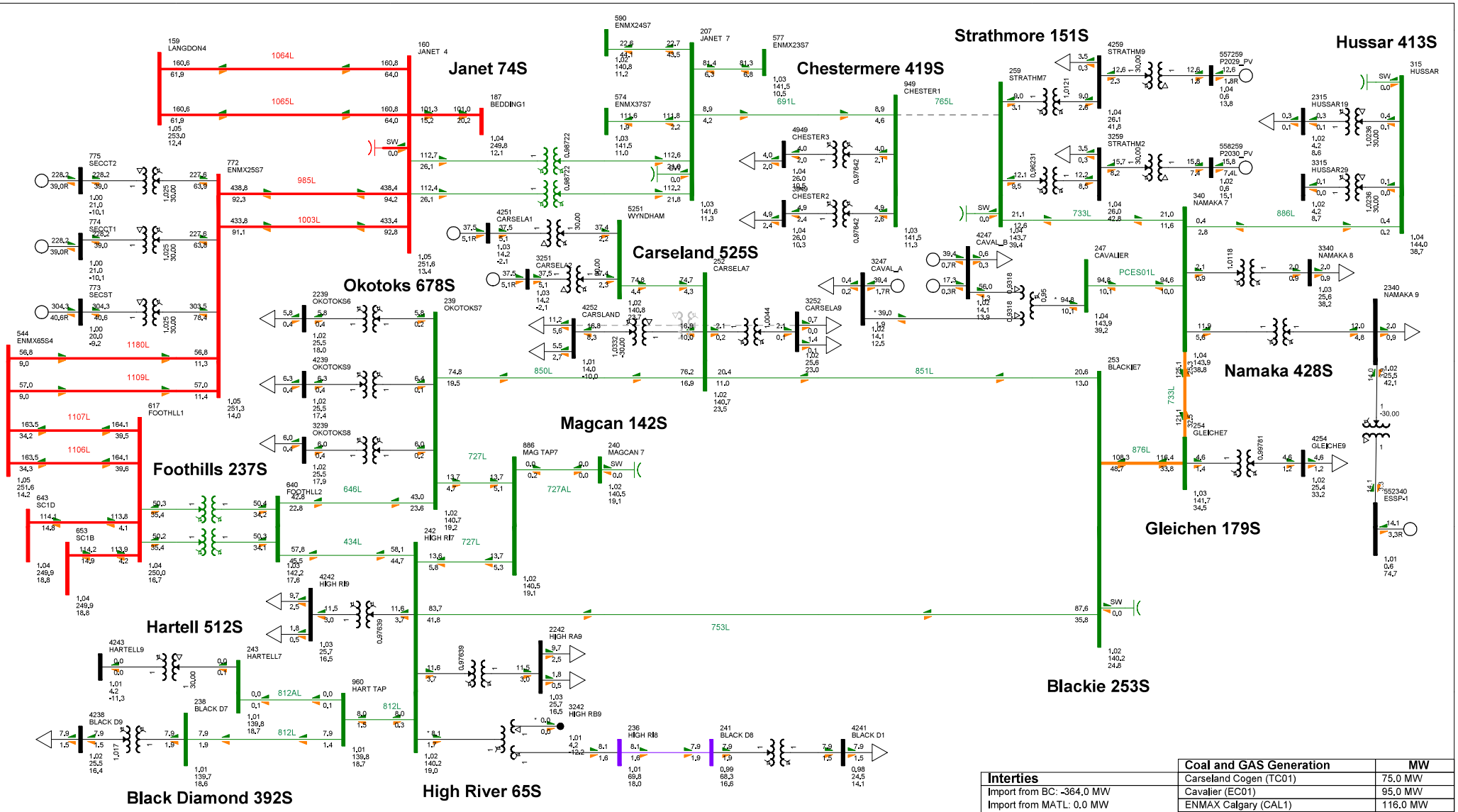
Interties	Coal and GAS Generation	MW
Import from BC: -376.3 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A2-1: P2334_2024SL_PRE
CATEGORY A - NO CONTINGENCY
THU, NOV 18 2021 15:37

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



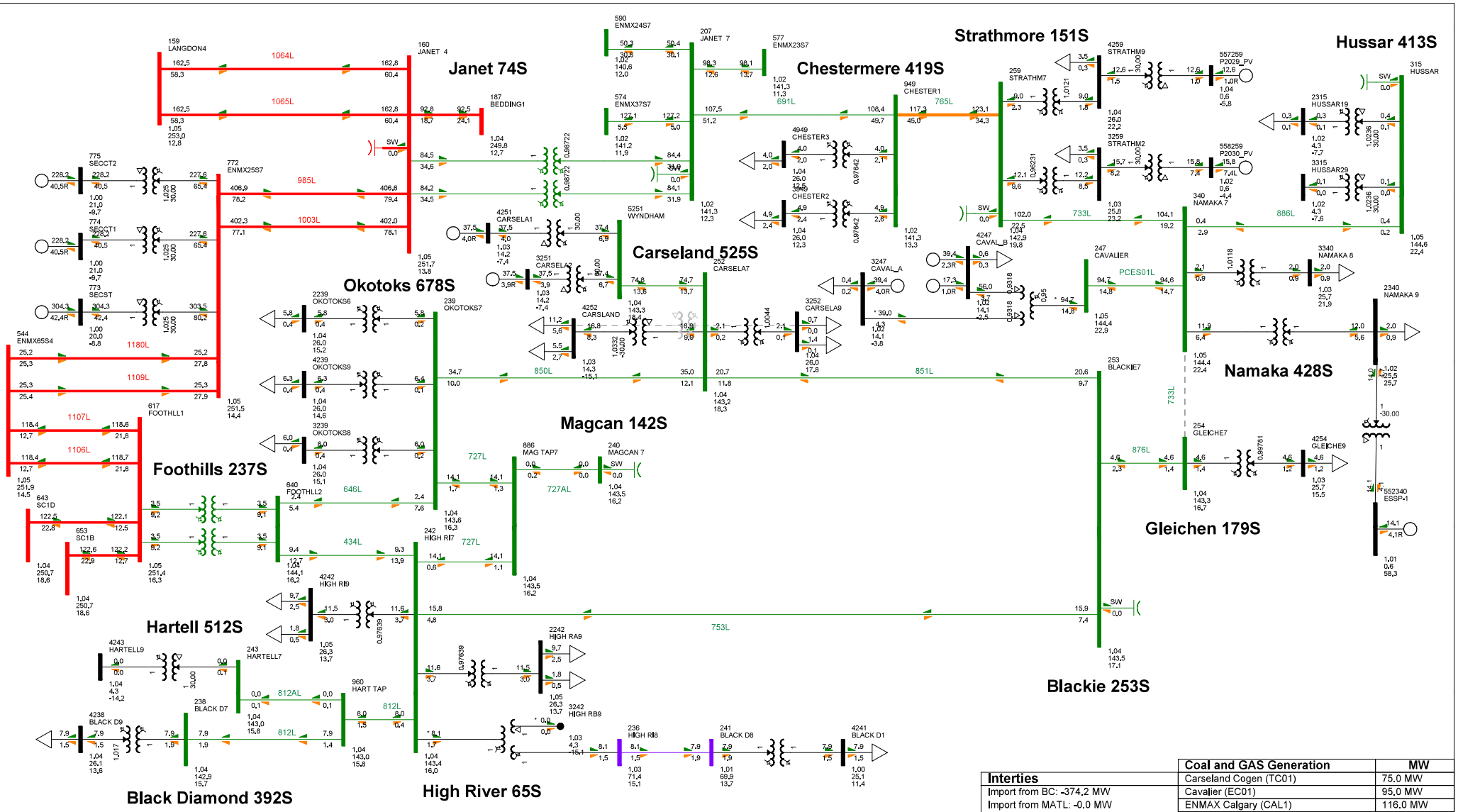
Interties	Coal and GAS Generation	MW
Import from BC: -364.0 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A2-2: P2334_2024SL_PRE
CATEGORY B - 765L (STRATHMORE 151S - CHESTERMERE 419S)
THU, NOV 18 2021 15:38

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



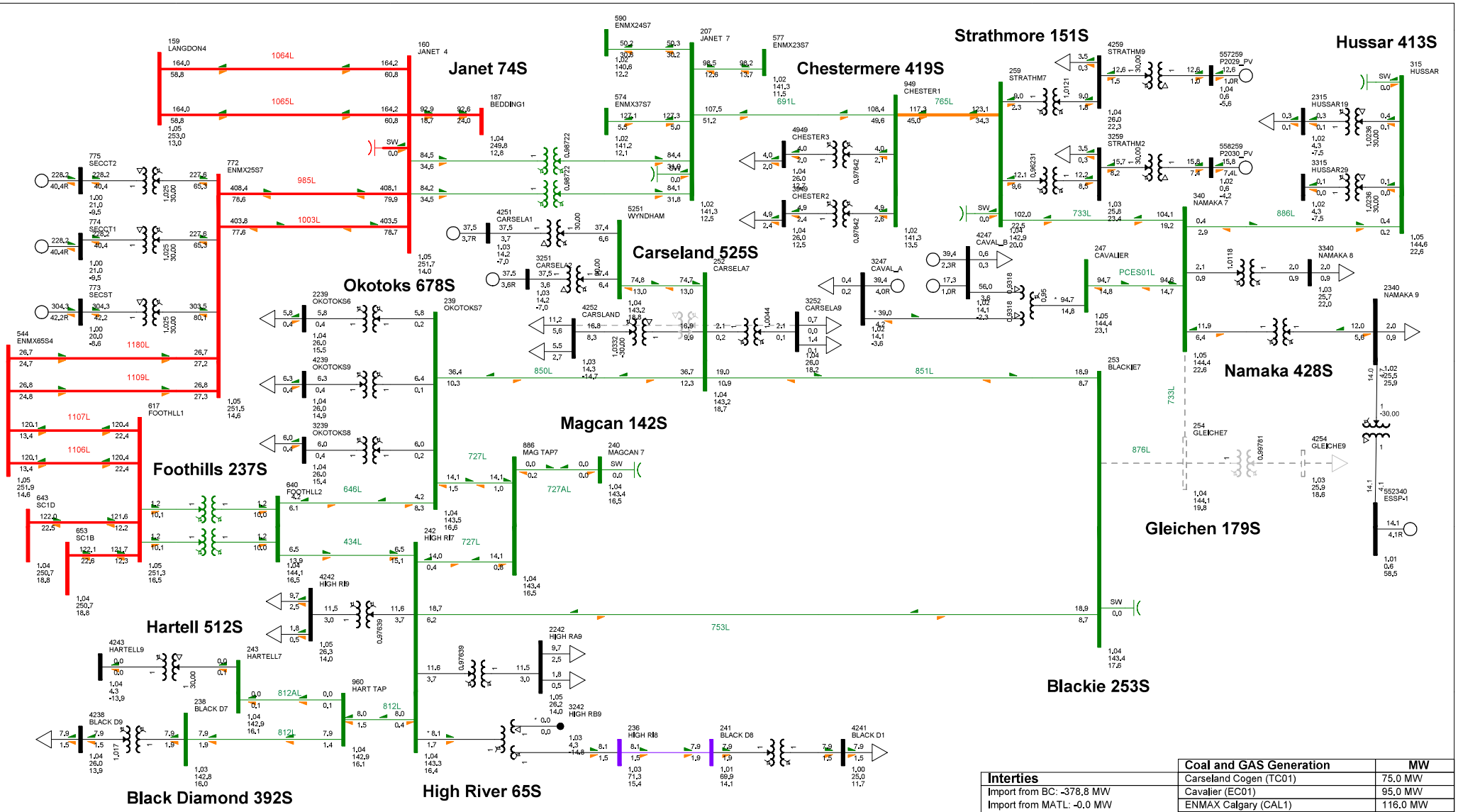
Interties	Coal and GAS Generation	MW
Import from BC: -374.2 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A2-3: P2334_2024SL_PRE
CATEGORY B - 733L (GLEICHEN 179S - NAMAKA 428S)
THU, NOV 18 2021 15:40

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



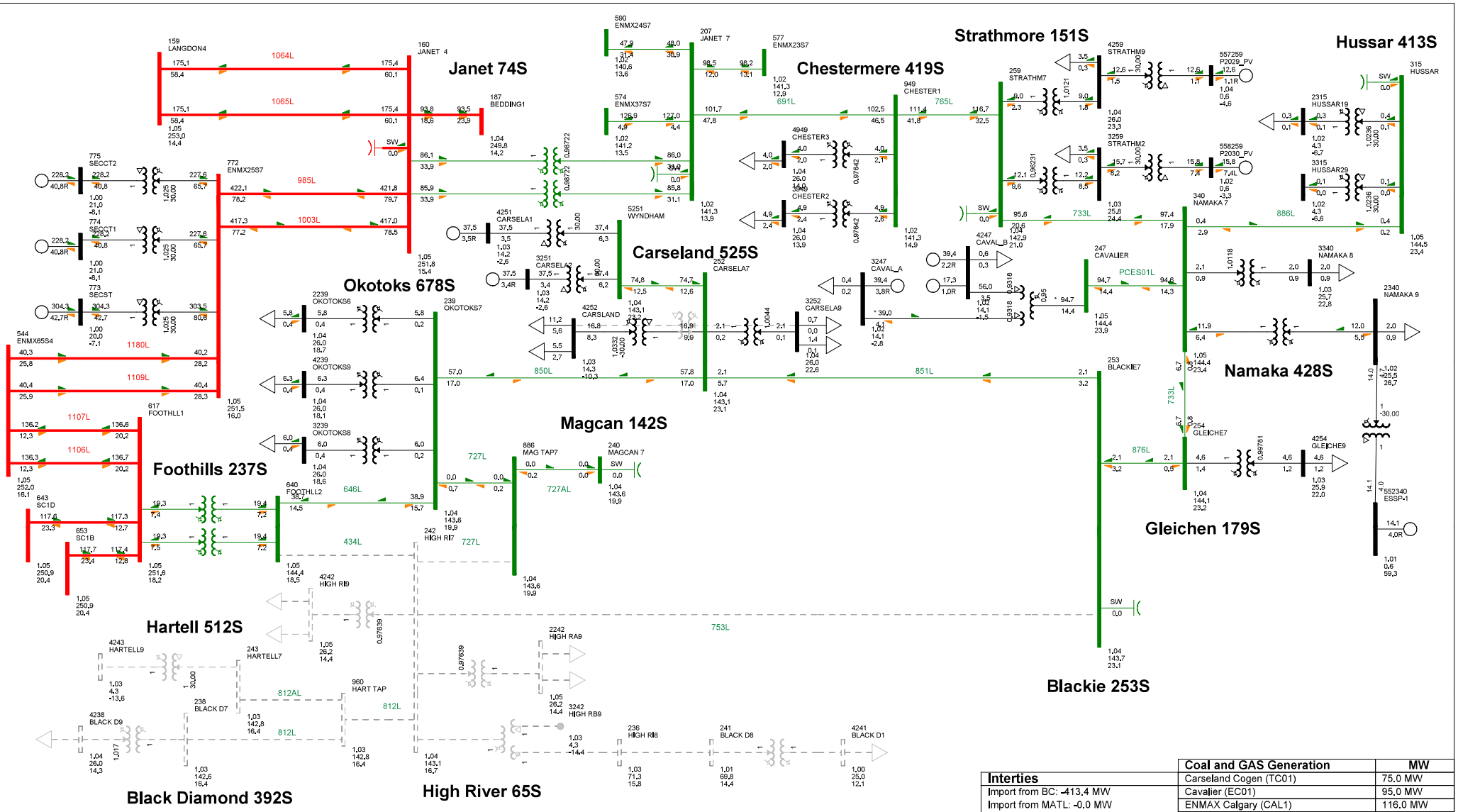
Interties	Coal and GAS Generation	MW
Import from BC: -378.8 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A2-4: P2334_2024SL_PRE
CATEGORY B - 179S GLEICHEN T1
THU, NOV 18 2021 15:41

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



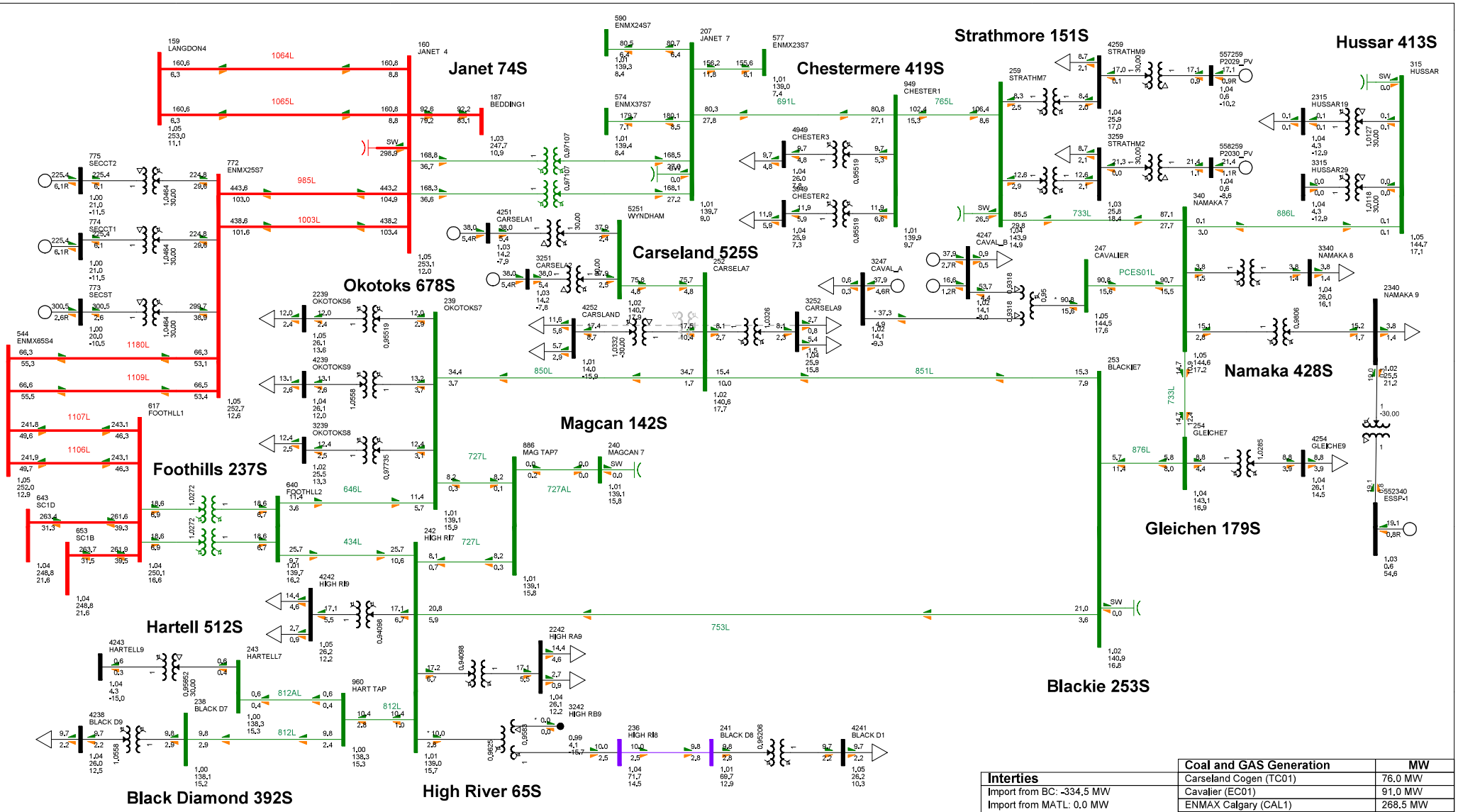
Interties	Coal and GAS Generation	MW
Import from BC: -413.4 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

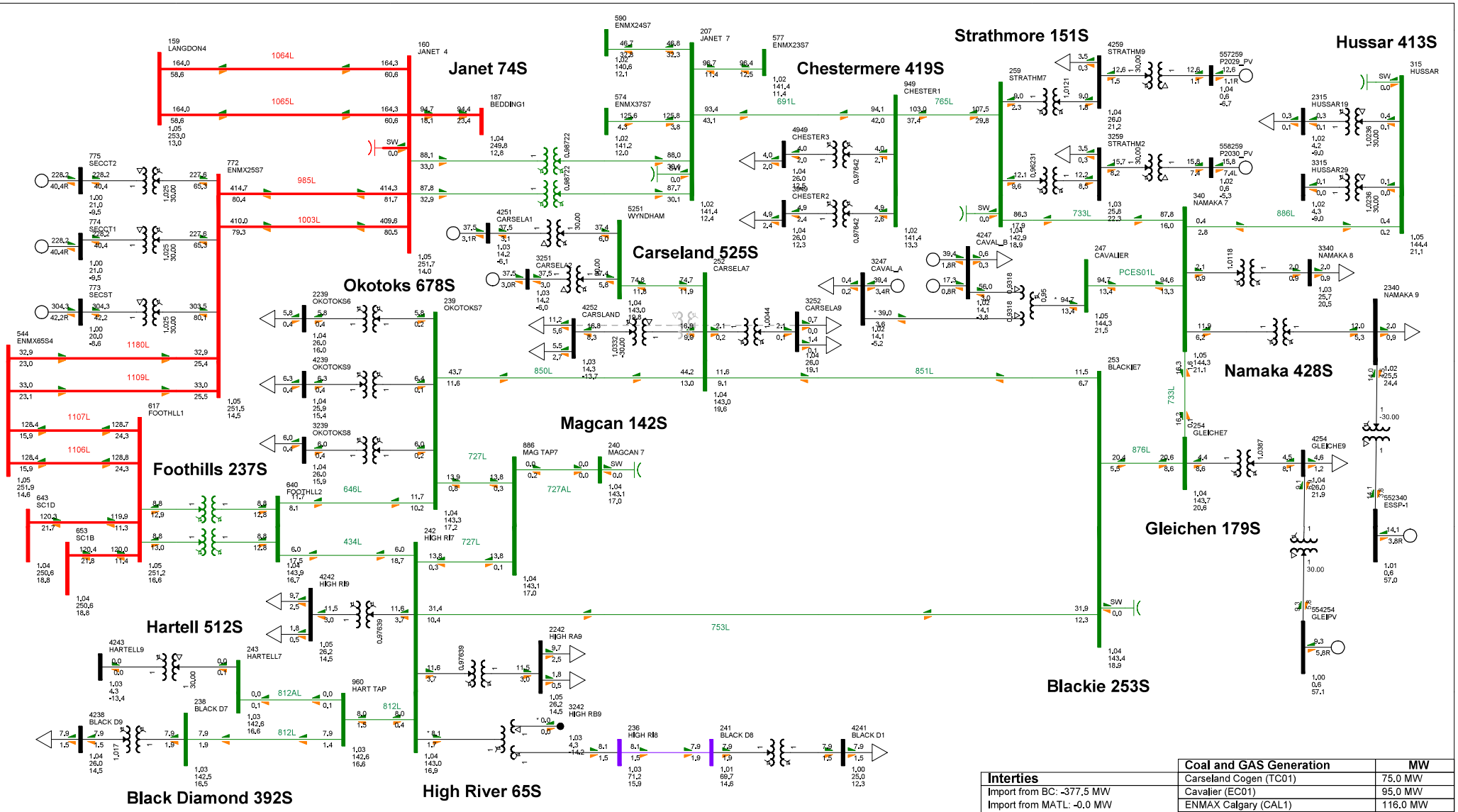
AESO Project Number: P2334

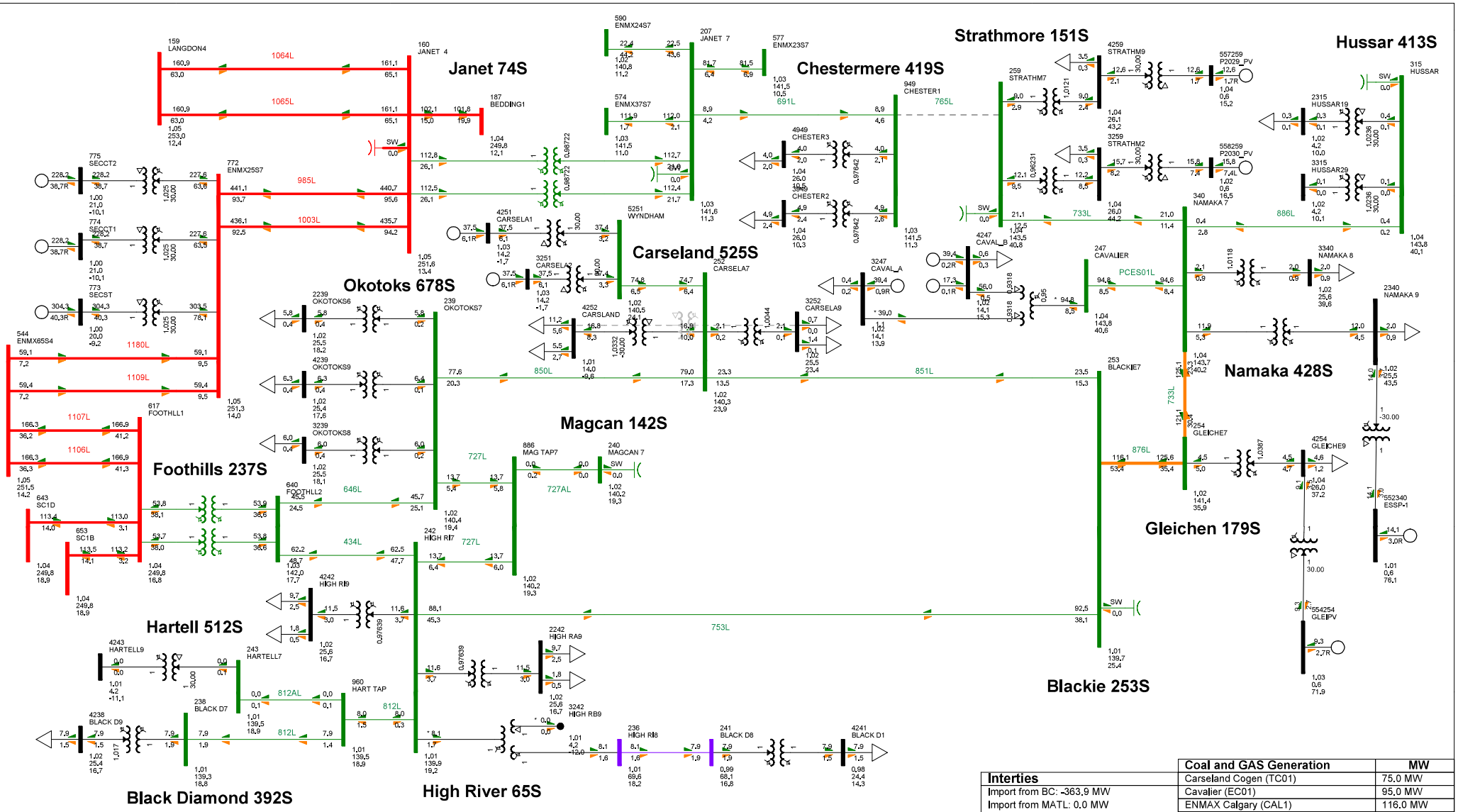
FIGURE A2-5: P2334_2024SL_PRE
CATEGORY B - 65S HIGH RIVER T1
THU, NOV 18 2021 15:41

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



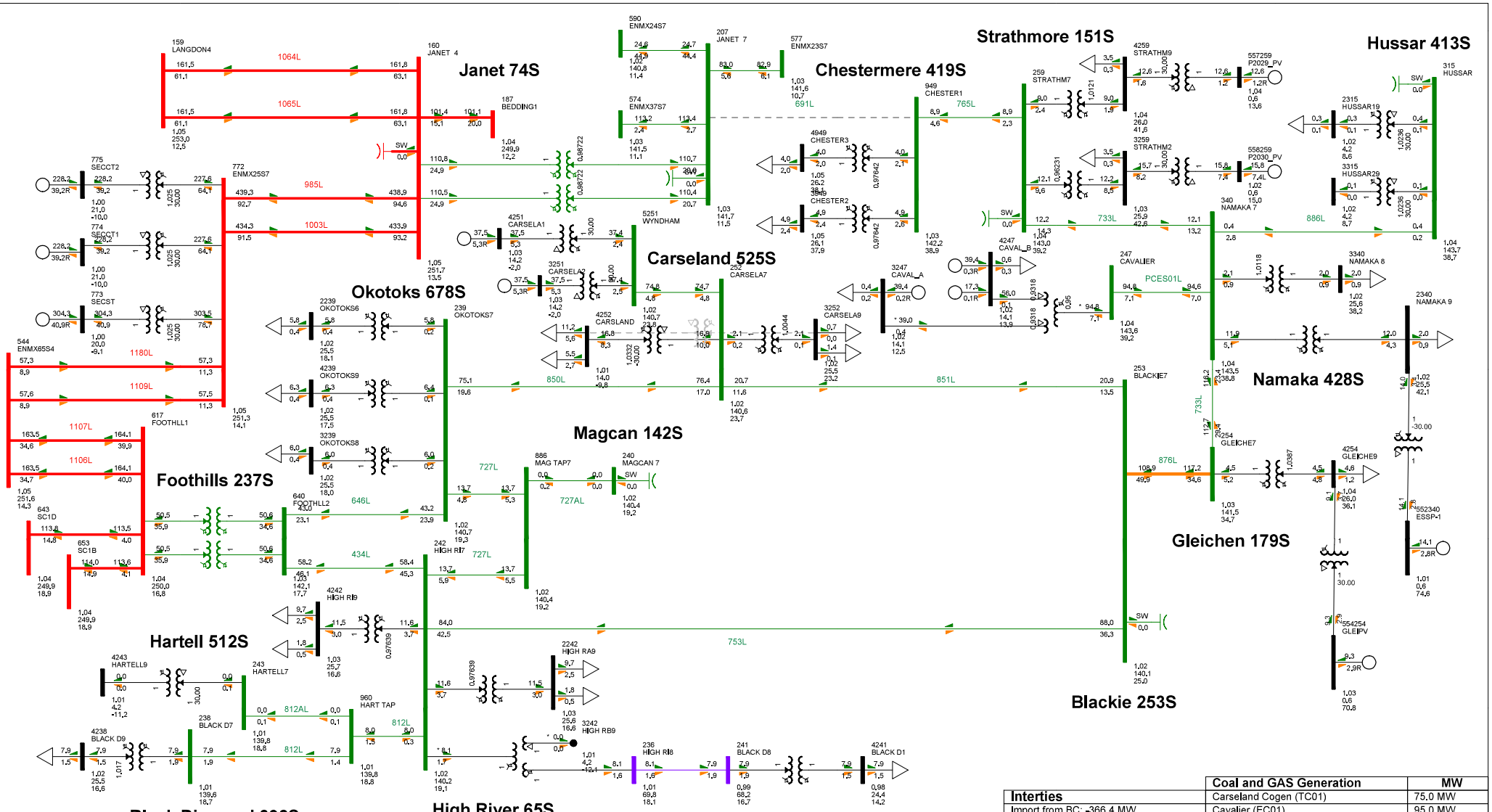
Interties	Coal and GAS Generation	MW
Import from BC: -334.5 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW


Janet 74S
Chestermere 419S
Strathmore 151S
Hussar 413S
Carseland 525S
Okotoks 678S
Magcan 142S
Foothills 237S
Namaka 428S
Gleichen 179S
Hartell 512S
Blackie 253S
Black Diamond 392S
High River 65S
1064L
1065L
985L
1003L
1180L
1109L
1107L
1106L
1064L
1065L
1003L
1180L
1109L
1107L
1106L
850L
851L
727L
727AL
646L
434L
812L
812AL
591L
765L
733L
886L
876L
753L
PCES01L
Coal and GAS Generation
MW
Interties
Carseland Cogen (TC01) 75.0 MW
Import from BC: -377.5 MW
Cavalier (EC01) 95.0 MW
Import from MATL: -0.0 MW
ENMAX Calgary (CAL1) 116.0 MW
Import from SK: -0.1 MW
Shepard (EGC1) 760.7 MW
TCE Saddlebrook Solar Storage
AESO Project Number: P2334
FIGURE A2-7: P2334_2024SL_PRE_SENS
CATEGORY A - NO CONTINGENCY
THU, NOV 18 2021 16:00
Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	
Import from BC: -363.9 MW	
Import from MATL: 0.0 MW	
Import from SK: -0.1 MW	

Coal and GAS Generation	MW
Carseland Cogen (TC01)	75.0 MW
Cavalier (EC01)	95.0 MW
ENMAX Calgary (CAL1)	116.0 MW
Shepard (EGC1)	760.7 MW



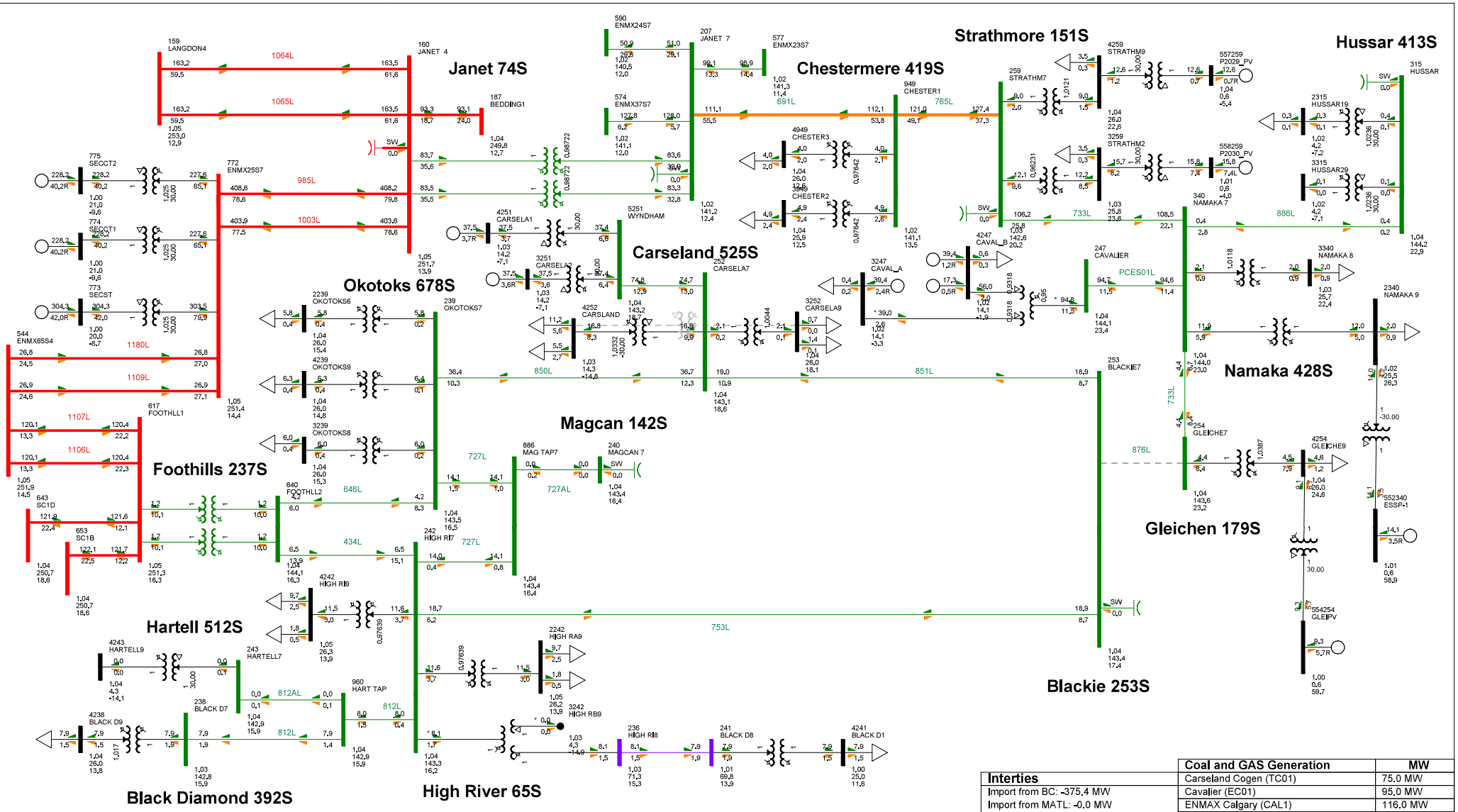
Interties	Coal and GAS Generation	MW
Import from BC: -366.4 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

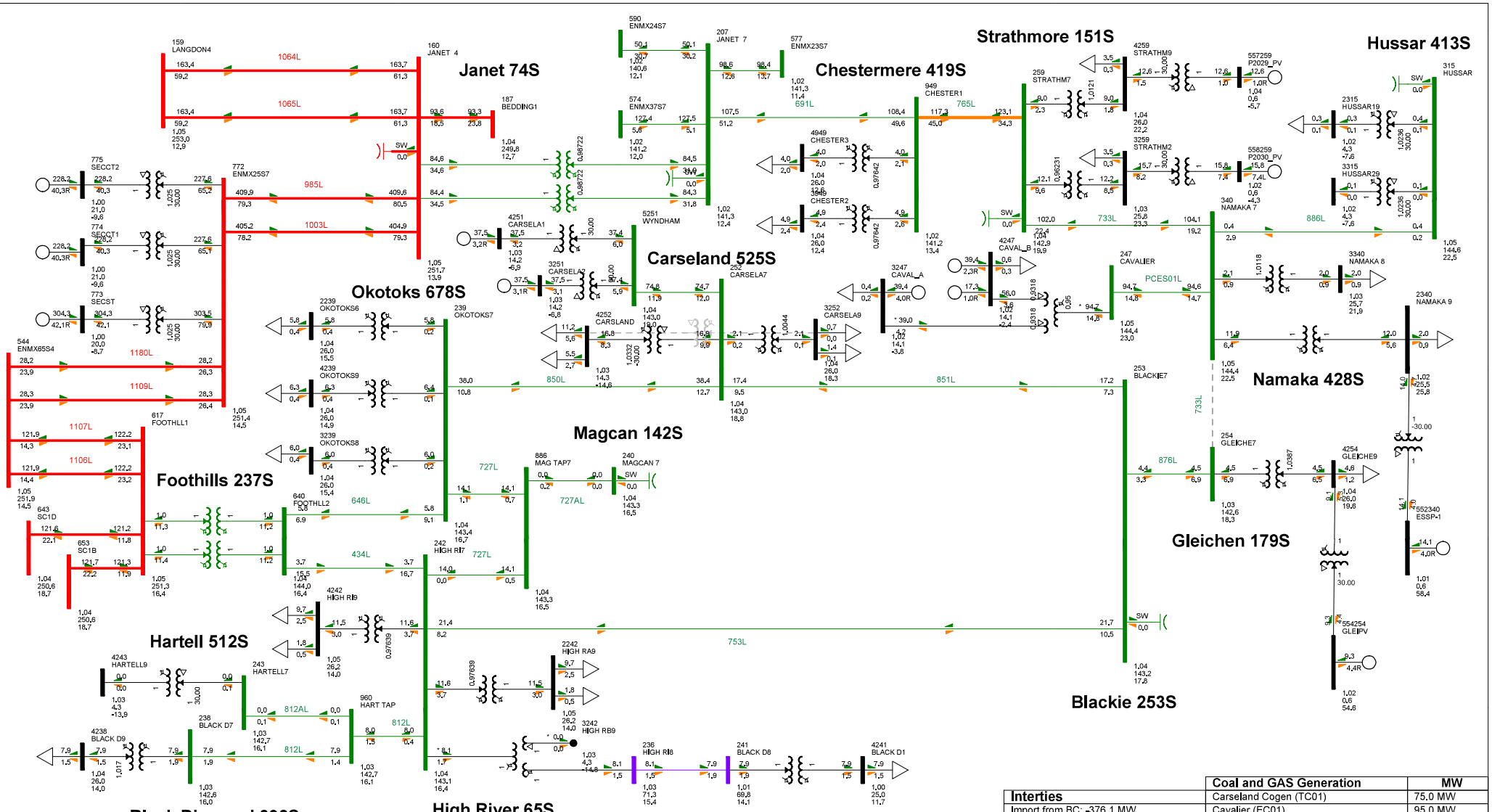
AESO Project Number: P2334

FIGURE A2-9: P2334_2024SL_PRE_SENS
CATEGORY B - 691L (CHESTERMERE 419S - JANET 74S)
THU, NOV 18 2021 16:00

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	Coal and GAS Generation	MW
Import from BC: -375.4 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW



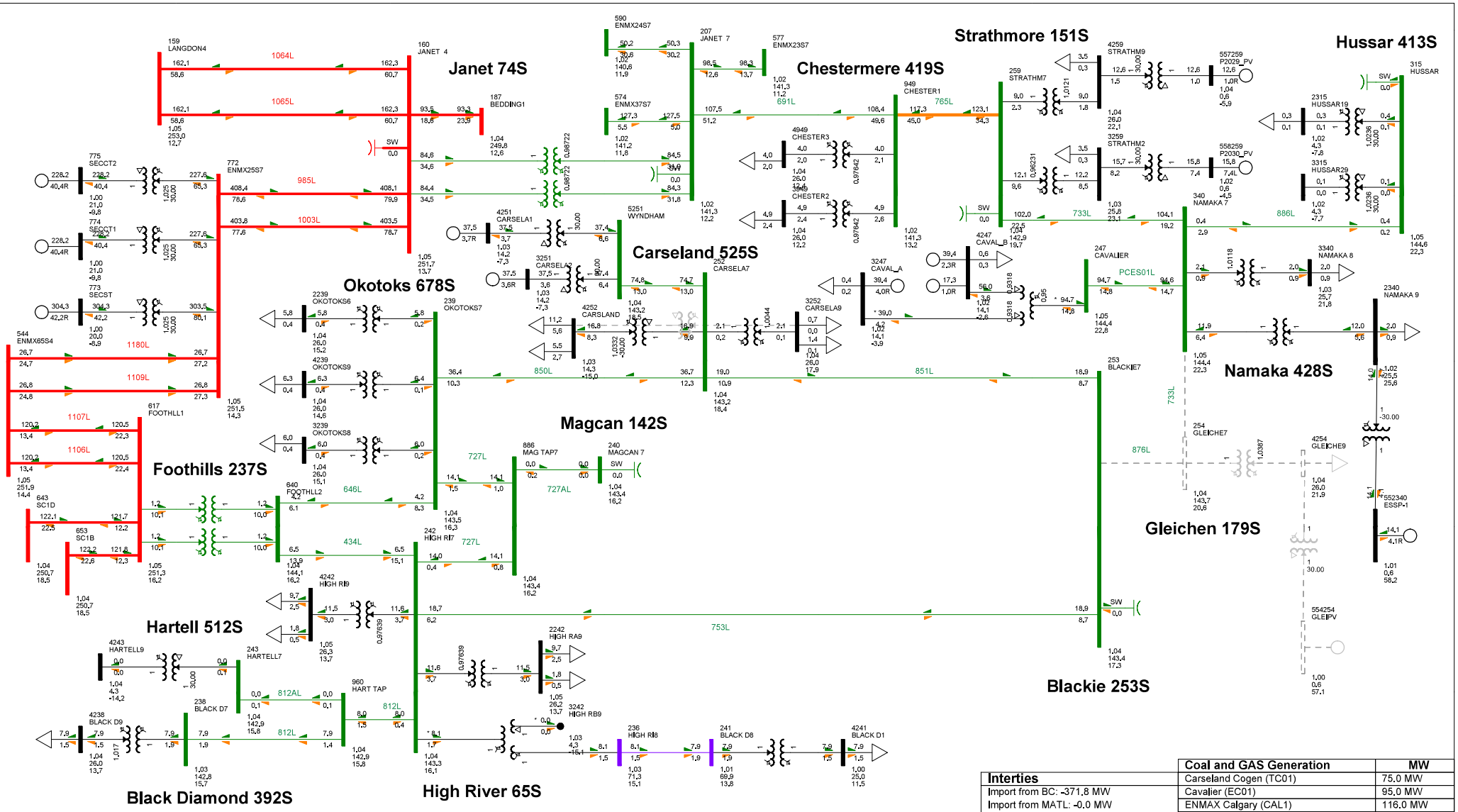
Interties	Coal and GAS Generation	MW
Import from BC: -376.1 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A2-11: P2334_2024SL_PRE_SENS CATEGORY B - 733L (GLEICHEN 179S - NAMAKA 428S) THU, NOV 18 2021 16:01

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	
Import from BC: -371.8 MW	
Import from MATL: -0.0 MW	
Import from SK: -0.1 MW	

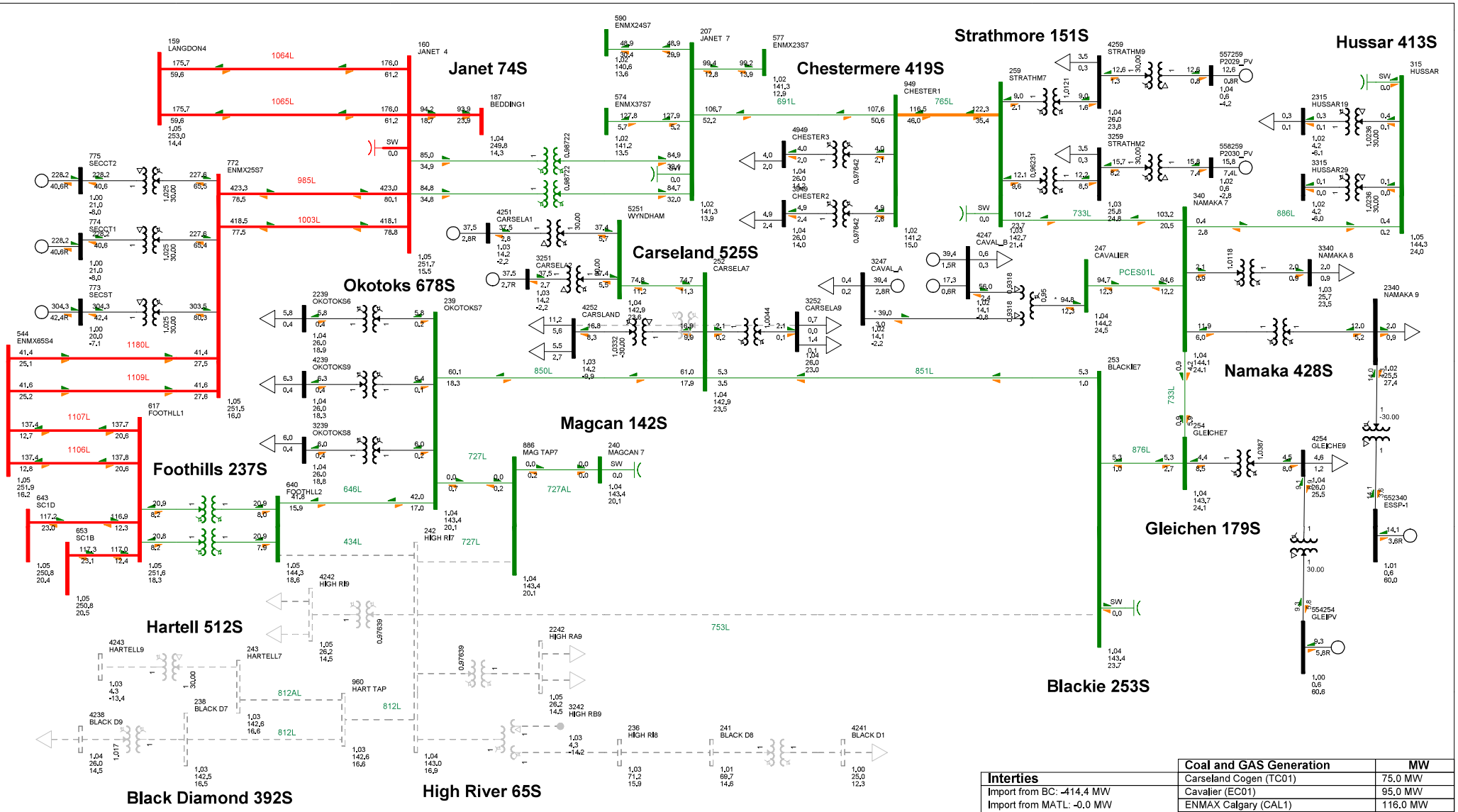
Coal and GAS Generation	MW
Carseland Cogen (TC01)	75.0 MW
Cavalier (EC01)	95.0 MW
ENMAX Calgary (CAL1)	116.0 MW
Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A2-12: P2334_2024SL_PRE_SENS
CATEGORY B - 179S GLEICHEN T1
THU, NOV 18 2021 16:02

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



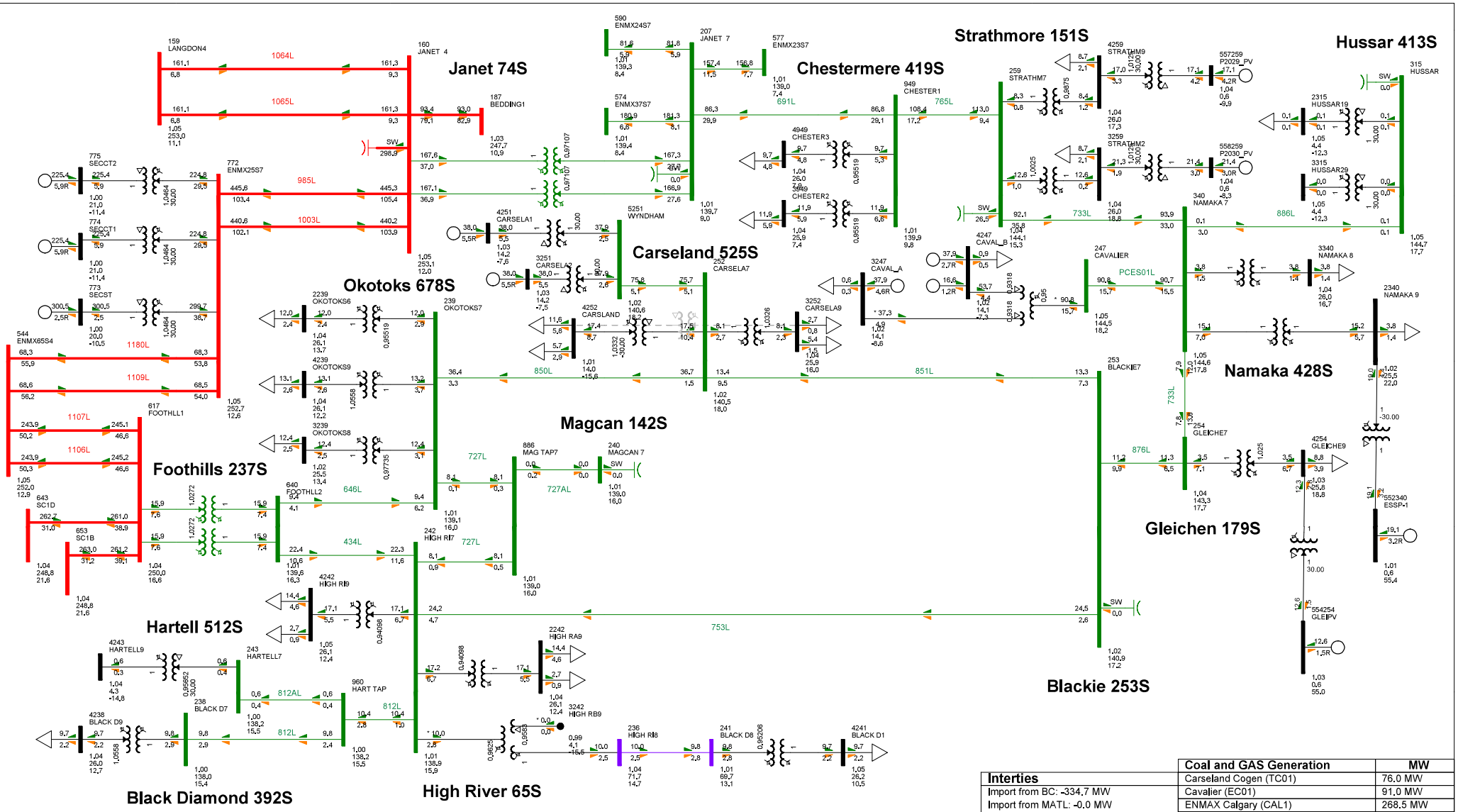
Interties	Coal and GAS Generation	MW
Import from BC: -414.4 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

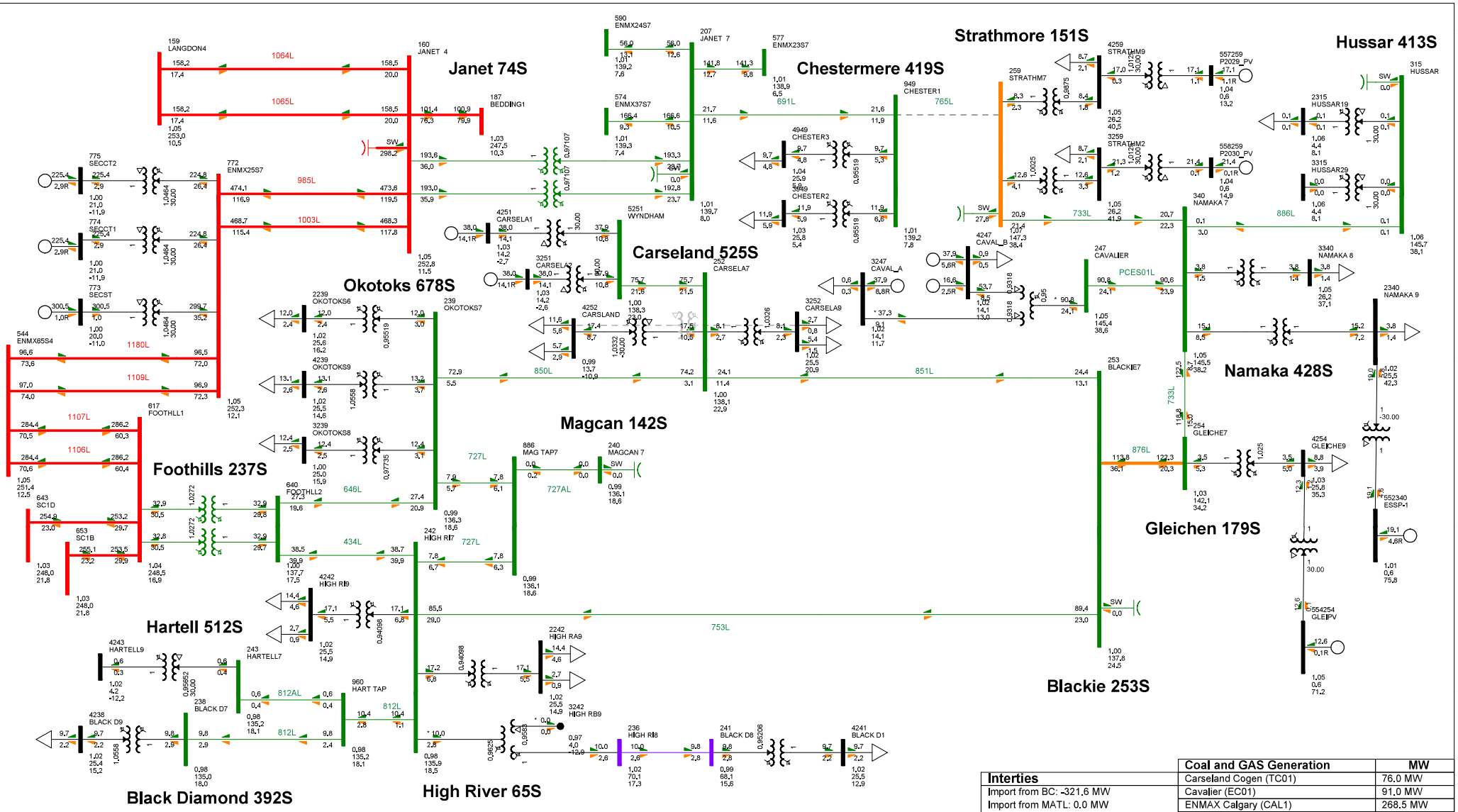
FIGURE A2-13: P2334_2024SL_PRE_SENS
CATEGORY B - 65S HIGH RIVER T1
THU, NOV 18 2021 16:07

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	Coal and GAS Generation	MW
Import from BC: -334.7 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



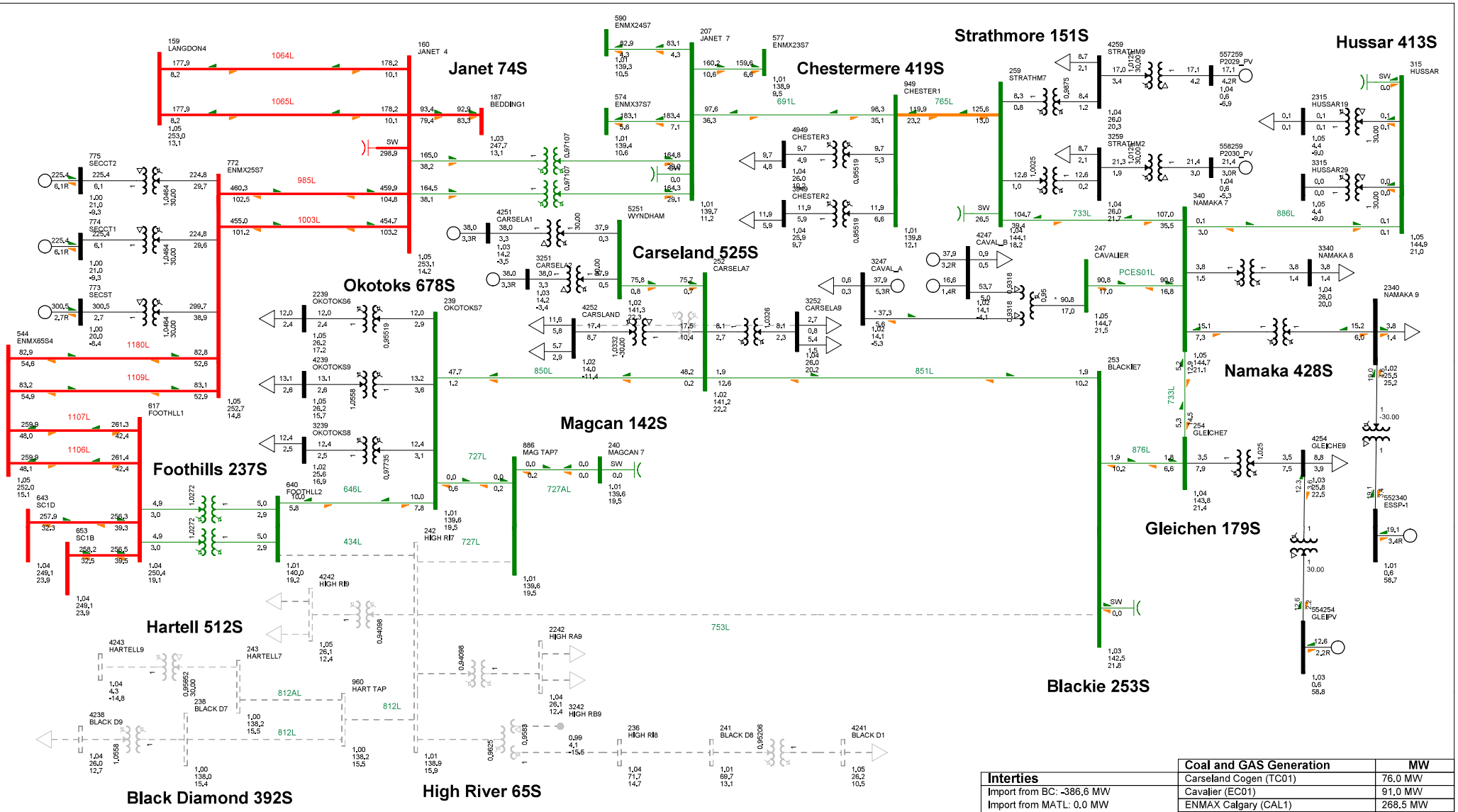
Interties	Coal and GAS Generation	MW
Import from BC: -321.6 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A2-15: P2334_2024SP_PRE_SENS
CATEGORY B - 765L (STRATHMORE 151S - CHESTERMERE 419S)
THU, NOV 18 2021 16:08

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	Coal and GAS Generation	MW
Import from BC: -386.6 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

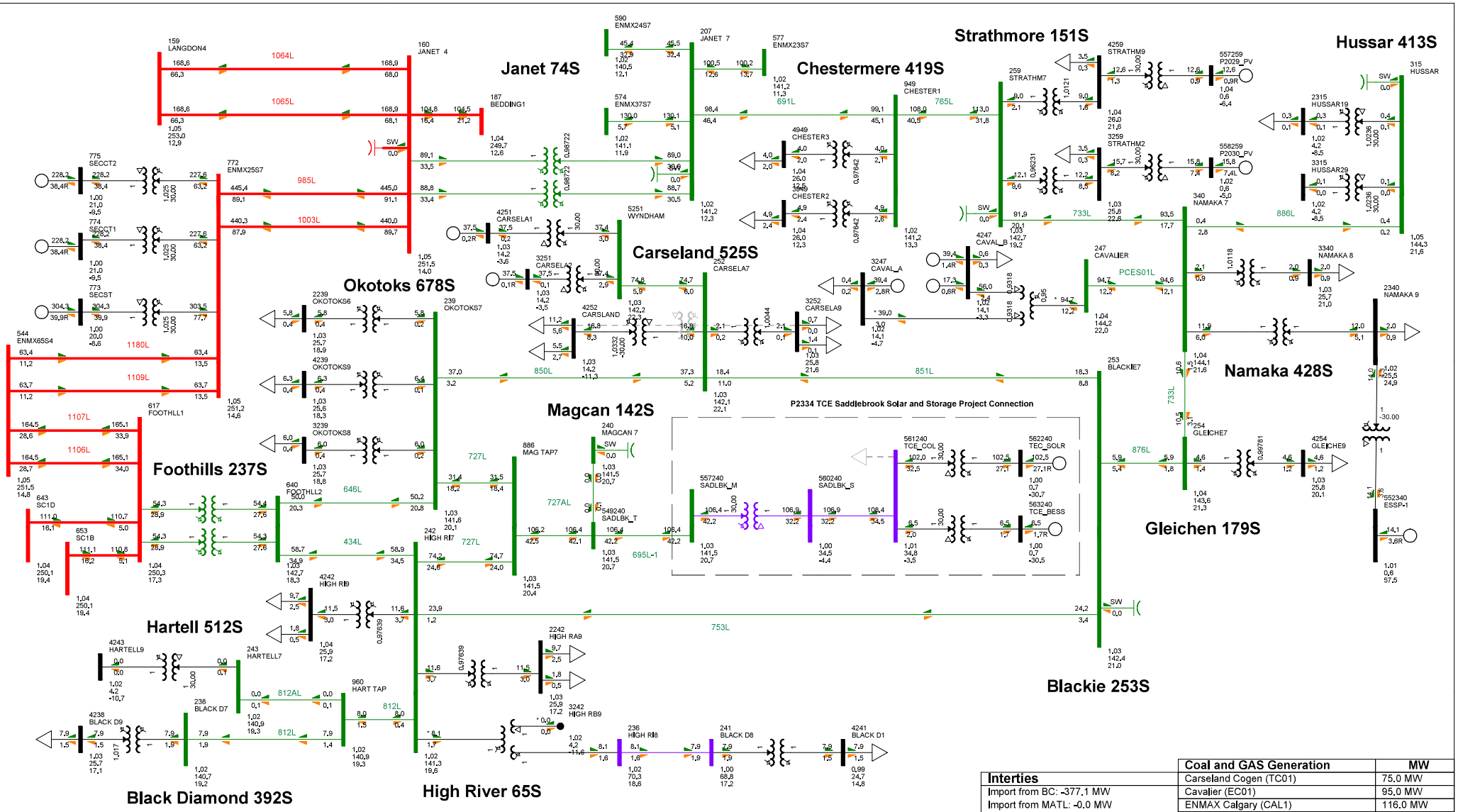
TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A2-16: P2334_2024SP_PRE_SENS
CATEGORY B - 65S HIGH RIVER T1
THU, NOV 18 2021 16:54

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000

Attachment A3
Post-Project Power Flow Diagrams



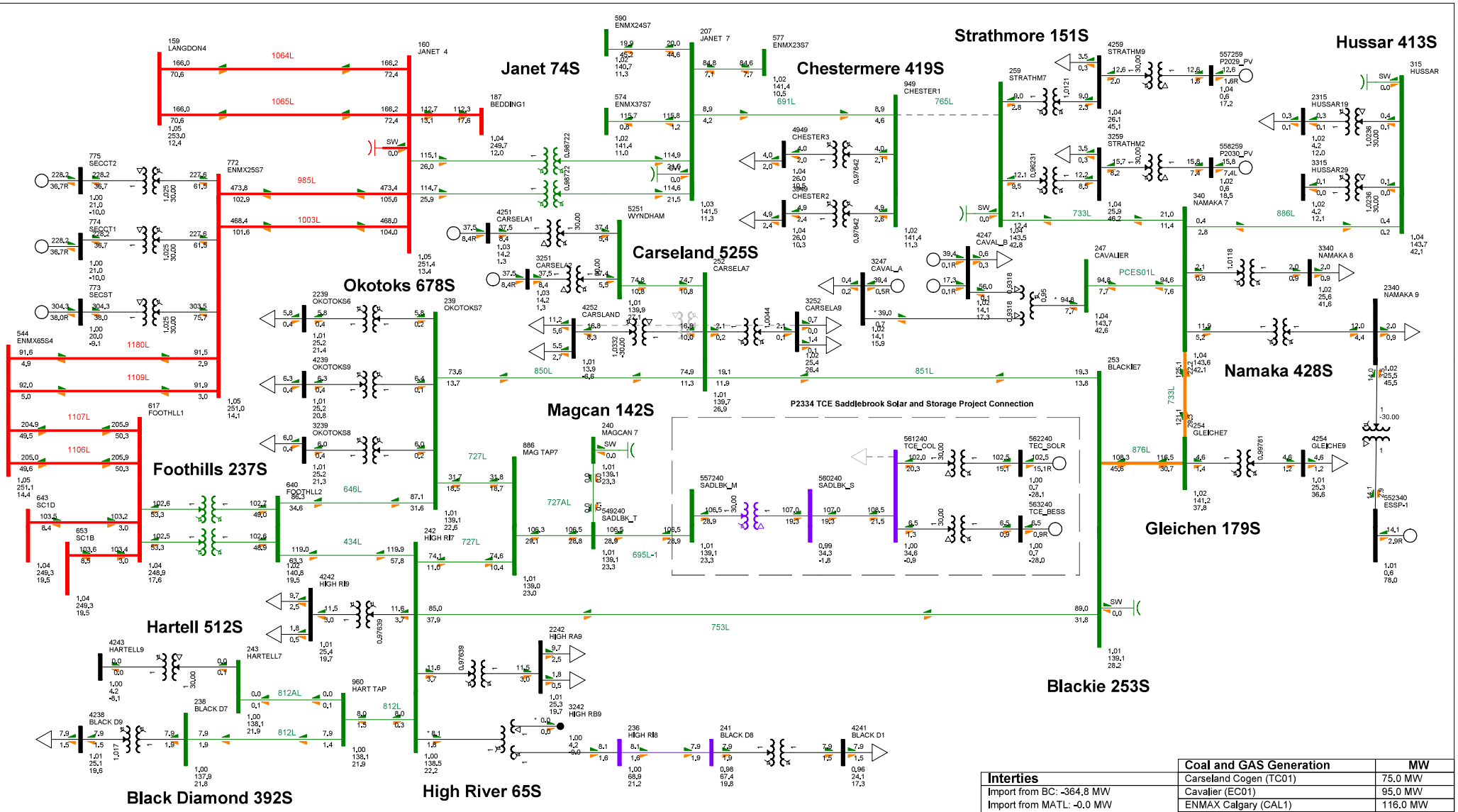
Interties	Coal and GAS Generation	MW
Import from BC: -377.1 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-1: P2334_2024SL_POST
CATEGORY A - NO CONTINGENCY
FRI, NOV 19 2021 14:04

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



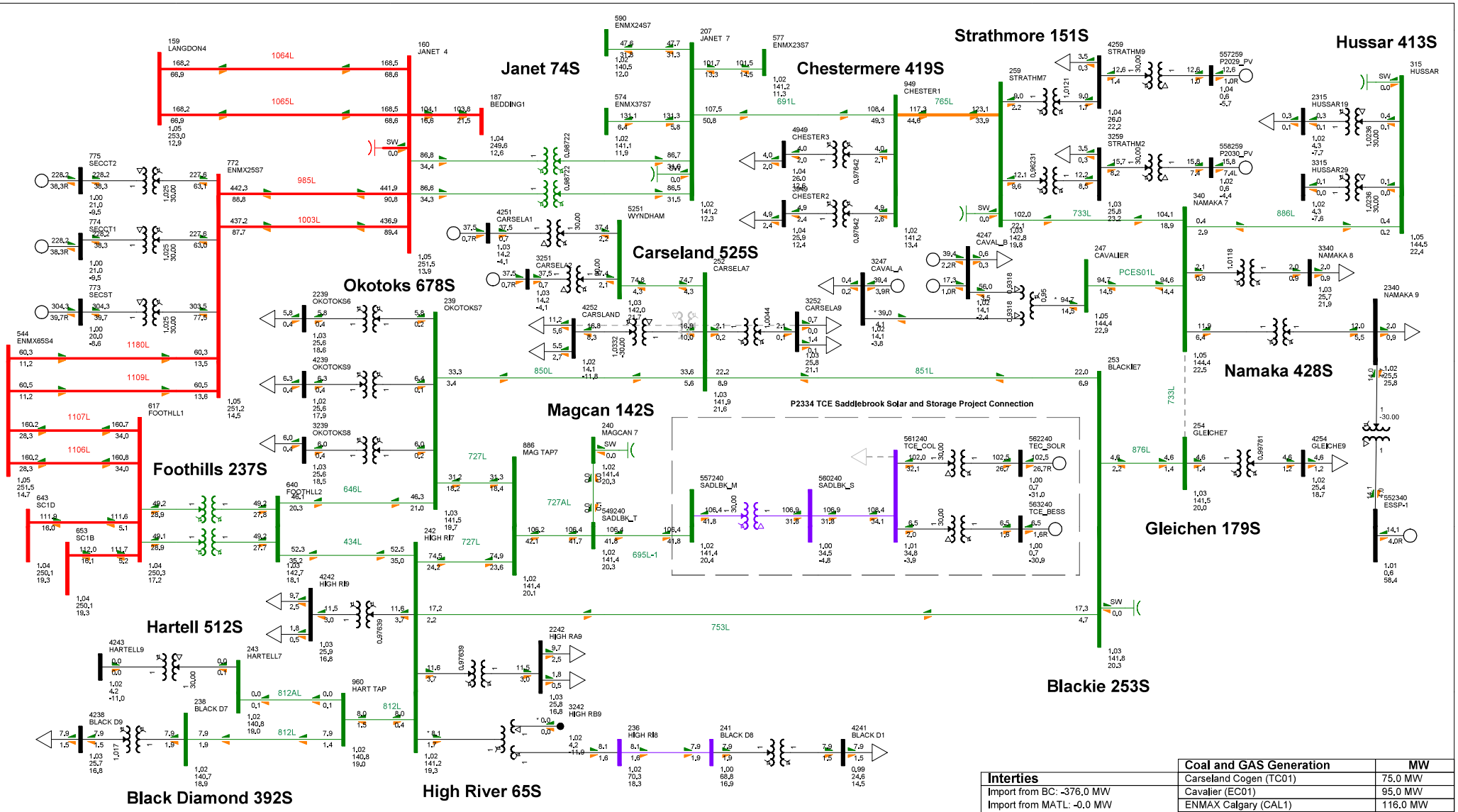
Interties	Coal and GAS Generation	MW
Import from BC: -364.8 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-2: P2334_2024SL_POST
CATEGORY B - 765L (STRATHMORE 151S - CHESTERMERE 419S)
FRI, NOV 19 2021 14:04

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



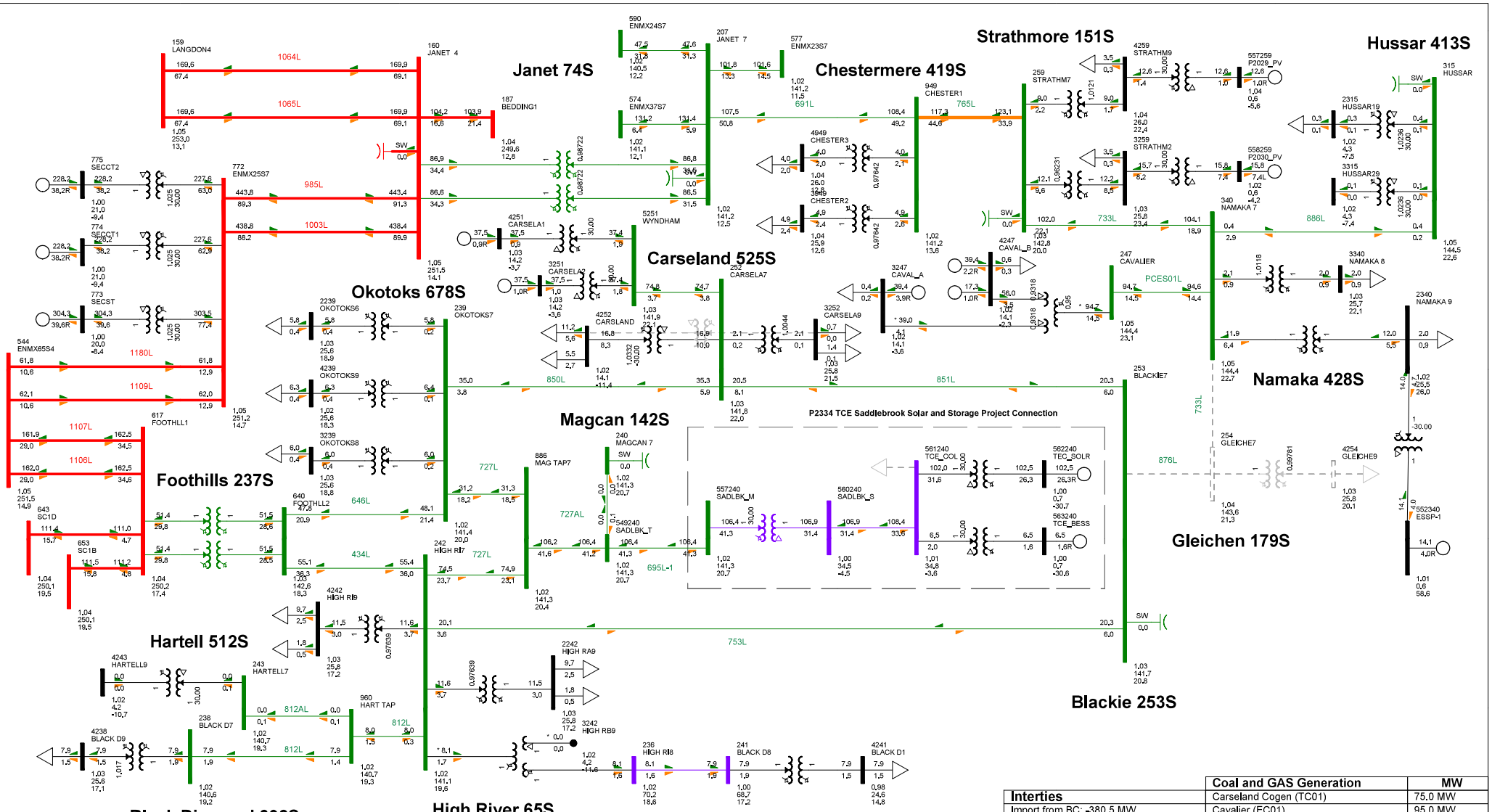
Interties	Coal and GAS Generation	MW
Import from BC: -376.0 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-3: P2334_2024SL_POST
CATEGORY B - 733L (GLEICHEN 179S - NAMAKA 428S)
FRI, NOV 19 2021 14:06

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	
Import from BC: -380.5 MW	
Import from MATL: -0.0 MW	
Import from SK: -0.1 MW	

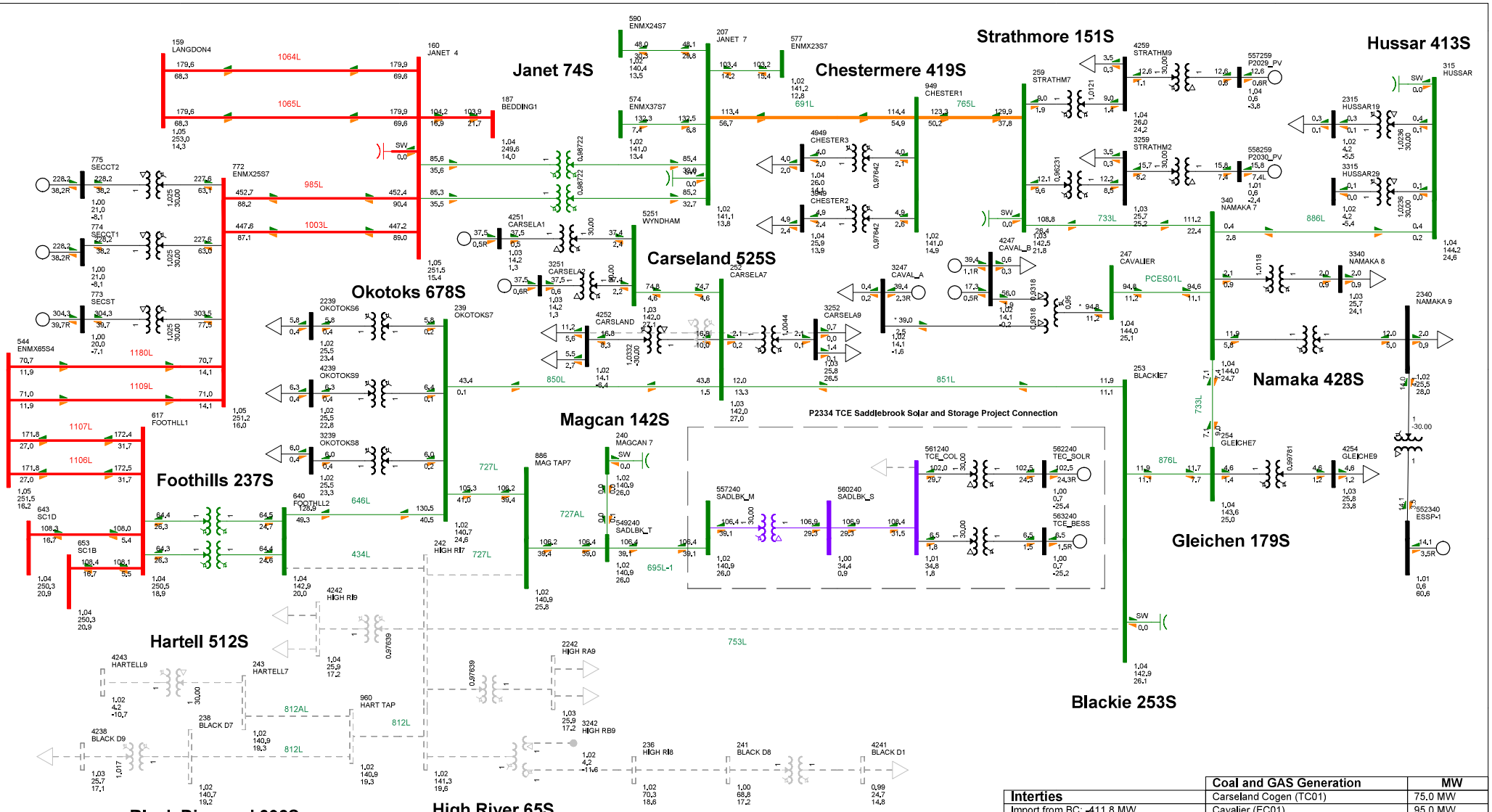
Coal and GAS Generation	MW
Carseland Cogen (TC01)	75.0 MW
Cavalier (EC01)	95.0 MW
ENMAX Calgary (CAL1)	116.0 MW
Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-4: P2334_2024SL_POST
CATEGORY B - 179S GLEICHEN T1
FRI, NOV 19 2021 14:06

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



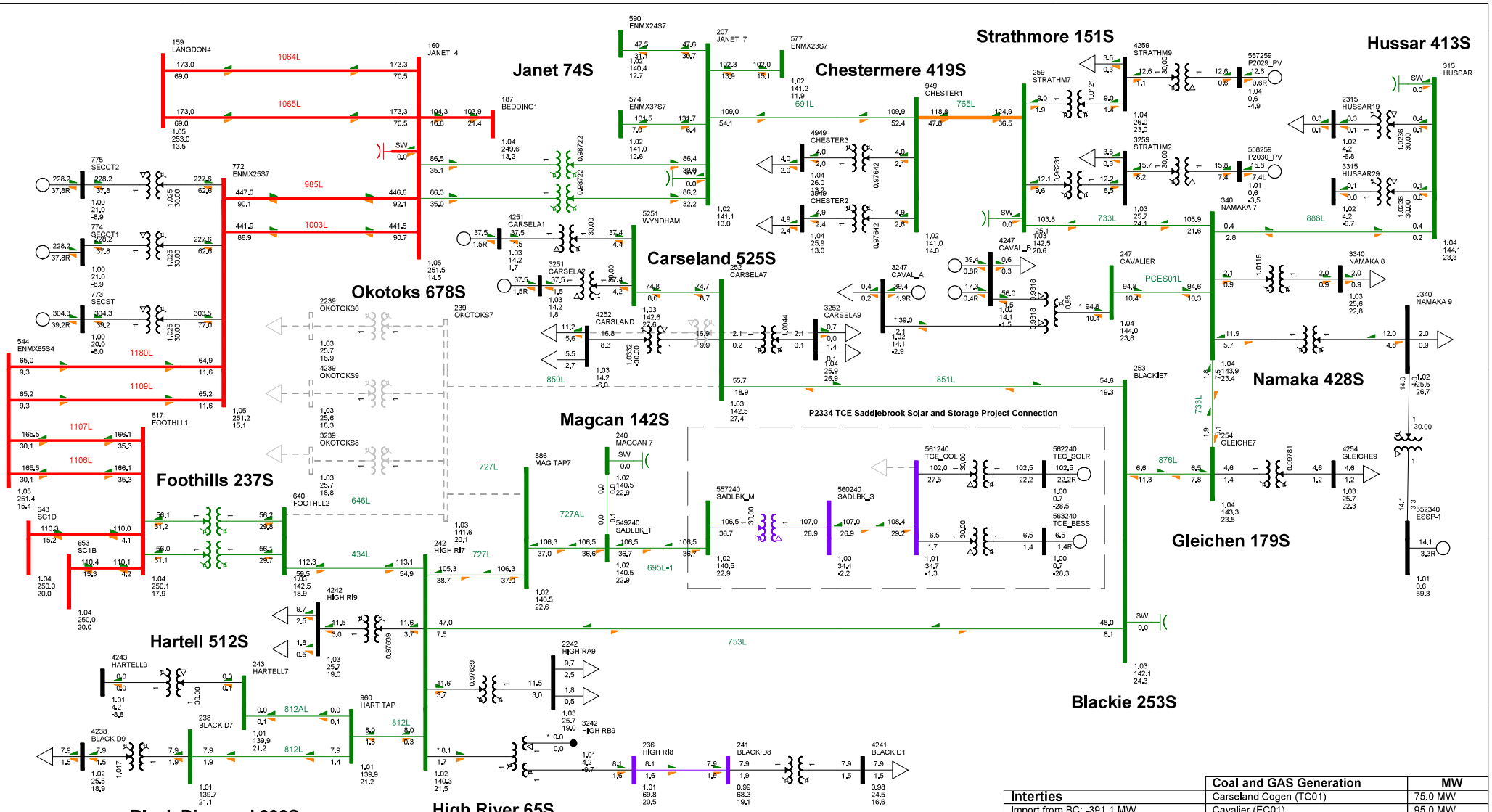
Interties	Coal and GAS Generation	MW
Import from BC: -411.8 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

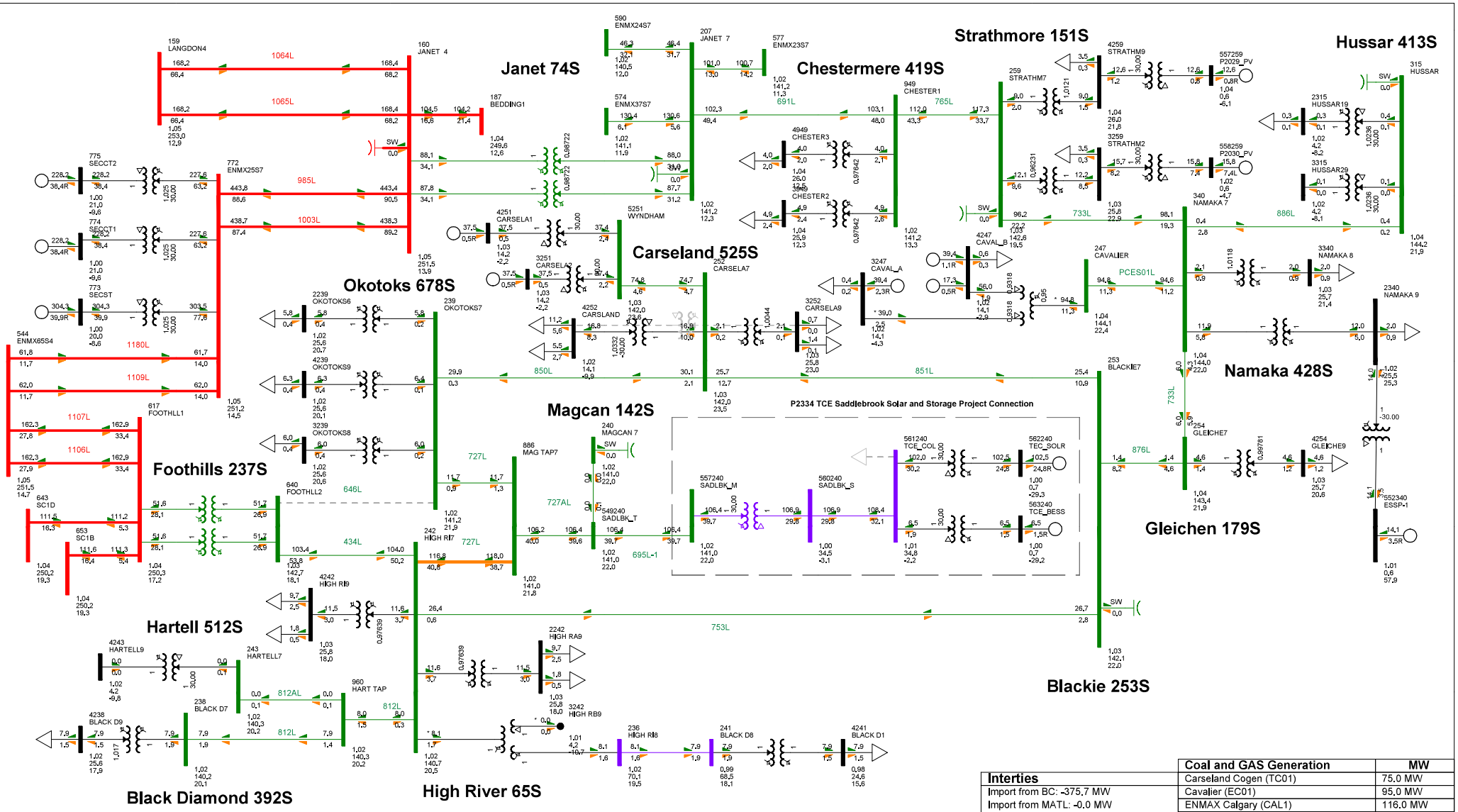
FIGURE A3-5: P2334_2024SL_POST
CATEGORY B - 65S HIGH RIVER T1
FRI, NOV 19 2021 14:11

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	Coal and GAS Generation	MW
Import from BC: -391.1 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage	AESO Project Number: P2334	FIGURE A3-6: P2334_2024SL_POST CATEGORY B - 678S OKOTOKS T1 FRI, NOV 19 2021 14:20	Bus - Voltage (kV/pu)/Angle Branch - MW/Mvar Equipment - MW/Mvar 100.0%Rate A 1.100OV 0.900UV kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



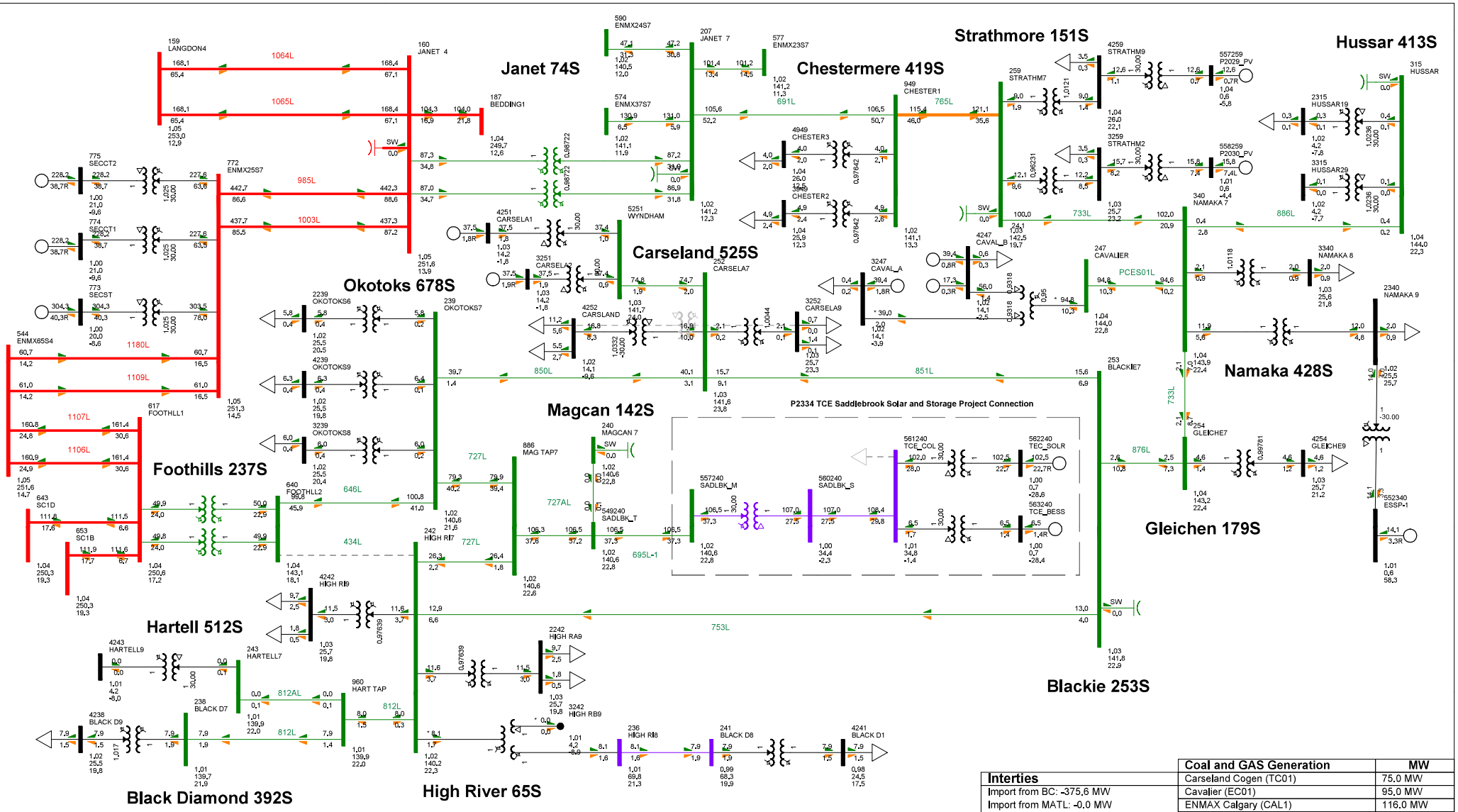
Interties	Coal and GAS Generation	MW
Import from BC: -375.7 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-7: P2334_2024SL_POST
CATEGORY B - 646L (OKOTOKS 678S - FOOTHILLS 237S)
FRI, NOV 19 2021 14:21

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



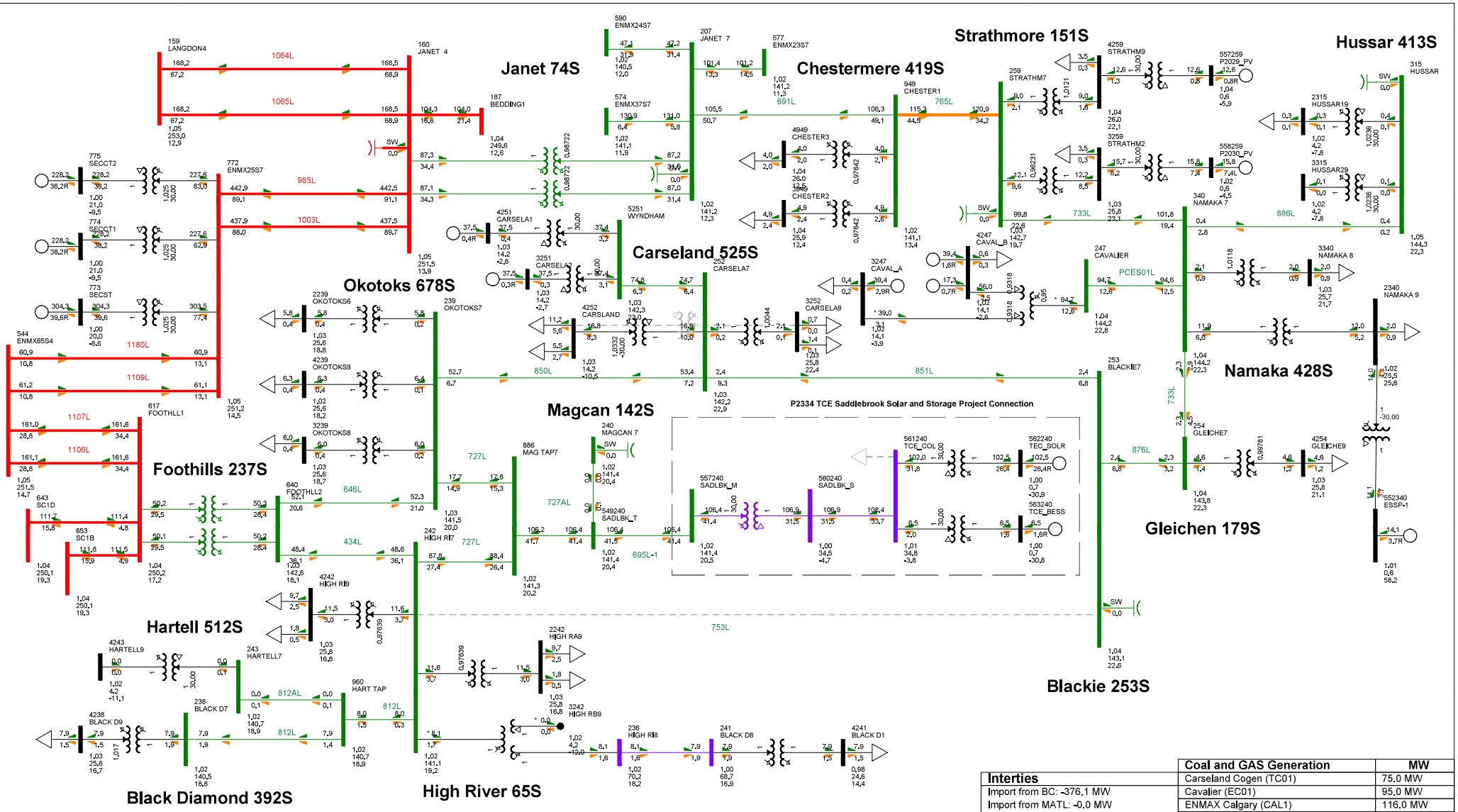
Interties	Coal and GAS Generation	MW
Import from BC: -375.6 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-8: P2334_2024SL_POST
CATEGORY B - 434L (FOOTHILLS 237S - HIGH RIVER 65S)
FRI, NOV 19 2021 14:21

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



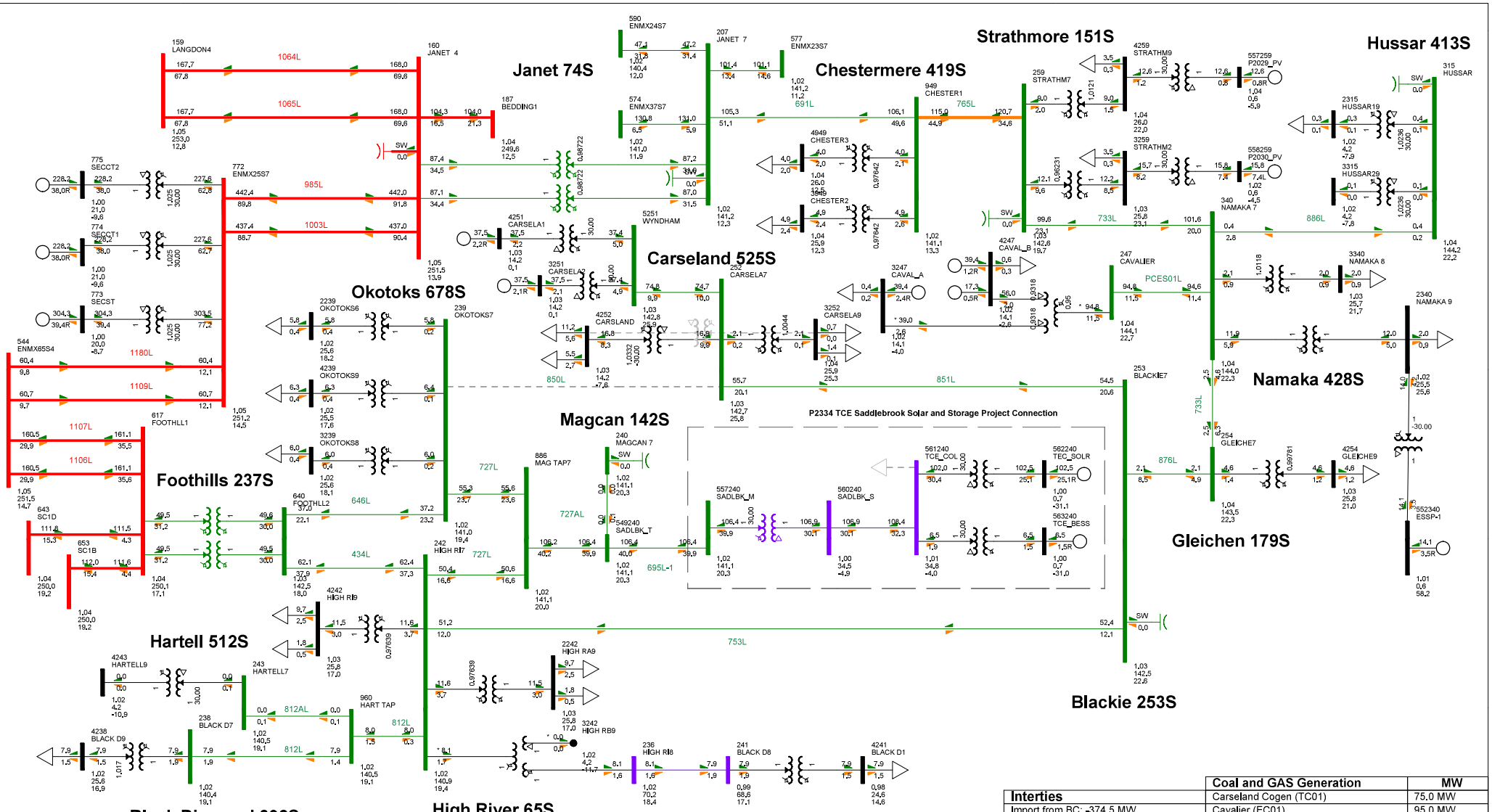
Interties	Coal and GAS Generation	MW
Import from BC: -376.1 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-9: P2334_2024SL_POST
CATEGORY B - 753L (HIGH RIVER 65S - BLACKIE 253S)
FRI, NOV 19 2021 14:23

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



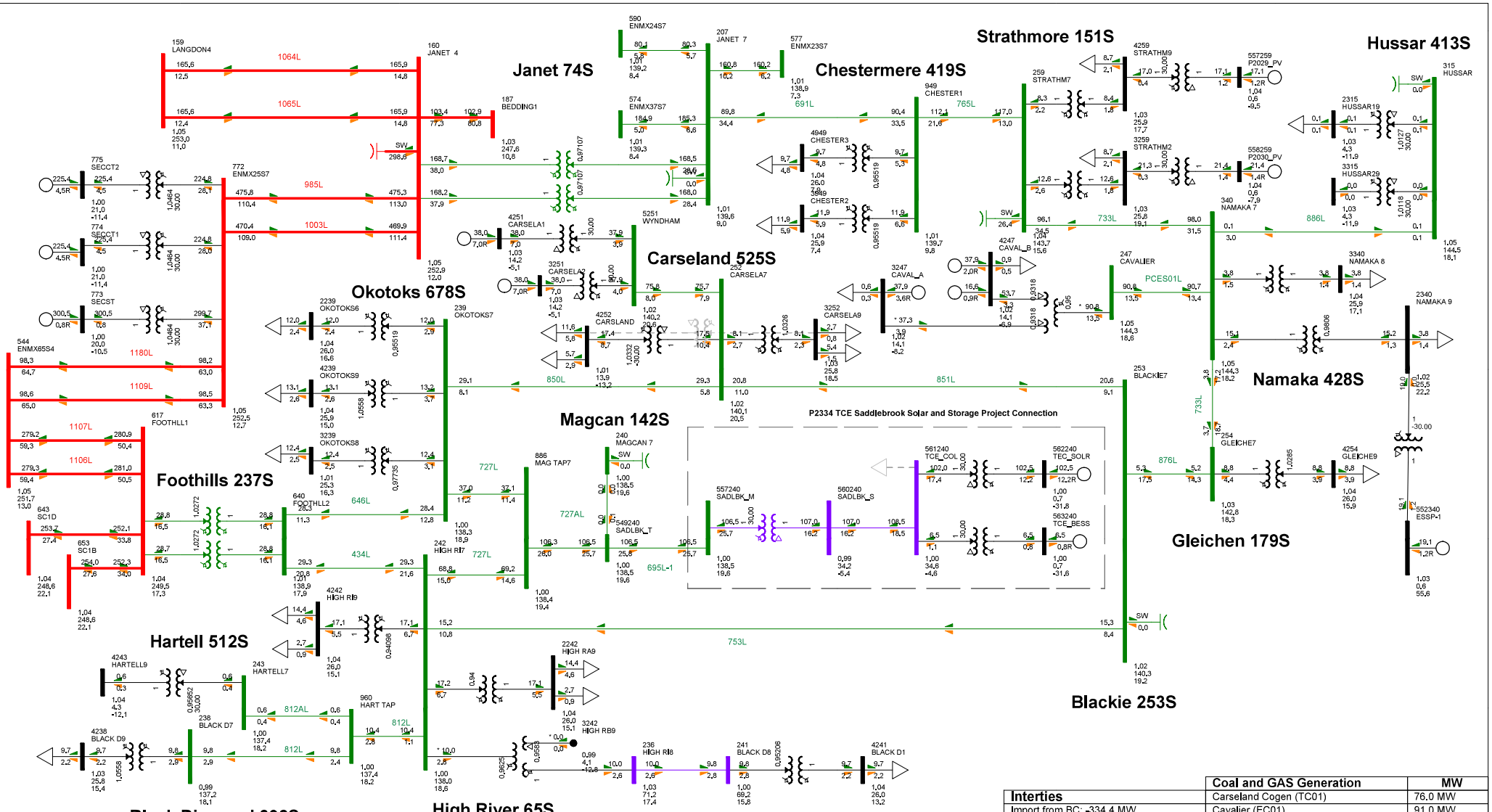
Interties	Coal and GAS Generation	MW
Import from BC: -374.5 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-10: P2334_2024SL_POST
CATEGORY B - 850L (CARSELAND 525S - OKOTOKS 678S)
FRI, NOV 19 2021 14:26

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



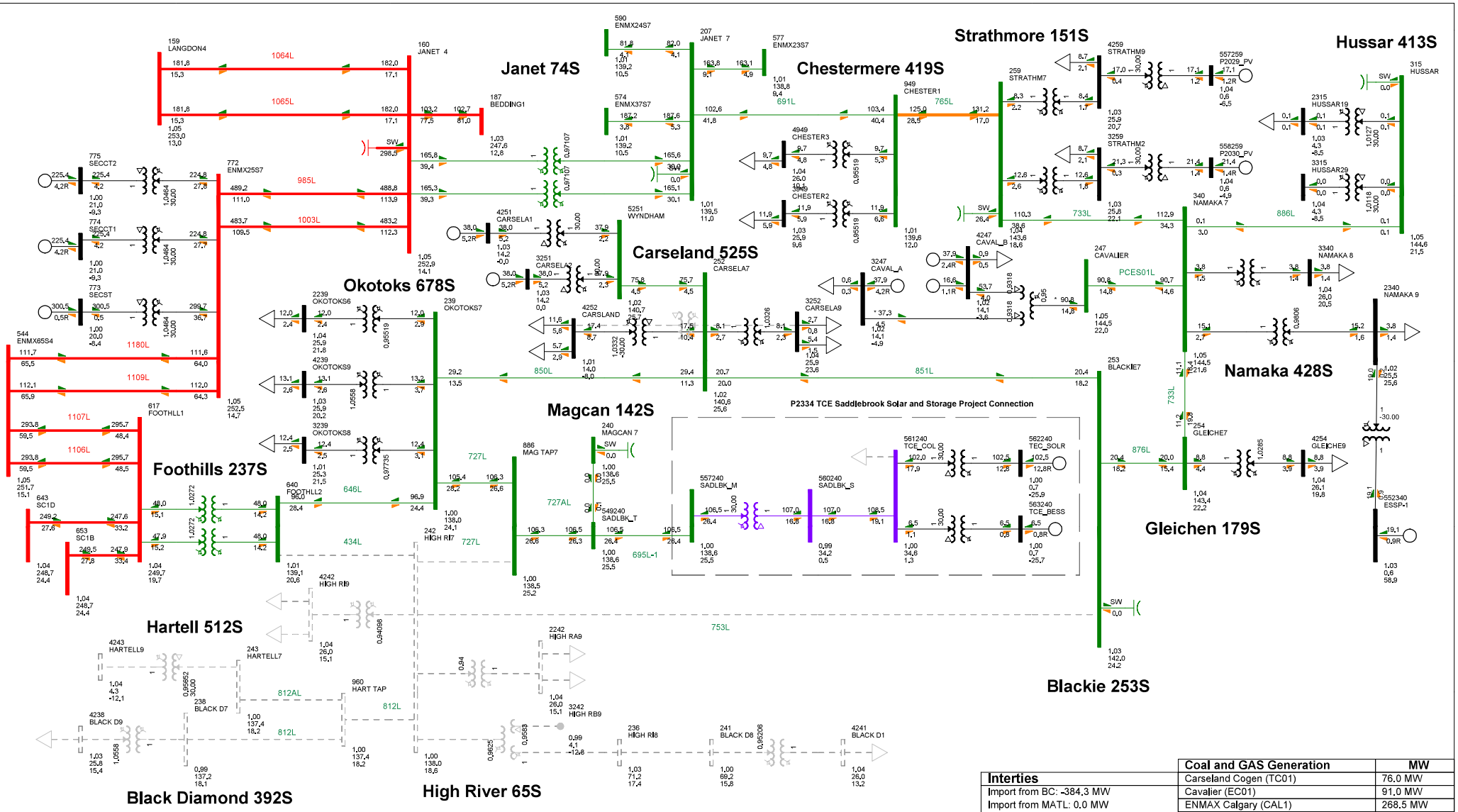
Interties	Coal and GAS Generation	MW
Import from BC: -334.4 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-11: P2334_2024SP_POST
CATEGORY A - NO CONTINGENCY
FRI, NOV 19 2021 14:31

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



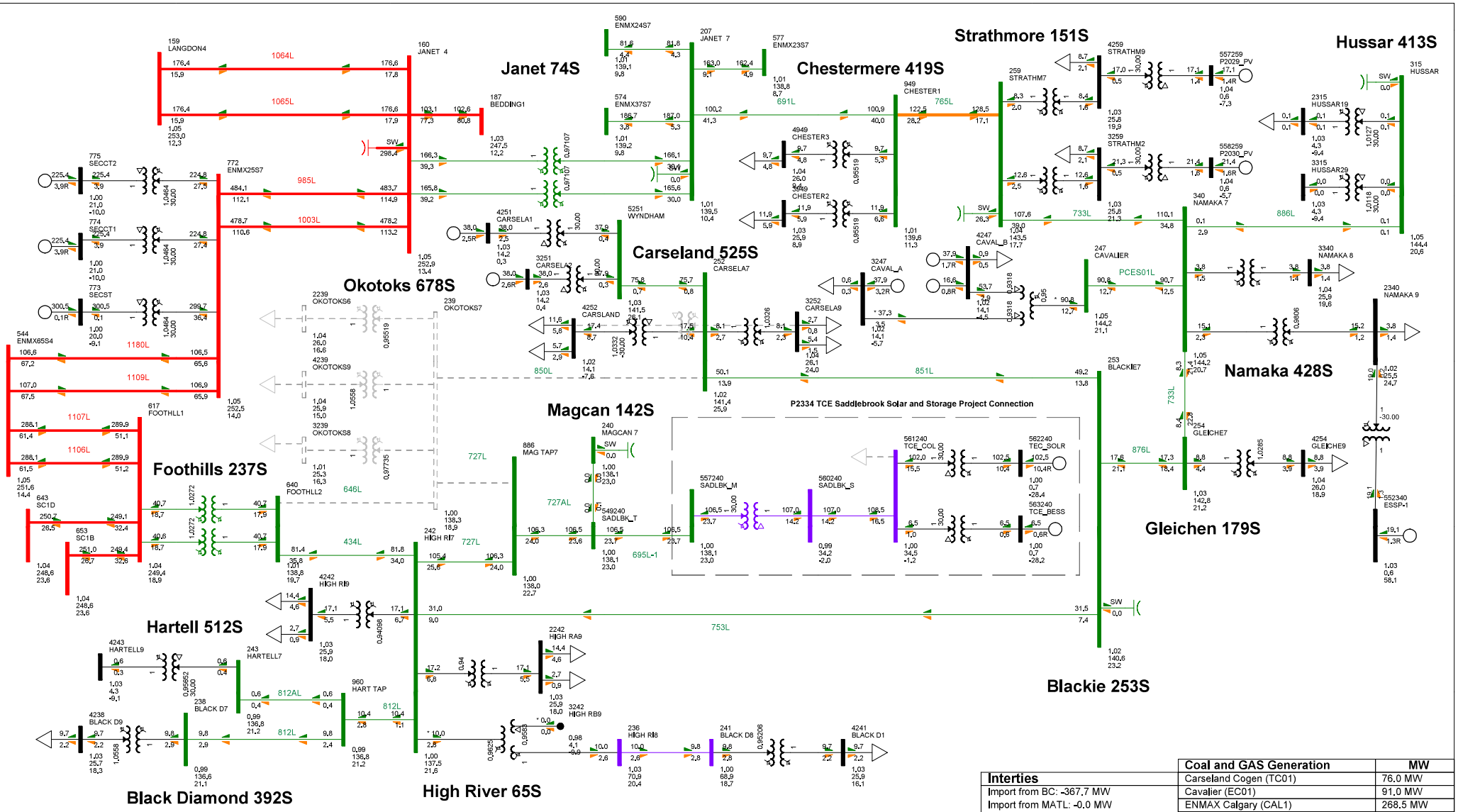
Interties	Coal and GAS Generation	MW
Import from BC: -384.3 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-12: P2334_2024SP_POST
CATEGORY B - 65S HIGH RIVER T1
FRI, NOV 19 2021 14:34

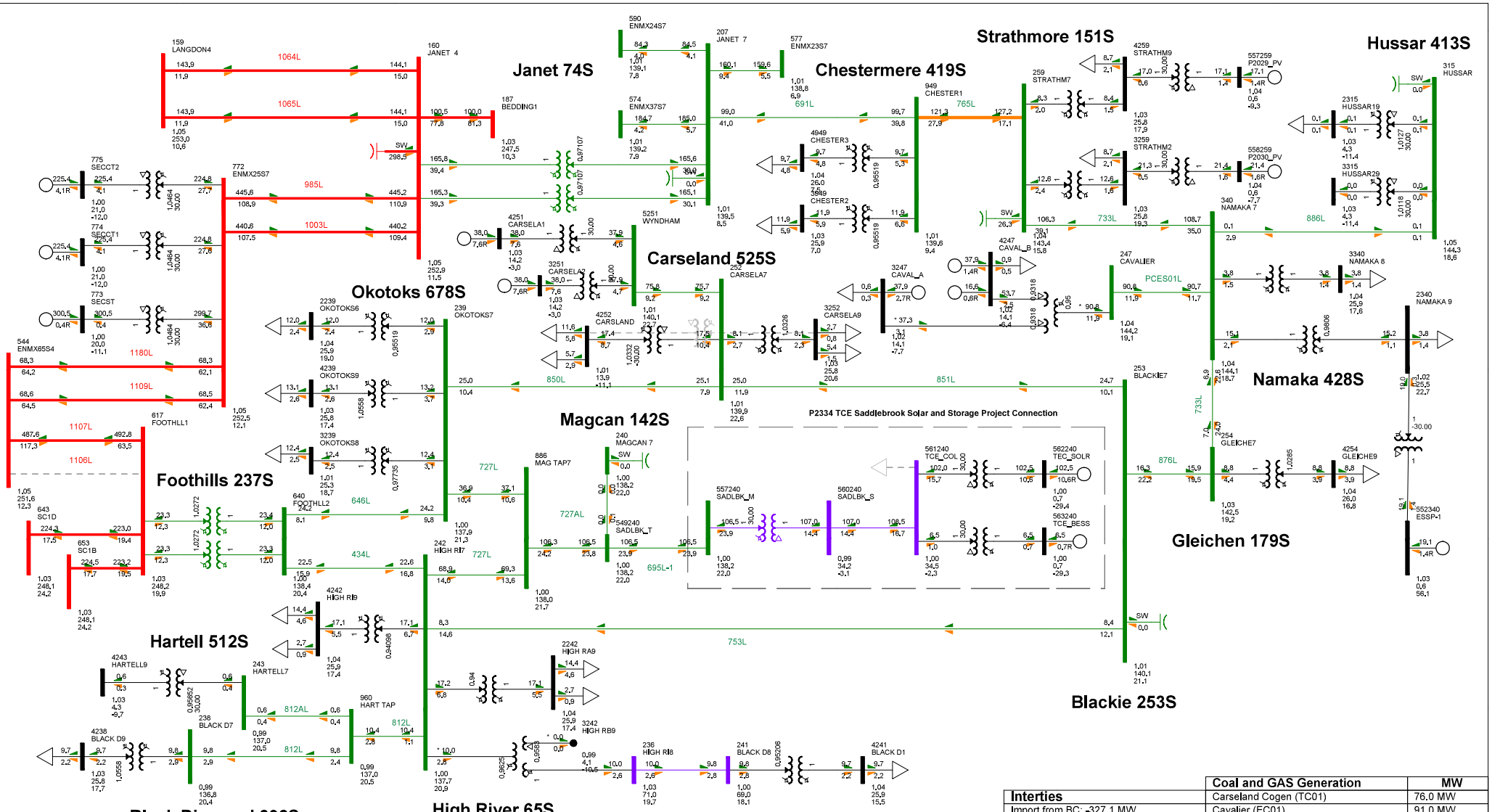
Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	Coal and GAS Generation	MW
Import from BC: -367.7 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage	AESO Project Number: P2334	FIGURE A3-13: P2334_2024SP_POST CATEGORY B - 678S OKOTOKS T1 FRI, NOV 19 2021 14:34

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



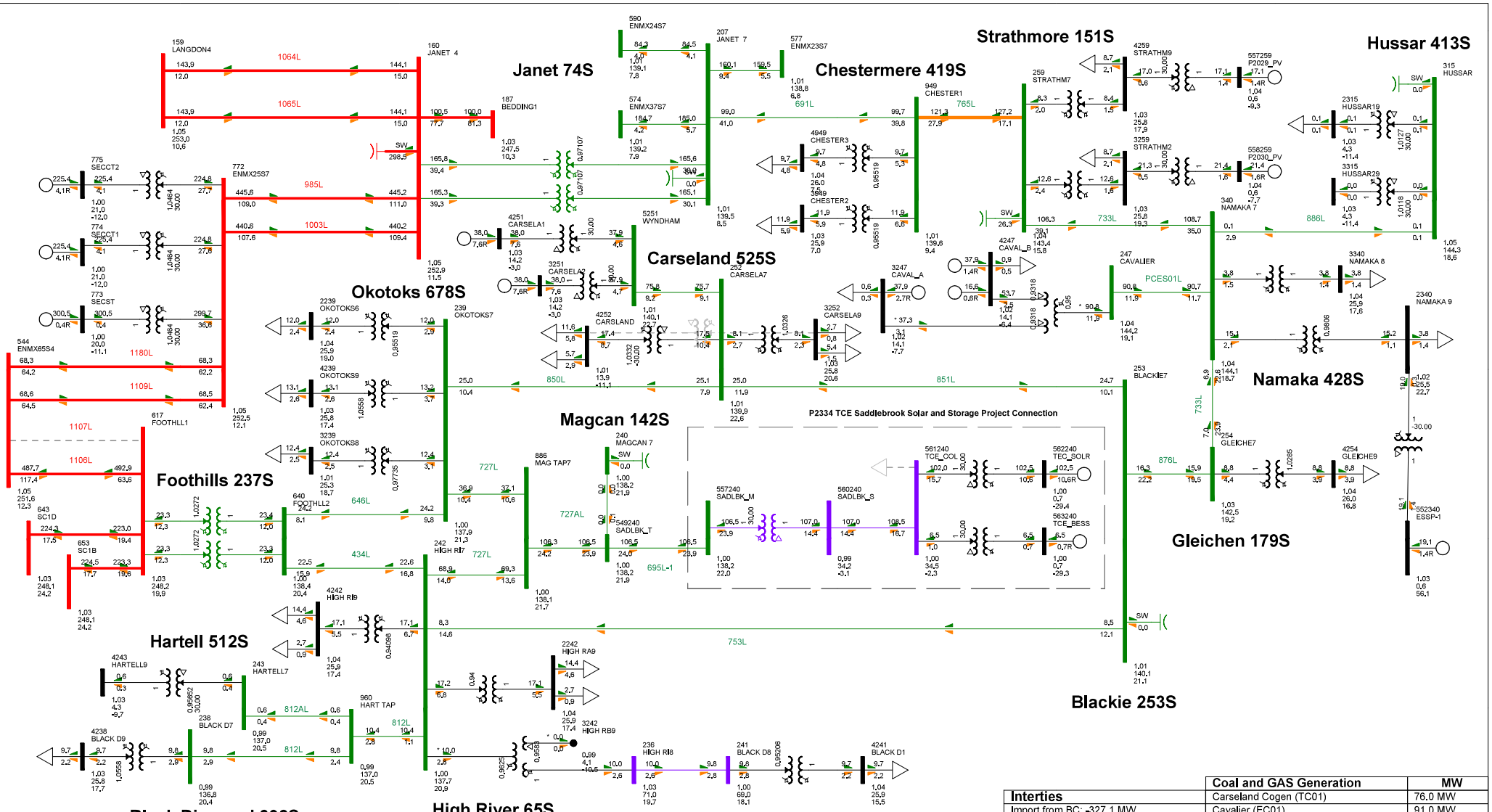
Interties	Coal and GAS Generation	MW
Import from BC: -327.1 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-14: P2334_2024SP_POST
CATEGORY B - 1106L (FOOTHILLS 237S - ENMAX SS65)
FRI, NOV 19 2021 14:36

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



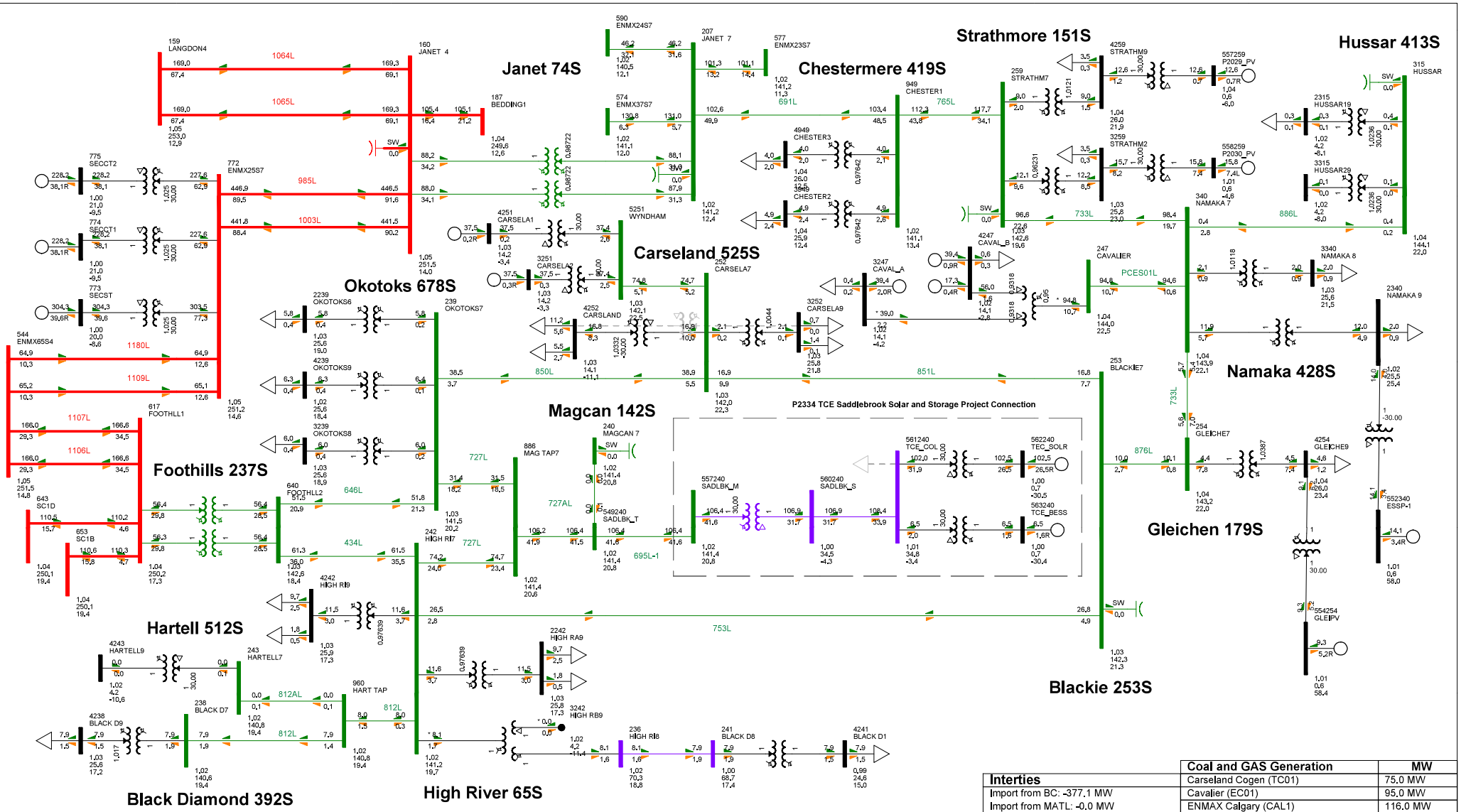
Interties	Coal and GAS Generation	MW
Import from BC: -327.1 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-15: P2334_2024SP_POST
CATEGORY B - 1107L (FOOTHILLS 237S - ENMAX SS65)
FRI, NOV 19 2021 14:36

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



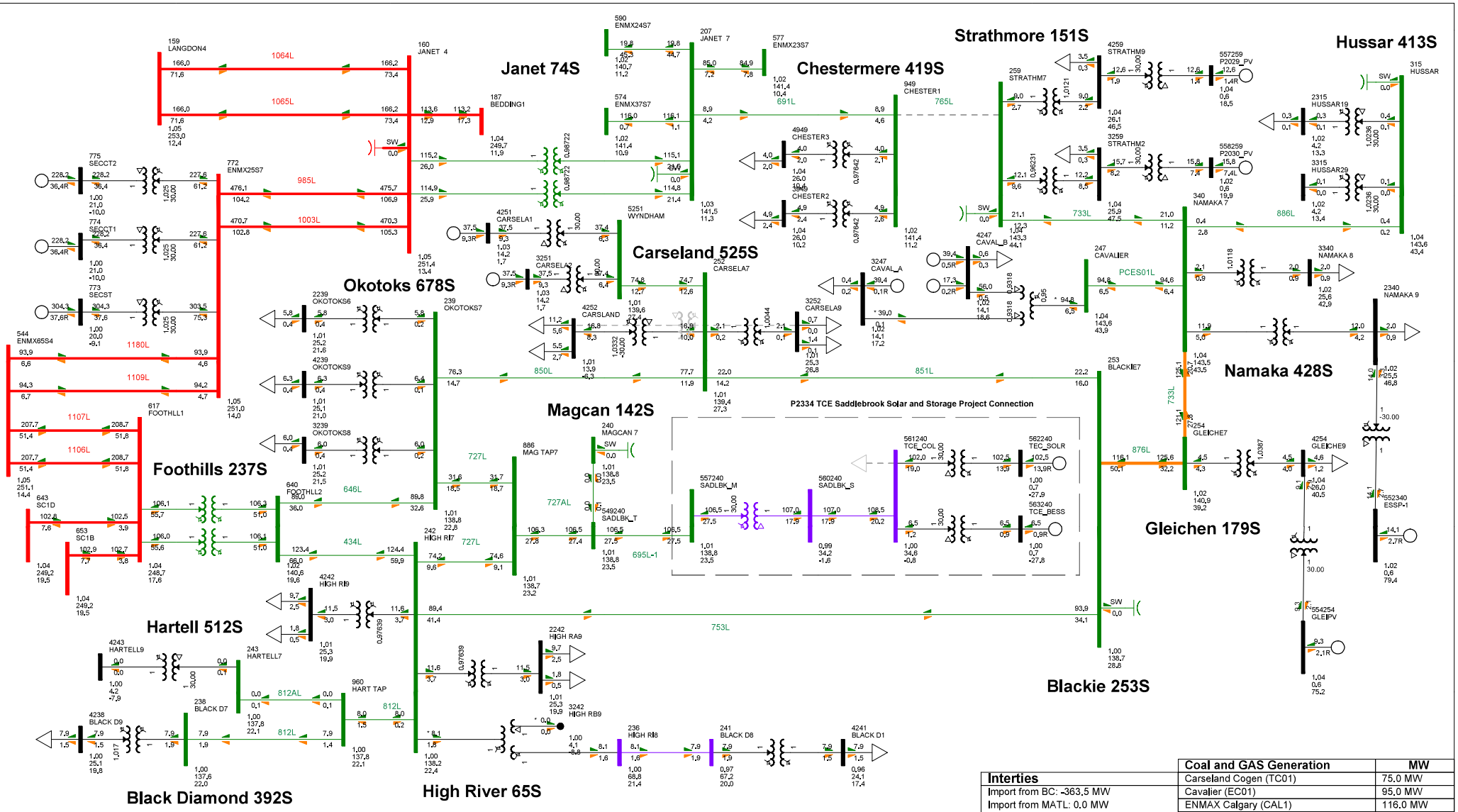
Interties	Coal and GAS Generation	MW
Import from BC: -377.1 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-16: P2334_2024SL_POST_SENS
CATEGORY A - NO CONTINGENCY
FRI, NOV 19 2021 14:37

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



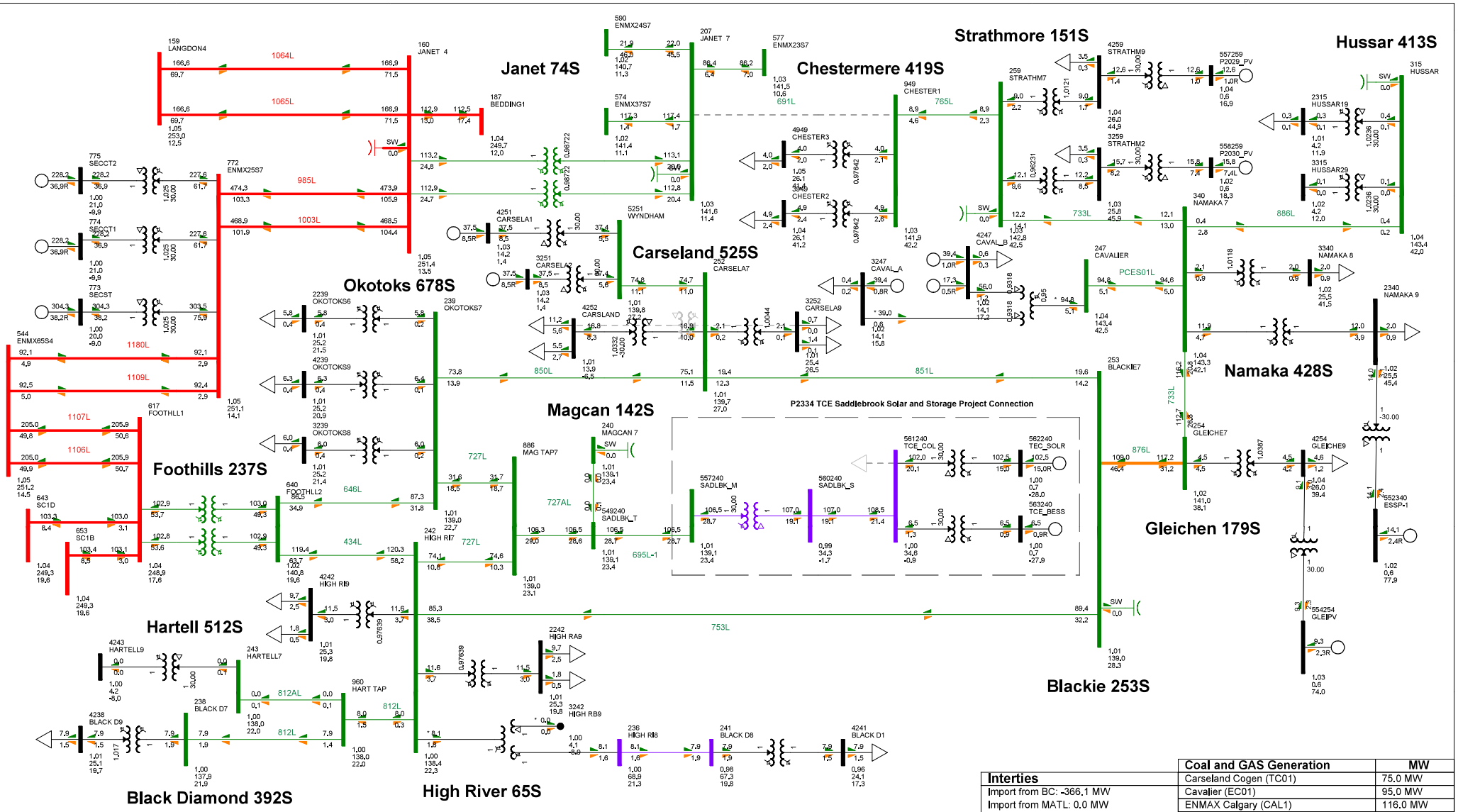
Interties	Coal and GAS Generation	MW
Import from BC: -363.5 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-17: P2334_2024SL_POST_SENS
CATEGORY B - 765L (STRATHMORE 151S - CHESTERMERE 419S)
FRI, NOV 19 2021 14:38

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	
Import from BC: -366.1 MW	
Import from MATL: 0.0 MW	
Import from SK: -0.1 MW	

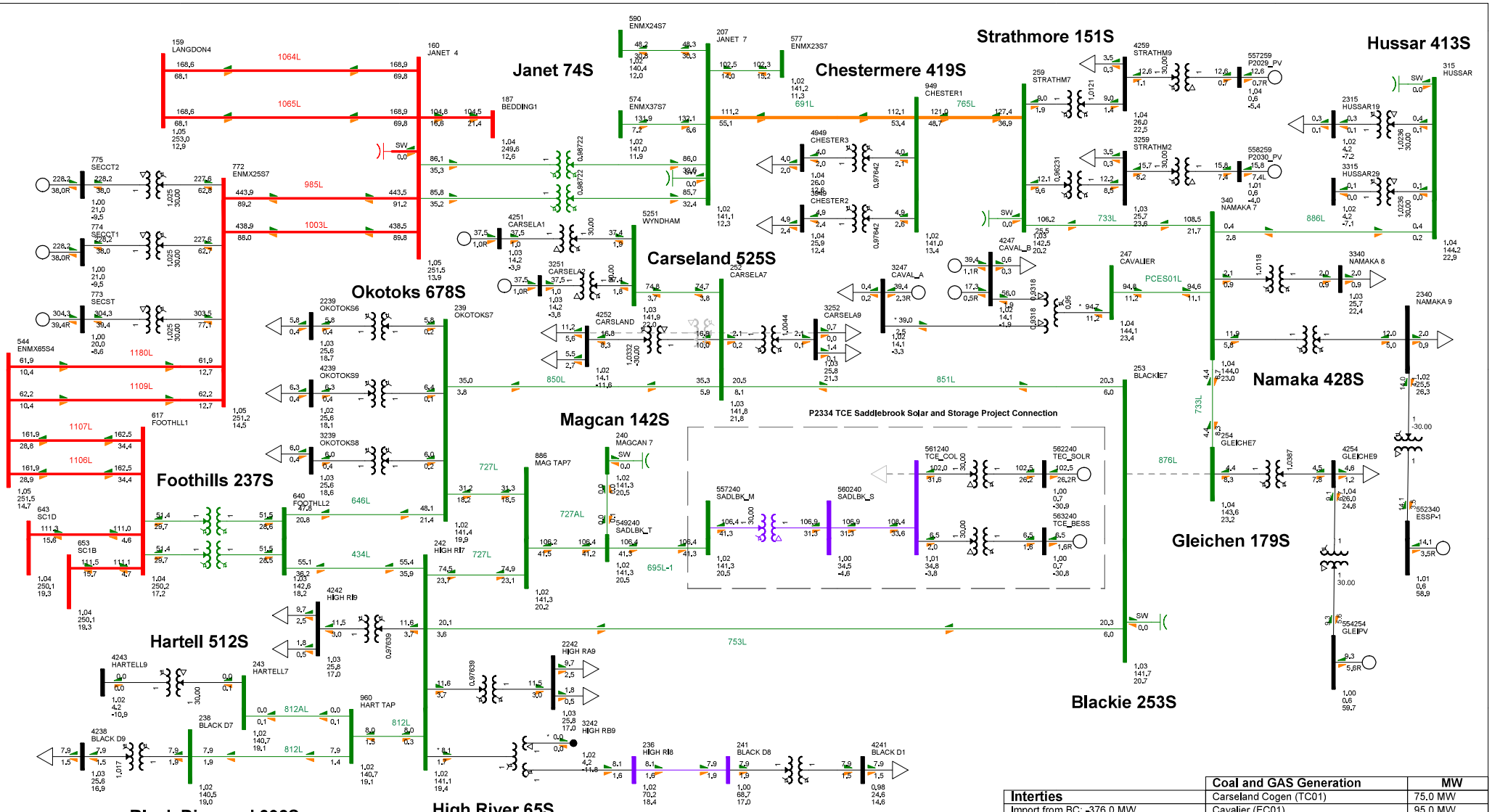
Coal and GAS Generation	MW
Carseland Cogen (TC01)	75.0 MW
Cavalier (EC01)	95.0 MW
ENMAX Calgary (CAL1)	116.0 MW
Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-18: P2334_2024SL_POST_SENS
CATEGORY B - 691L (CHESTERMERE 419S - JANET 74S)
FRI, NOV 19 2021 14:38

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



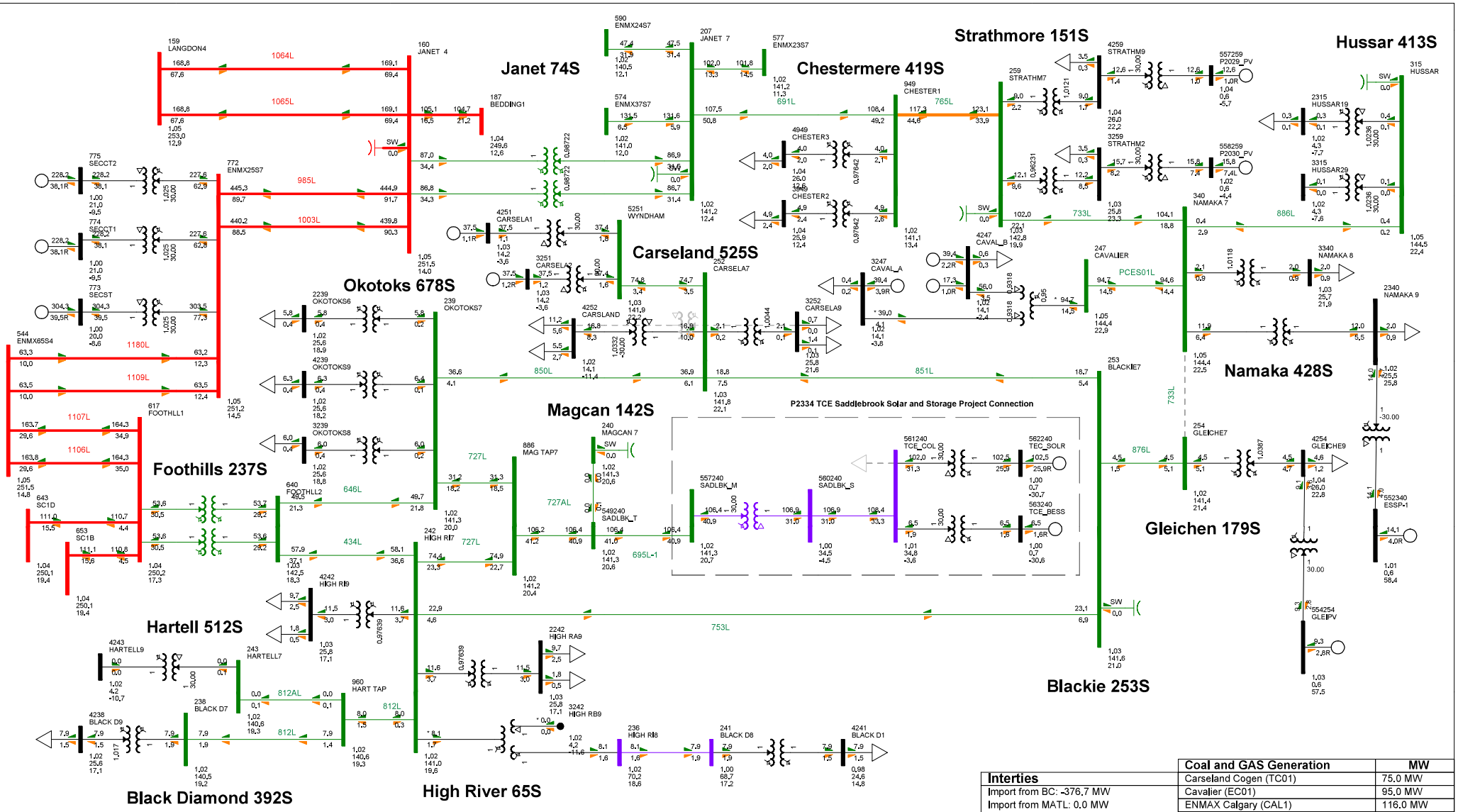
Interties	Coal and GAS Generation	MW
Import from BC: -376.0 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-19: P2334_2024SL_POST_SENS
CATEGORY B - 876L (BLACKIE 253S - GLEICHEN 179S)
FRI, NOV 19 2021 14:39

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



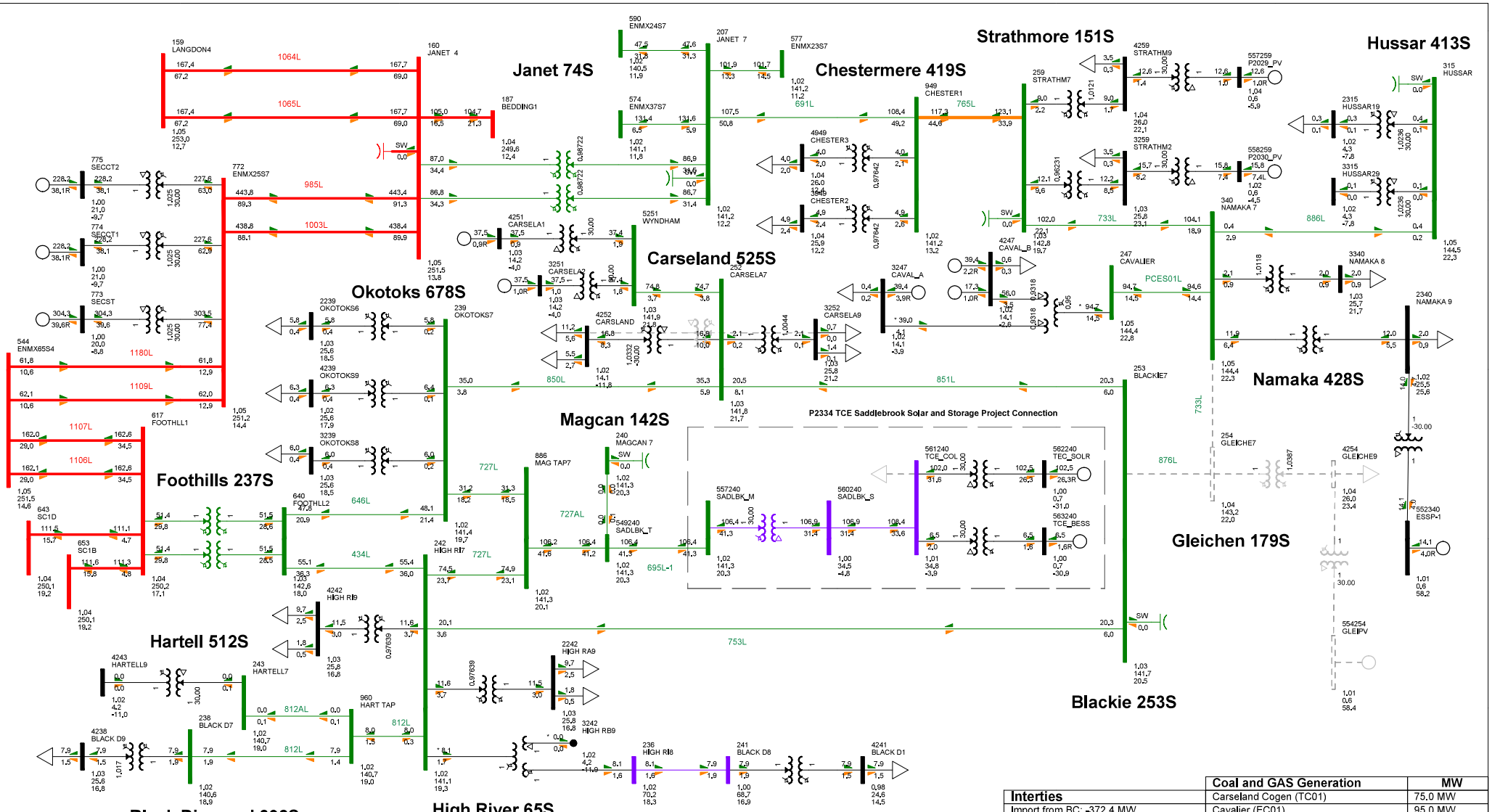
Interties	Coal and GAS Generation	MW
Import from BC: -376.7 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-20: P2334_2024SL_POST_SENS
CATEGORY B - 733L (GLEICHEN 179S - NAMAKA 428S)
FRI, NOV 19 2021 14:39

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



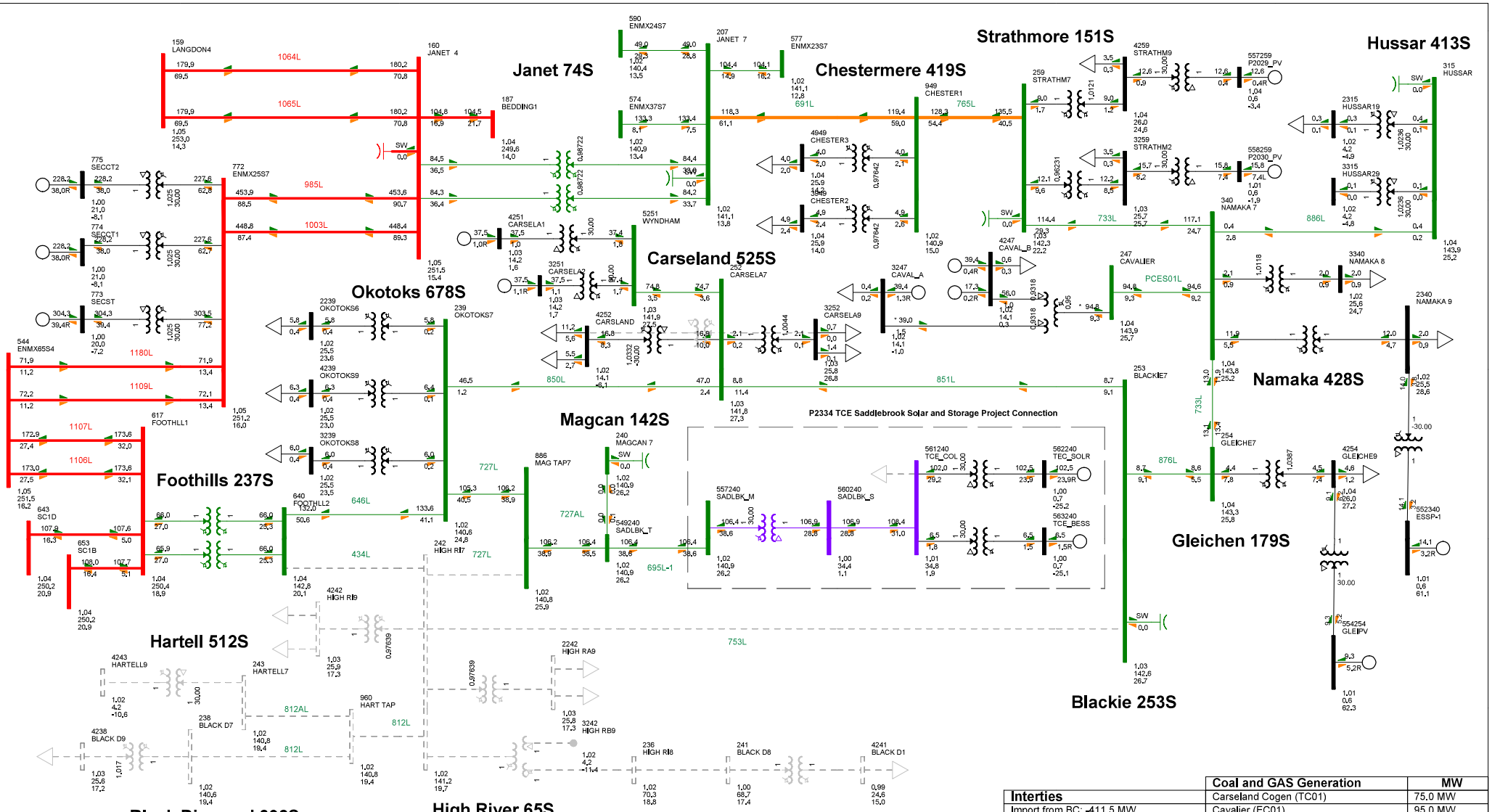
Interties	Coal and GAS Generation	MW
Import from BC: -372.4 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-21: P2334_2024SL_POST_SENS
CATEGORY B - 179S GLEICHEN T1
FRI, NOV 19 2021 14:39

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	
Import from BC: -411.5 MW	
Import from MATL: -0.0 MW	
Import from SK: -0.1 MW	

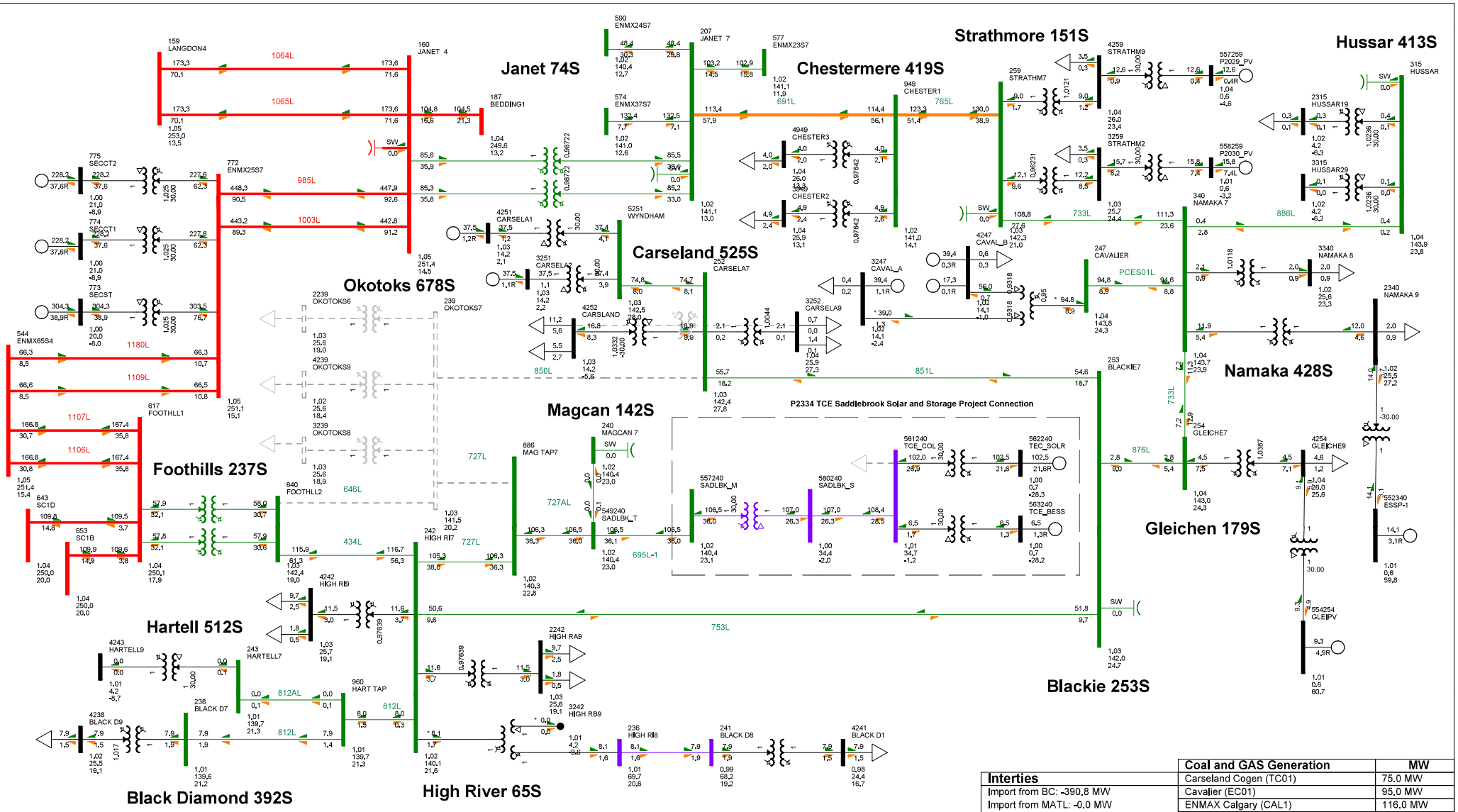
Coal and GAS Generation	MW
Carseland Cogen (TC01)	75.0 MW
Cavalier (EC01)	95.0 MW
ENMAX Calgary (CAL1)	116.0 MW
Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-22: P2334_2024SL_POST_SENS
CATEGORY B - 65S HIGH RIVER T1
FRI, NOV 19 2021 14:40

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



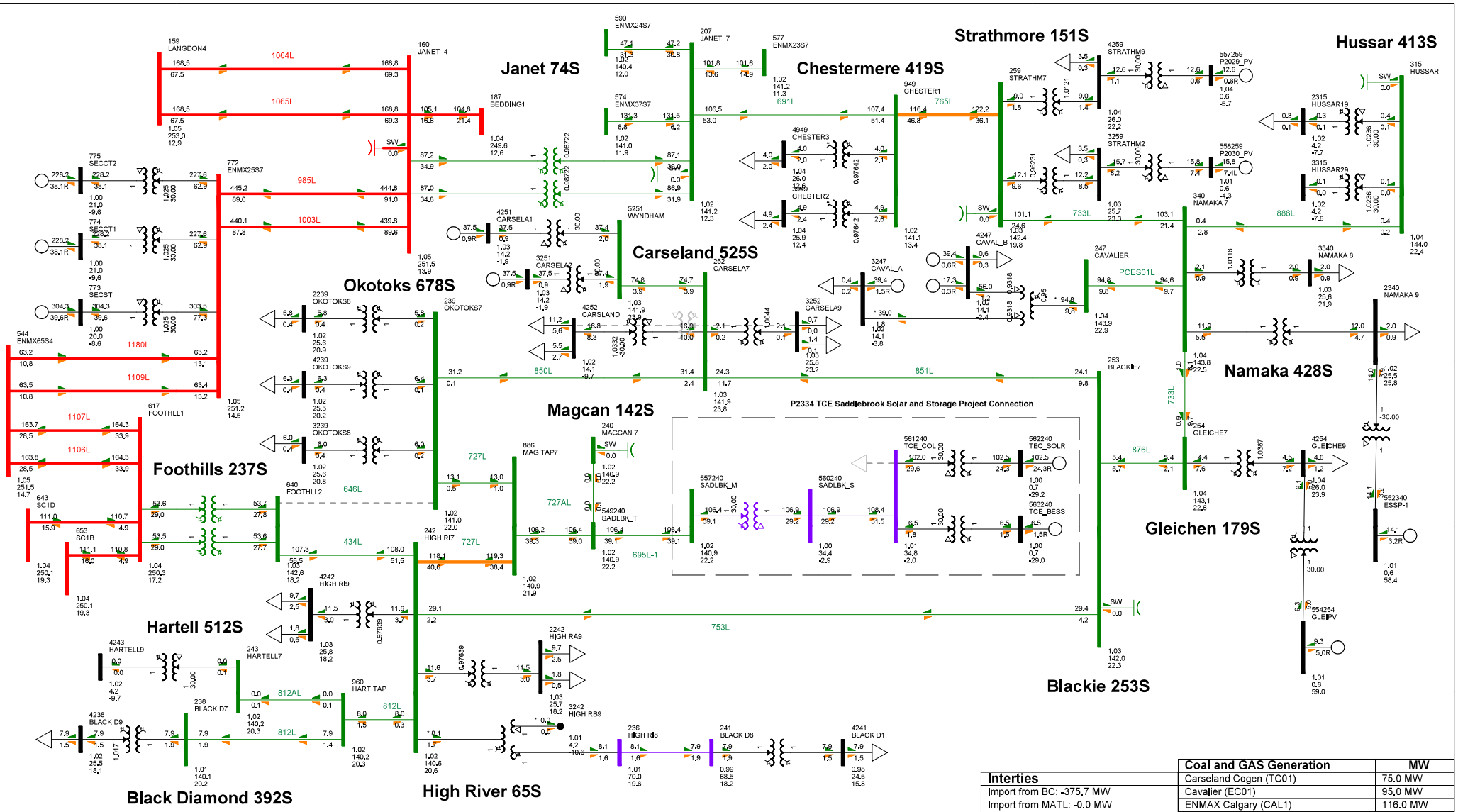
Interties	Coal and GAS Generation	MW
Import from BC: -390.8 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-23: P2334_2024SL_POST_SENS
CATEGORY B - 678S OKOTOKS T1
FRI, NOV 19 2021 14:40

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



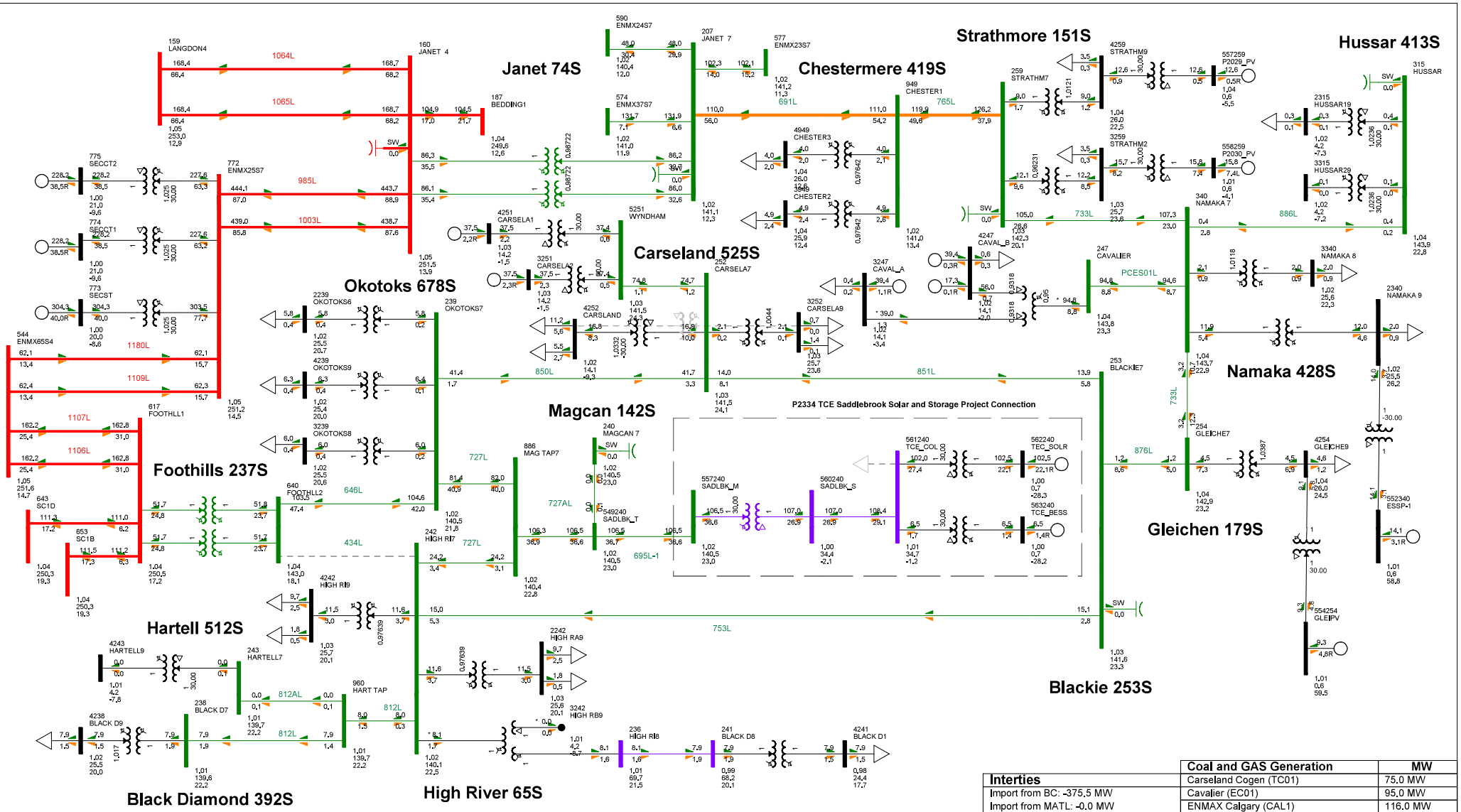
Interties	Coal and GAS Generation	MW
Import from BC: -375.7 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-24: P2334_2024SL_POST_SENS
CATEGORY B - 646L (OKOTOKS 678S - FOOTHILLS 237S)
FRI, NOV 19 2021 14:40

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



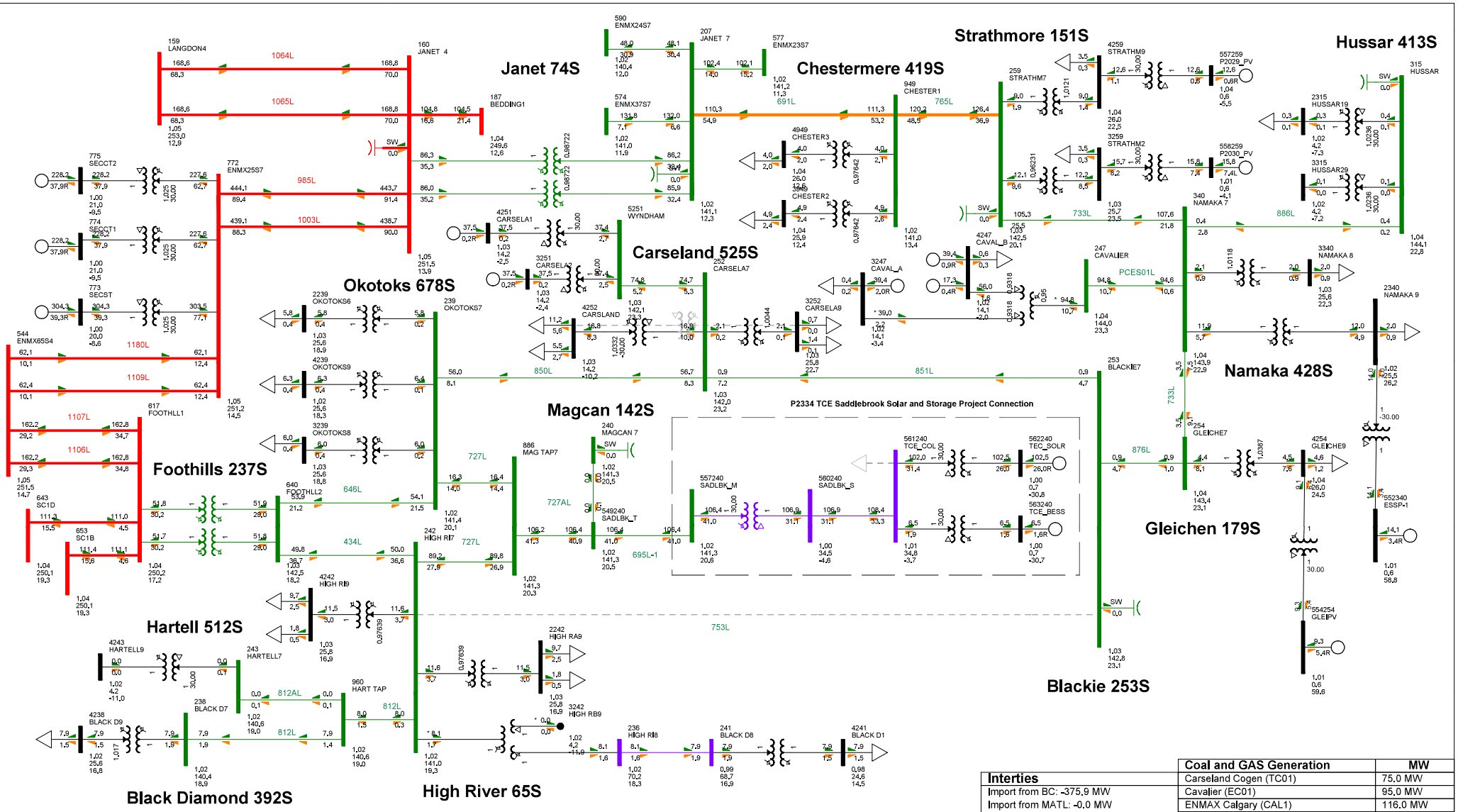
Interties	Coal and GAS Generation	MW
Import from BC: -375.5 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-25: P2334_2024SL_POST_SENS
CATEGORY B - 434L (FOOTHILLS 237S - HIGH RIVER 65S)
FRI, NOV 19 2021 14:41

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



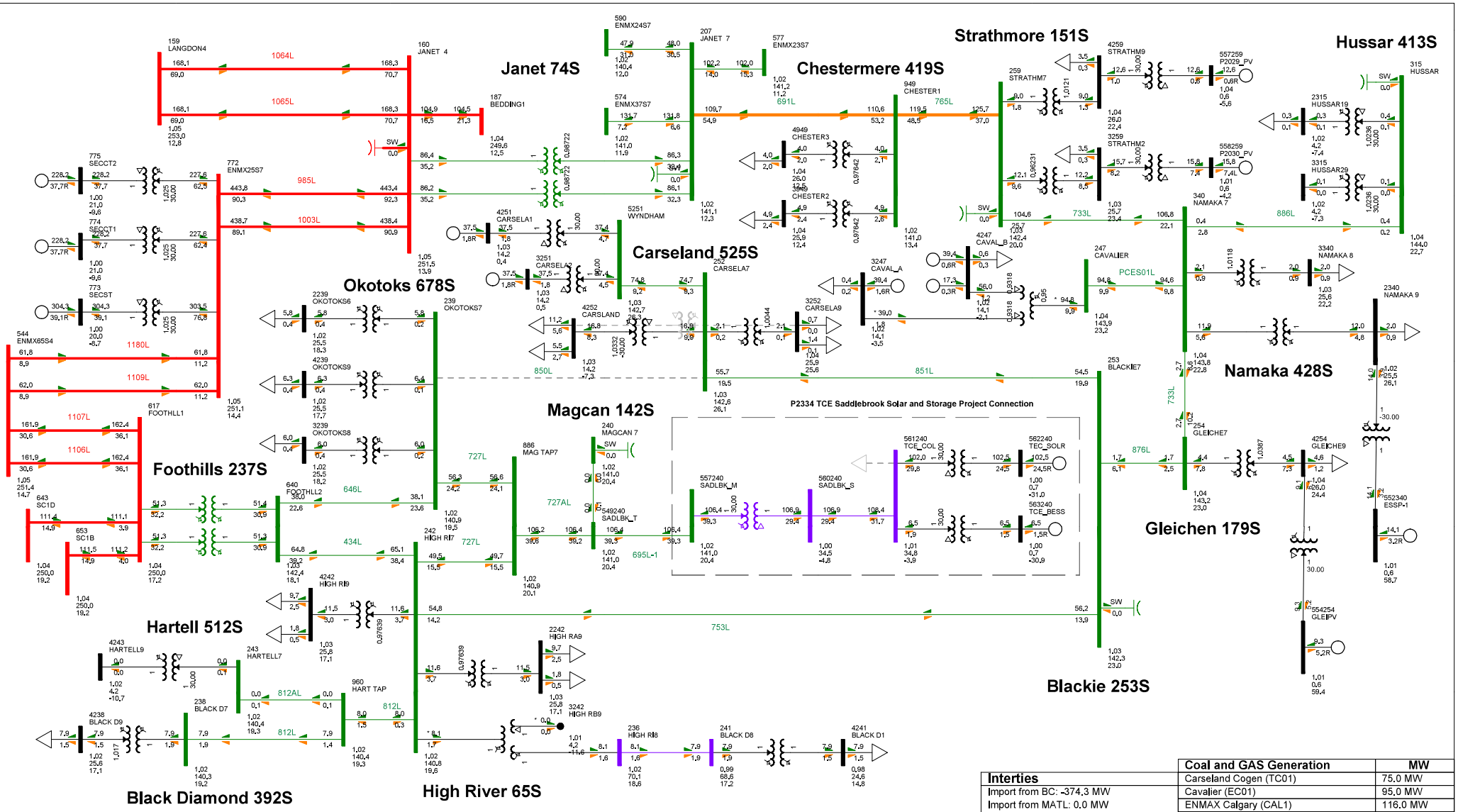
Interties	Coal and GAS Generation	MW
Import from BC: -375.9 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-26: P2334_2024SL_POST_SENS
CATEGORY B - 753L (HIGH RIVER 65S - BLACKIE 253S)
FRI, NOV 19 2021 14:41

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



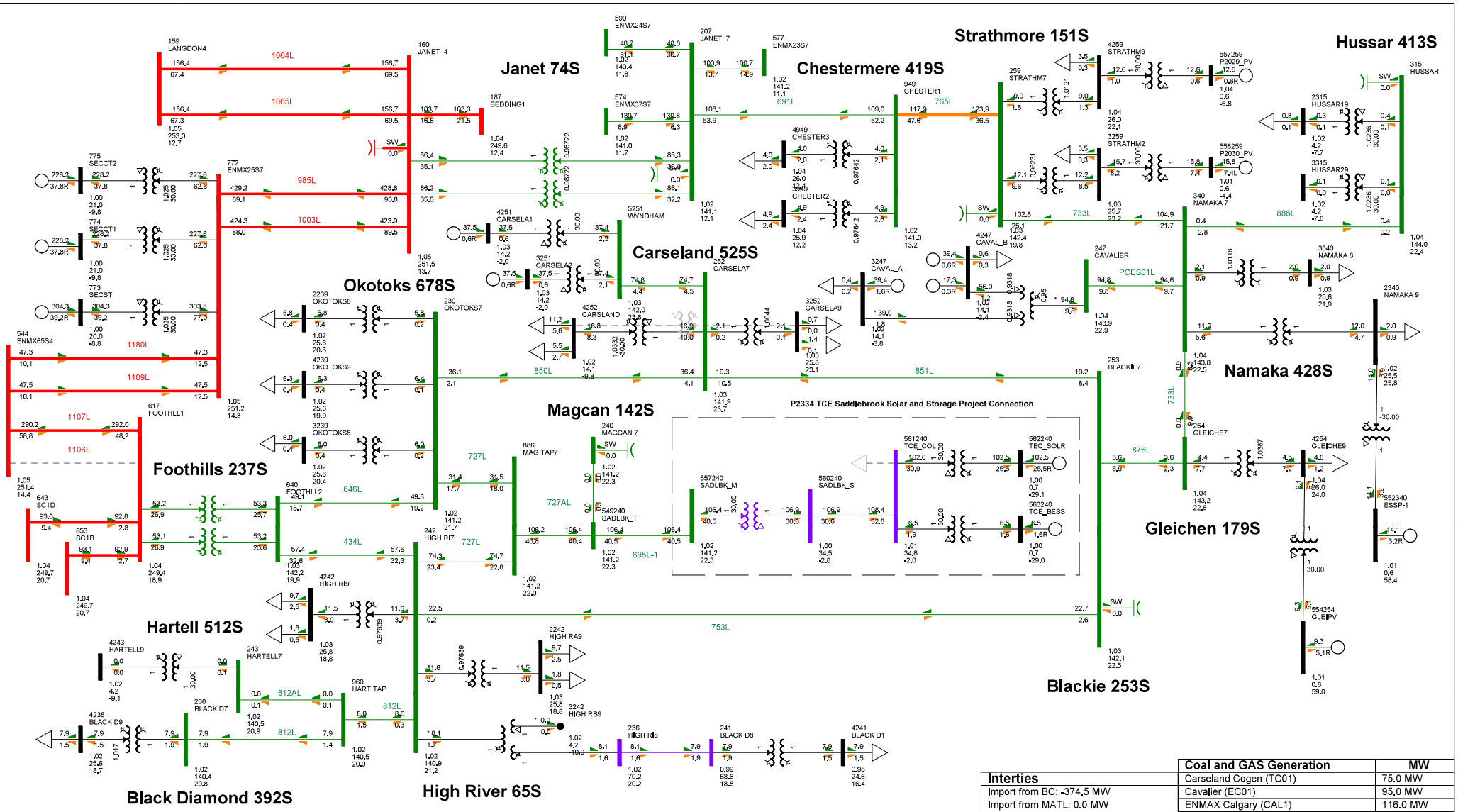
Interties	Coal and GAS Generation	MW
Import from BC: -374.3 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-27: P2334_2024SL_POST_SENS
CATEGORY B - 850L (CARSELAND 525S - OKOTOKS 678S)
FRI, NOV 19 2021 14:42

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



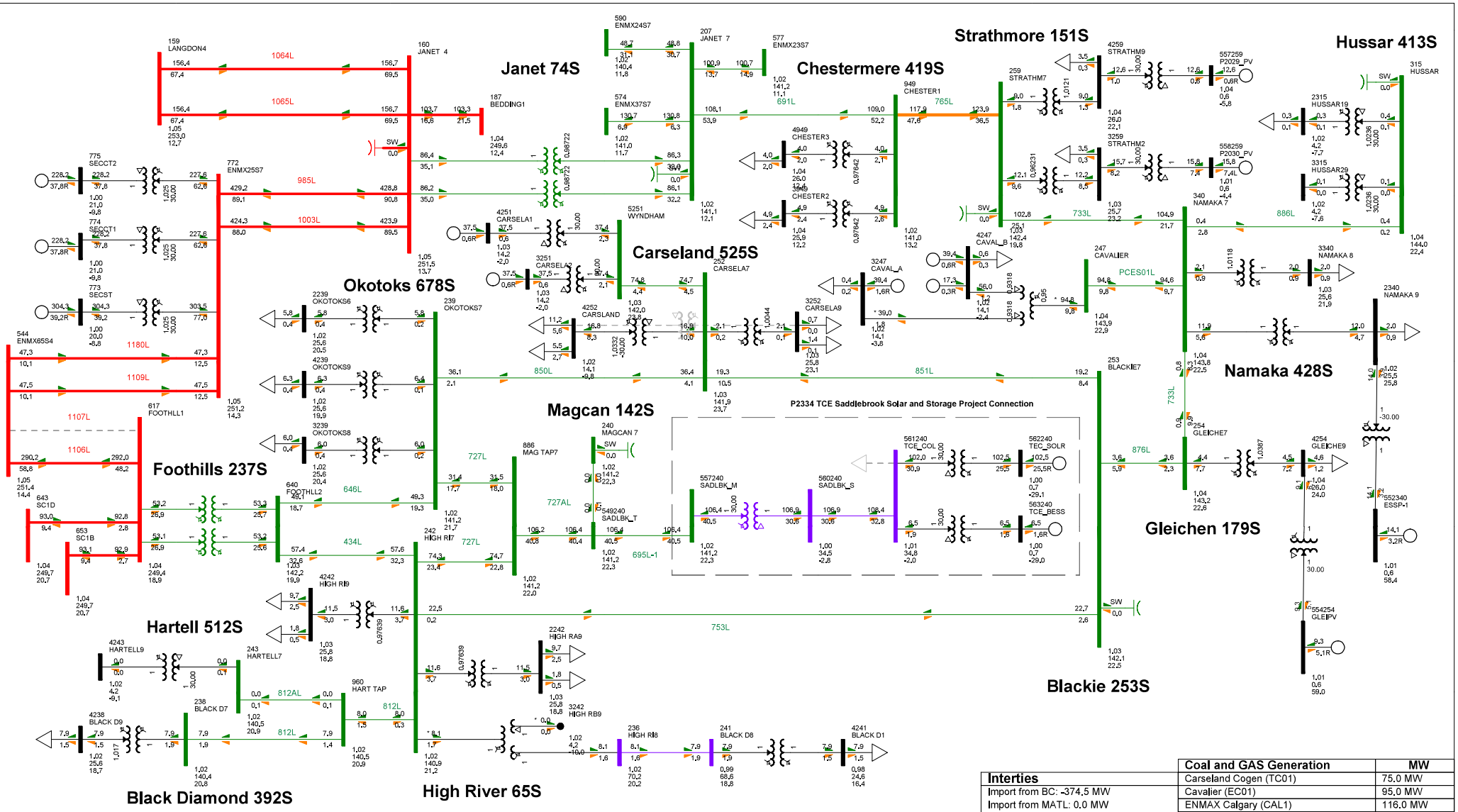
Interties	Coal and GAS Generation	MW
Import from BC: -374.5 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-28: P2334_2024SL_POST_SENS
CATEGORY B - 1106L (FOOTHILLS 237S - ENMAX SS65)
FRI, NOV 19 2021 14:42

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



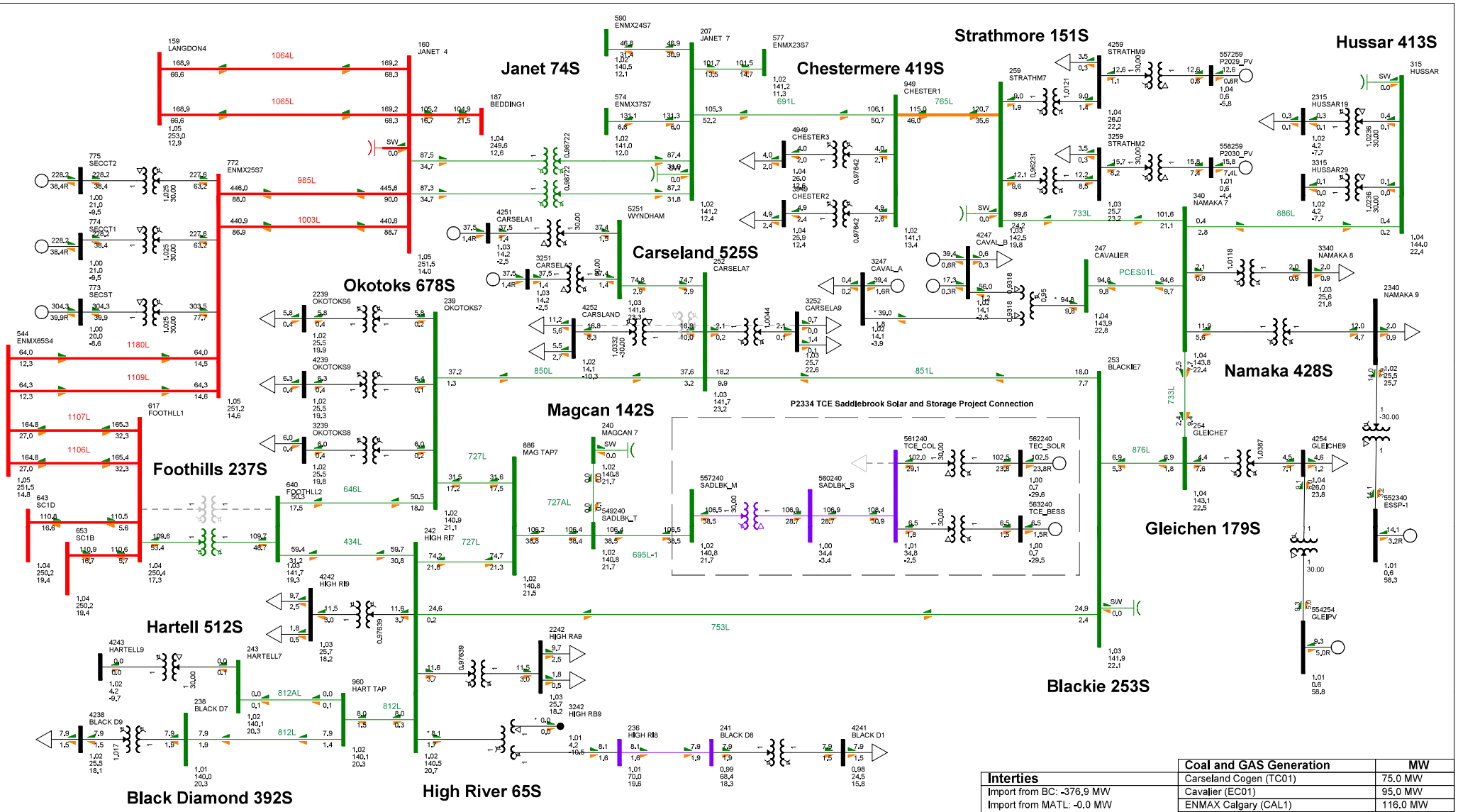
Interties	Coal and GAS Generation	MW
Import from BC: -374.5 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-29: P2334_2024SL_POST_SENS
CATEGORY B - 1107L (FOOTHILLS 237S - ENMAX SS65)
FRI, NOV 19 2021 14:47

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



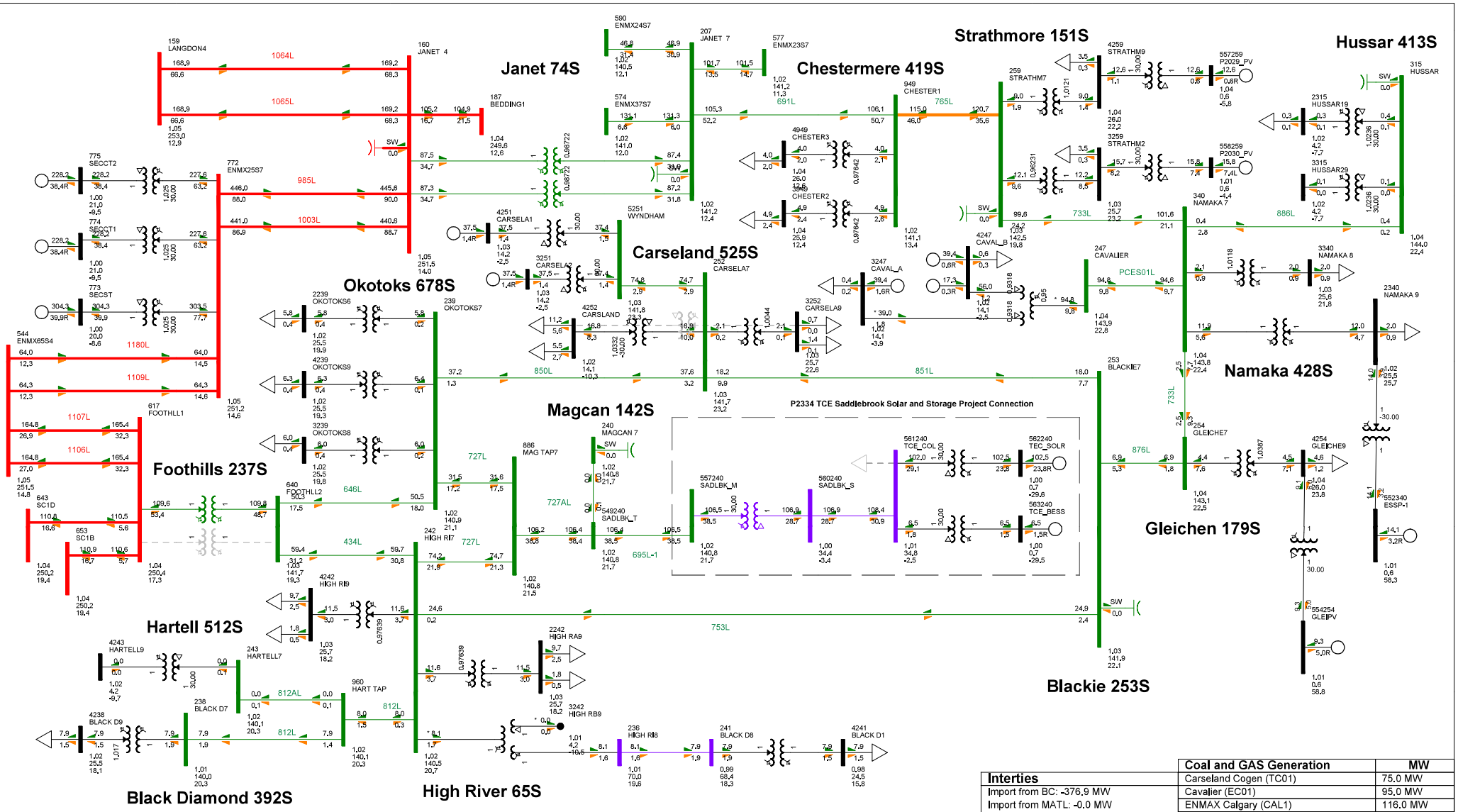
Interties	Coal and GAS Generation	MW
Import from BC: -376.9 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-30: P2334_2024SL_POST_SENS
CATEGORY B - FOOTHILLS 237S T1
FRI, NOV 19 2021 15:47

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



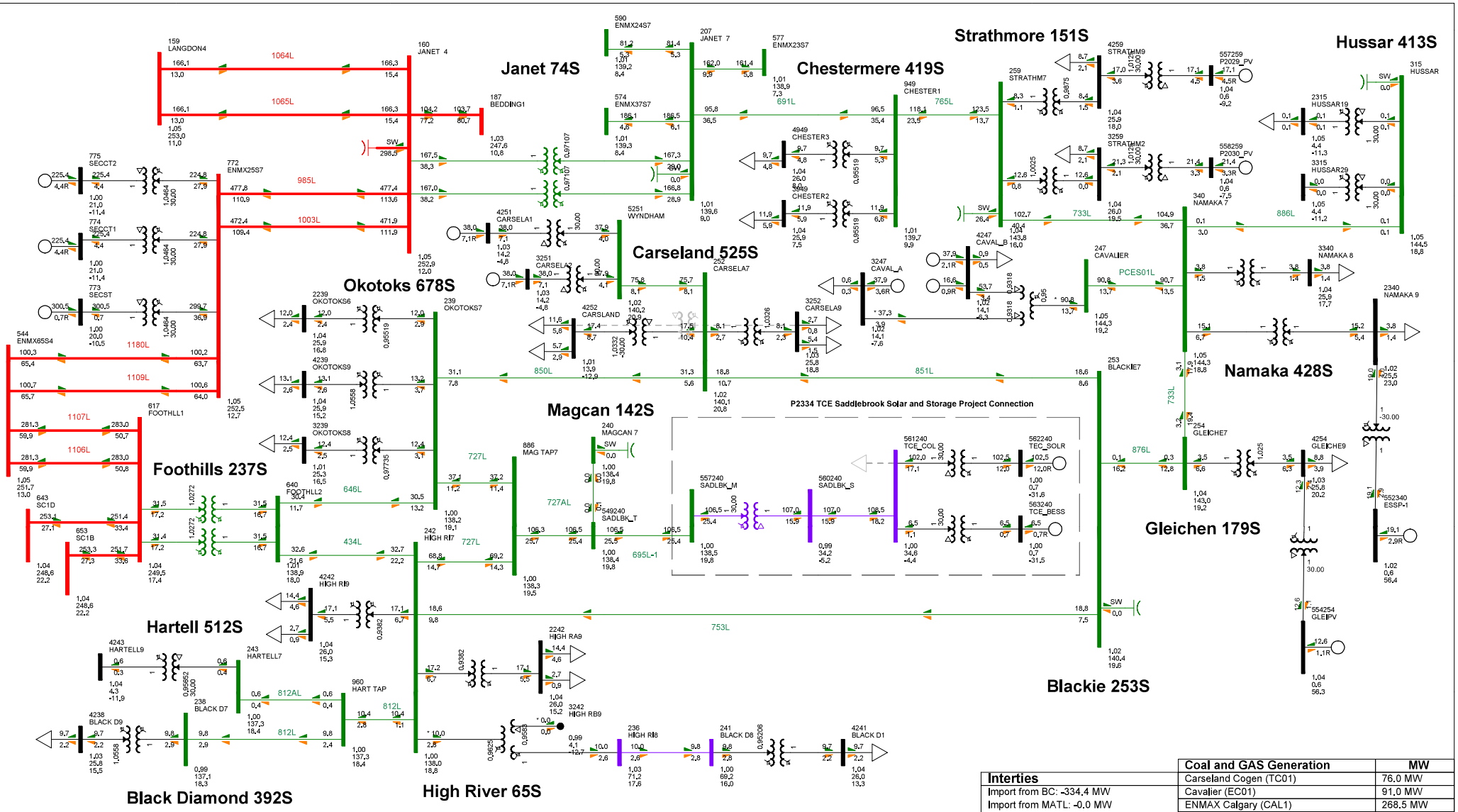
Interties	Coal and GAS Generation	MW
Import from BC: -376.9 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

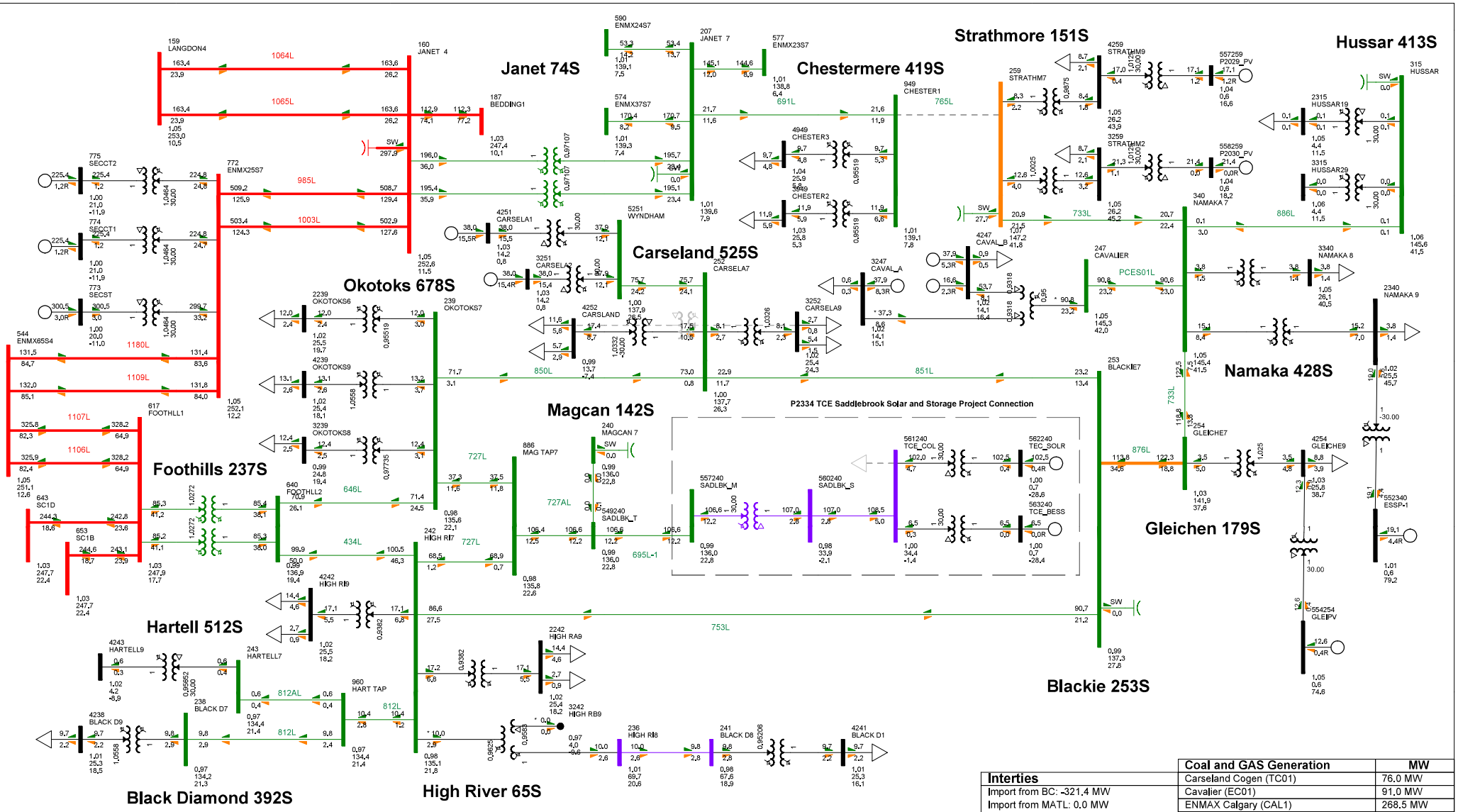
FIGURE A3-31 P2334_2024SL_POST_SENS
CATEGORY B - FOOTHILLS 237S T2
FRI, NOV 19 2021 15:47

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	Coal and GAS Generation	MW
Import from BC: -334.4 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage	AESO Project Number: P2334	FIGURE A3-32: P2334_2024SP_POST_SENS CATEGORY A - NO CONTINGENCY FRI, NOV 19 2021 14:48	Bus - Voltage (kV/pu)/Angle Branch - MW/Mvar Equipment - MW/Mvar 100.0%Rate A 1.100OV 0.900UV kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	
Import from BC: -321.4 MW	
Import from MATL: 0.0 MW	
Import from SK: -0.1 MW	

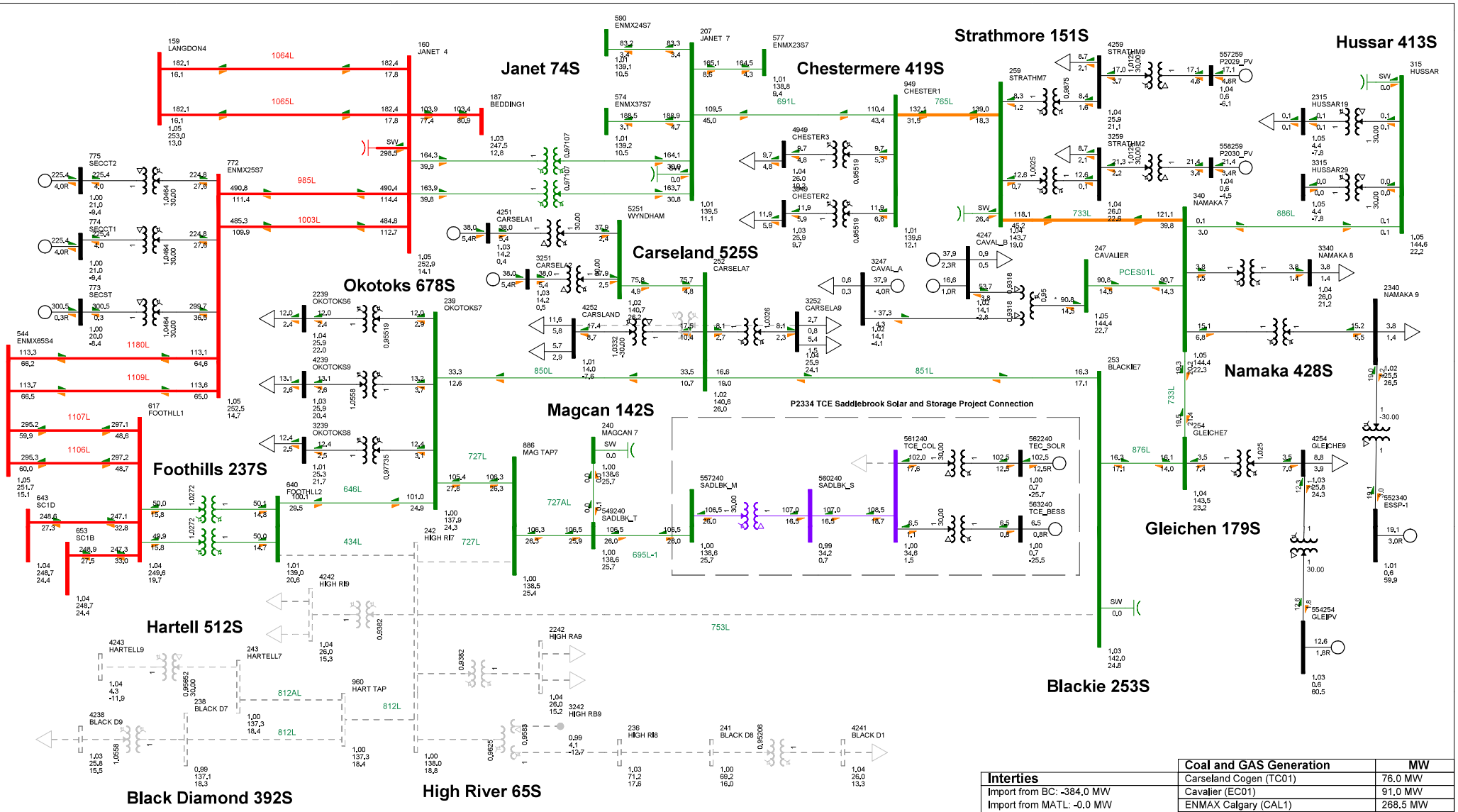
Coal and GAS Generation	MW
Carseland Cogen (TC01)	76.0 MW
Cavalier (EC01)	91.0 MW
ENMAX Calgary (CAL1)	268.5 MW
Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-33: P2334_2024SP_POST_SENS
CATEGORY B - 765L (STRATHMORE 151S - CHESTERMERE 419S)
FRI, NOV 19 2021 14:48

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	
Import from BC: -384.0 MW	
Import from MATL: -0.0 MW	
Import from SK: -0.1 MW	

Coal and GAS Generation	MW
Carseland Cogen (TC01)	76.0 MW
Cavalier (EC01)	91.0 MW
ENMAX Calgary (CAL1)	268.5 MW
Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-34: P2334_2024SP_POST_SENS
CATEGORY B - 65S HIGH RIVER T1
FRI, NOV 19 2021 14:58

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
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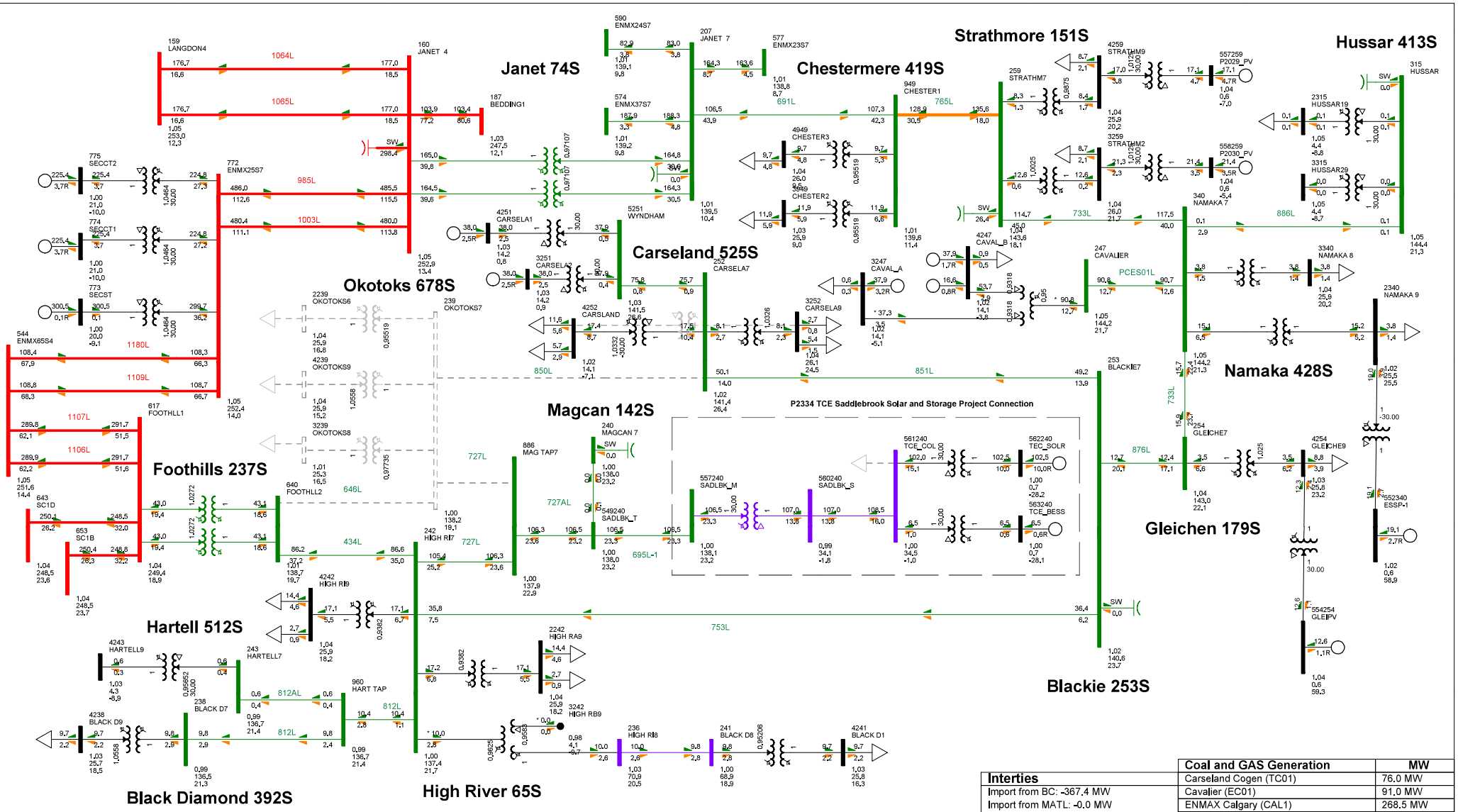


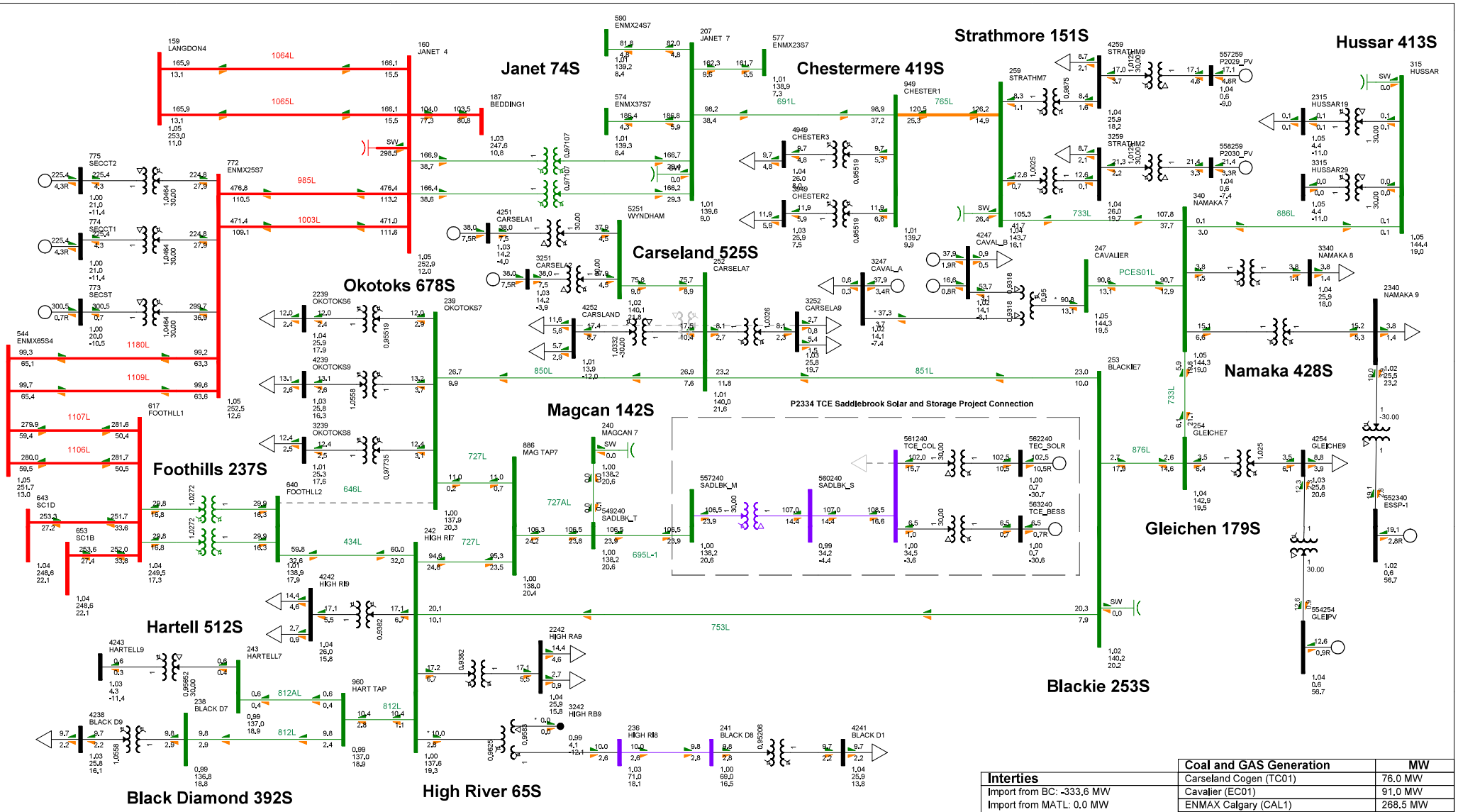
Interties	Coal and GAS Generation	MW
Import from BC: -367.4 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-35: P2334_2024SP_POST_SENS
CATEGORY B - 678S OKOTOKS T1
FRI, NOV 19 2021 14:59

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



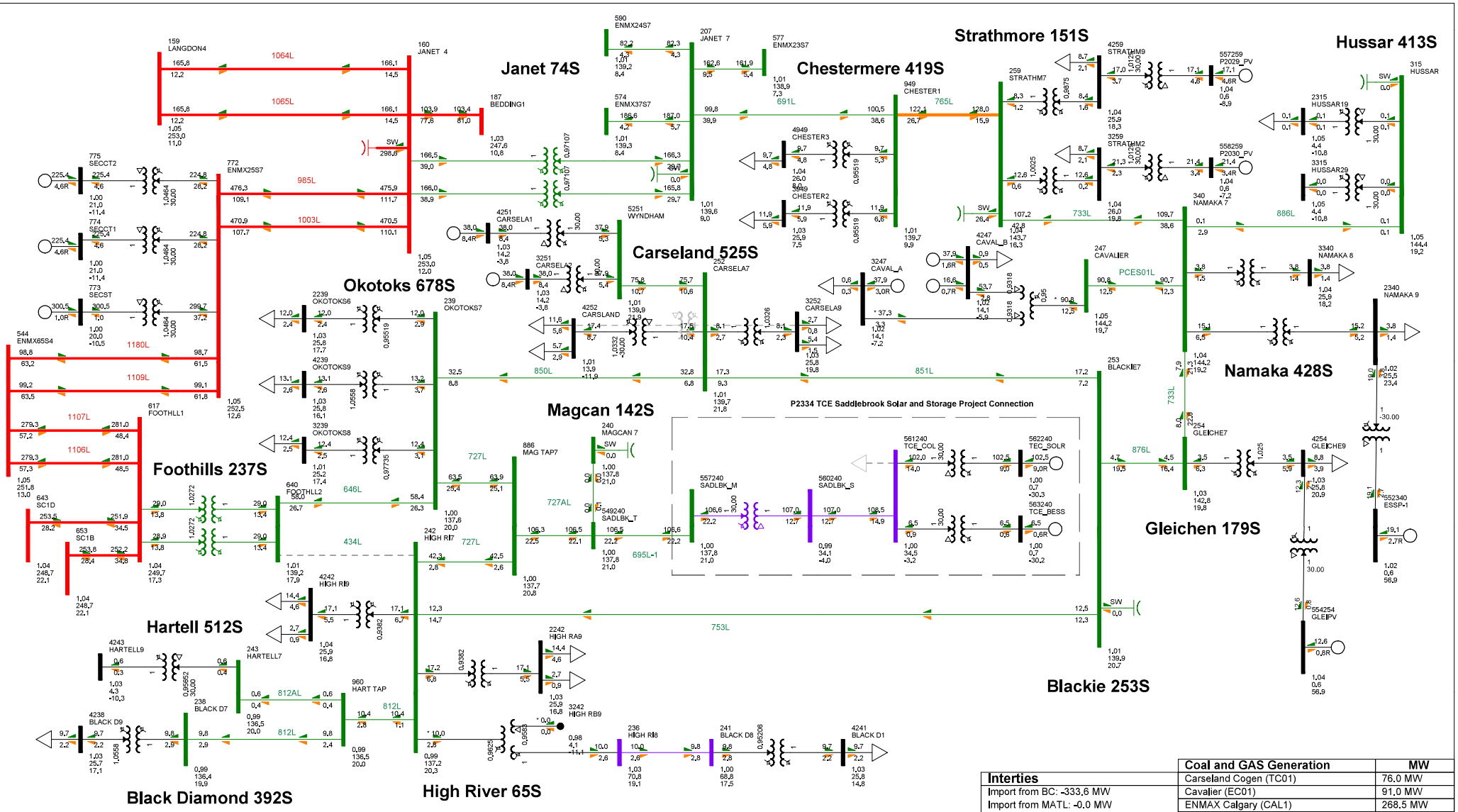
Interties	Coal and GAS Generation	MW
Import from BC: -333.6 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-36: P2334_2024SP_POST_SENS
CATEGORY B - 646L (OKOTOKS 678S - FOOTHILLS 237S)
FRI, NOV 19 2021 14:59

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



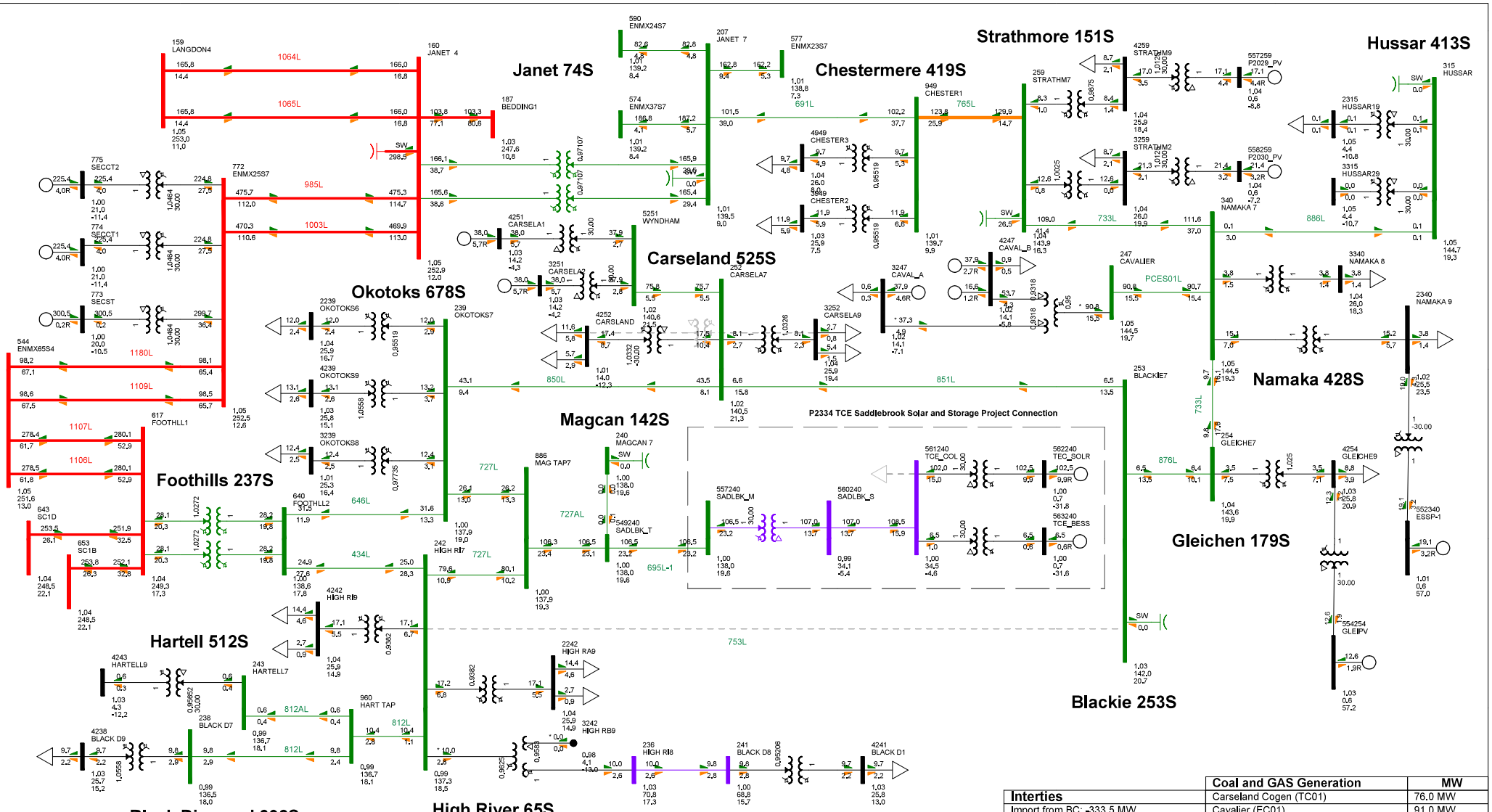
Interties	Coal and GAS Generation	MW
Import from BC: -333.6 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-37: P2334_2024SP_POST_SENS
CATEGORY B - 434L (FOOTHILLS 237S - HIGH RIVER 65S)
FRI, NOV 19 2021 14:59

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



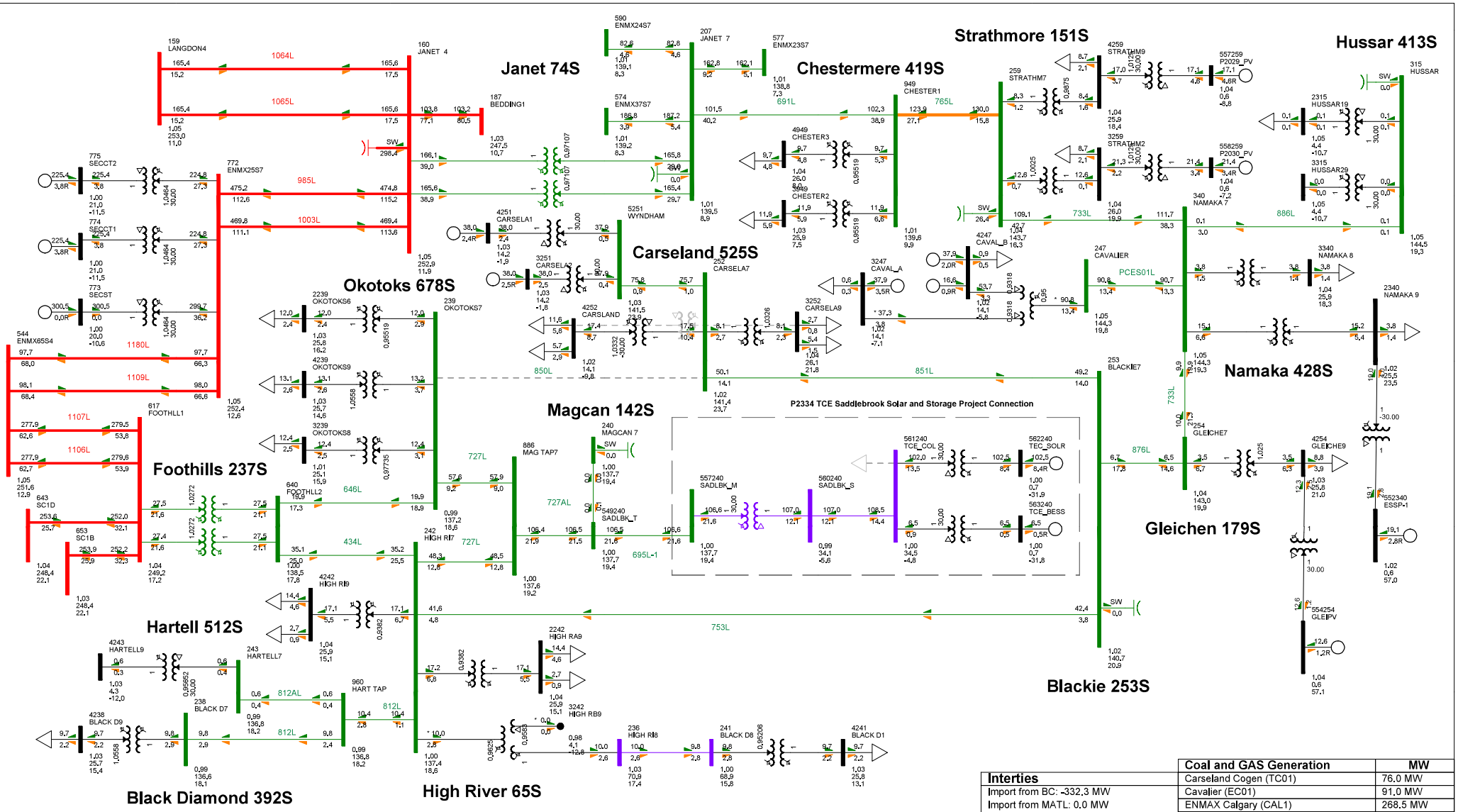
Interties	Coal and GAS Generation	MW
Import from BC: -333.5 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: -0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-38: P2334_2024SP_POST_SENS
CATEGORY B - 753L (HIGH RIVER 65S - BLACKIE 253S)
FRI, NOV 19 2021 14:59

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



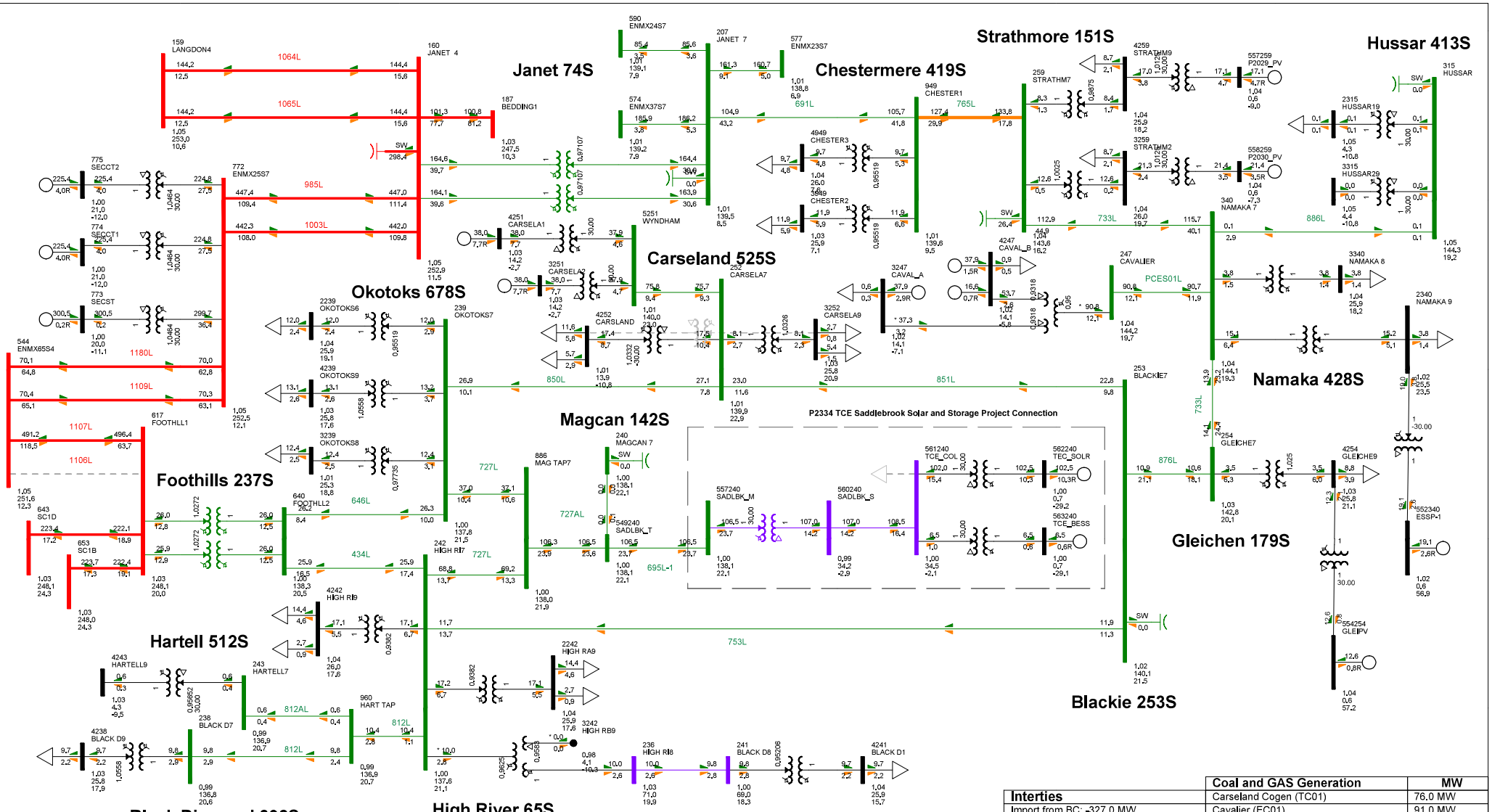
Interties	Coal and GAS Generation	MW
Import from BC: -332.3 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-39: P2334_2024SP_POST_SENS
CATEGORY B - 850L (CARSELAND 525S - OKOTOKS 678S)
FRI, NOV 19 2021 15:00

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



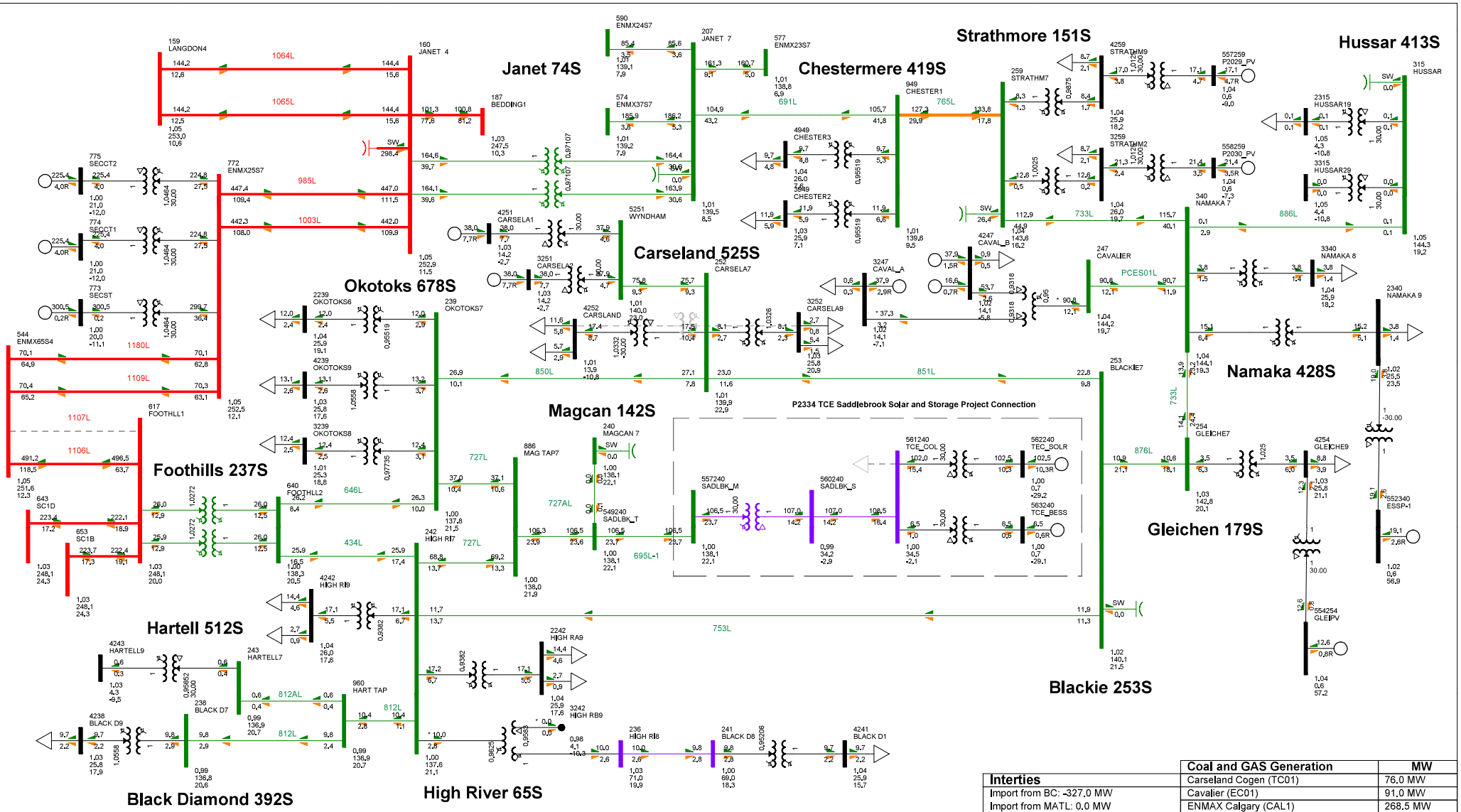
Interties	Coal and GAS Generation	MW
Import from BC: -327.0 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-40: P2334_2024SP_POST_SENS
CATEGORY B - 1106L (FOOTHILLS 237S - ENMAX SS65)
FRI, NOV 19 2021 15:00

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



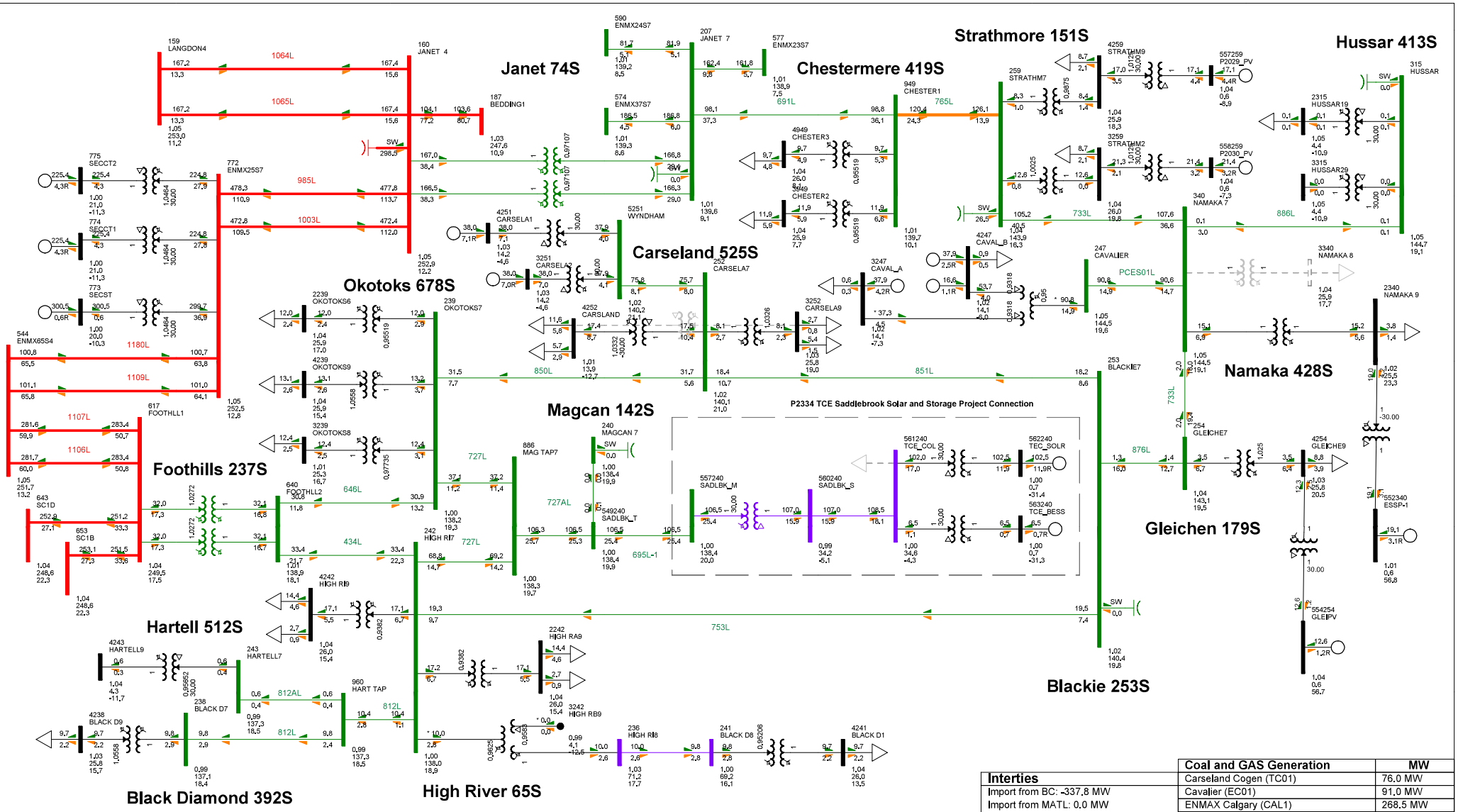
Interties	Coal and GAS Generation	MW
Import from BC: -327.0 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-41: P2334_2024SP_POST_SENS
CATEGORY B - 1107L (FOOTHILLS 237S - ENMAX SS65)
FRI, NOV 19 2021 15:00

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	Coal and GAS Generation	MW
Import from BC: -337.8 MW	Carseland Cogen (TC01)	76.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	91.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	268.5 MW
	Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A3-42: P2334_2024SP_POST_SENS
CATEGORY B - NAMAKA 428S T2
FRI, NOV 19 2021 16:04

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000

Attachment A4
Post-Project Transient Stability Diagrams

P2334_2024SL_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

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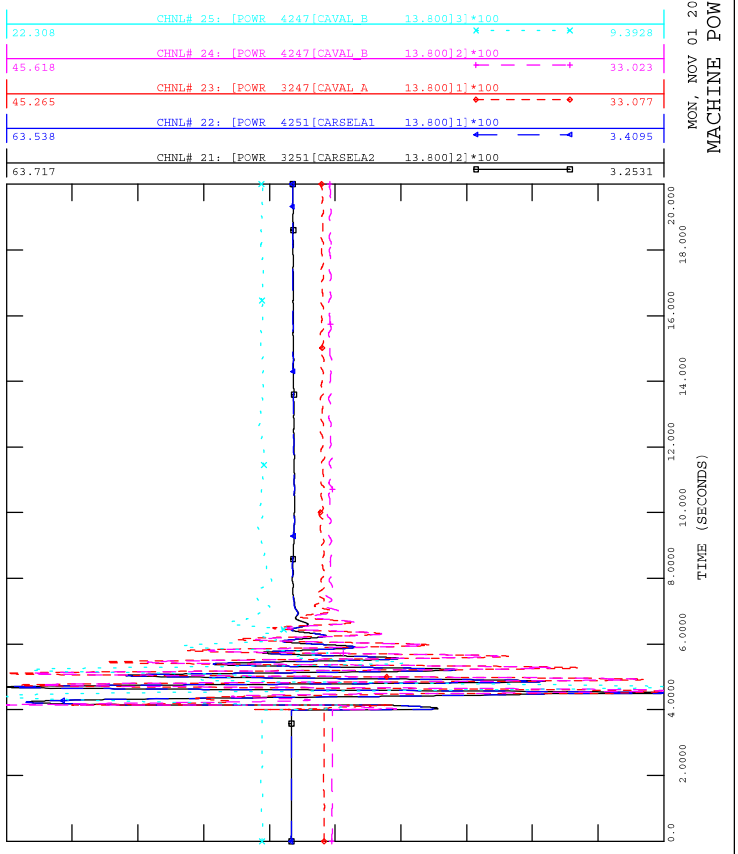

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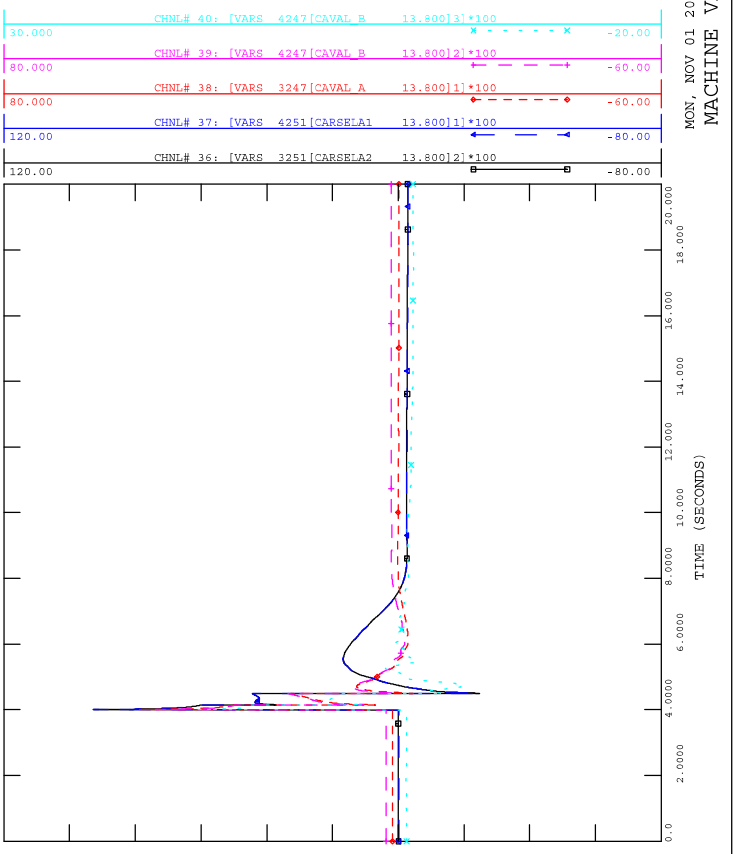

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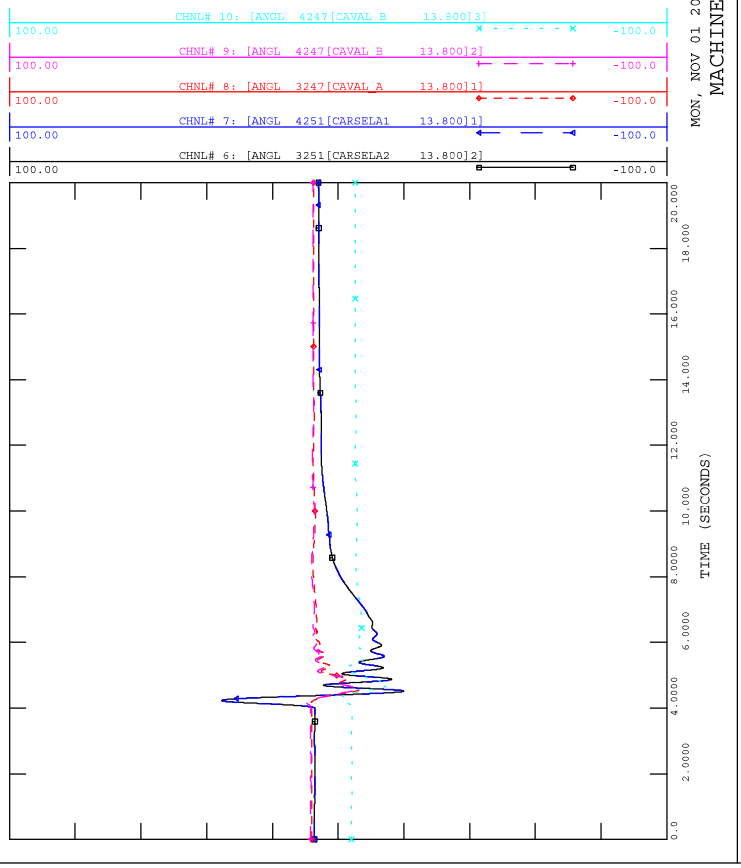

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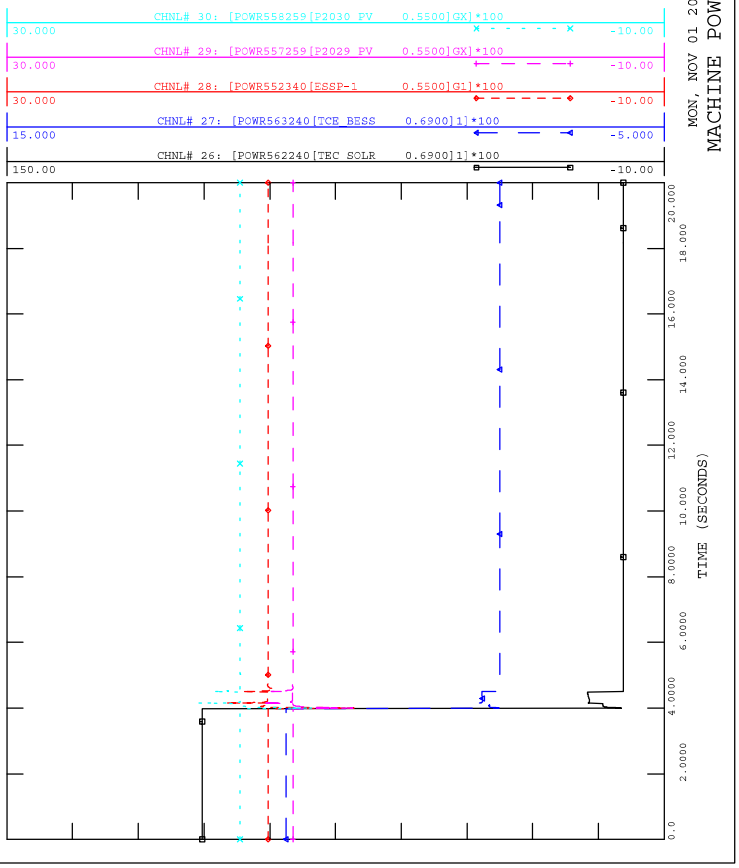

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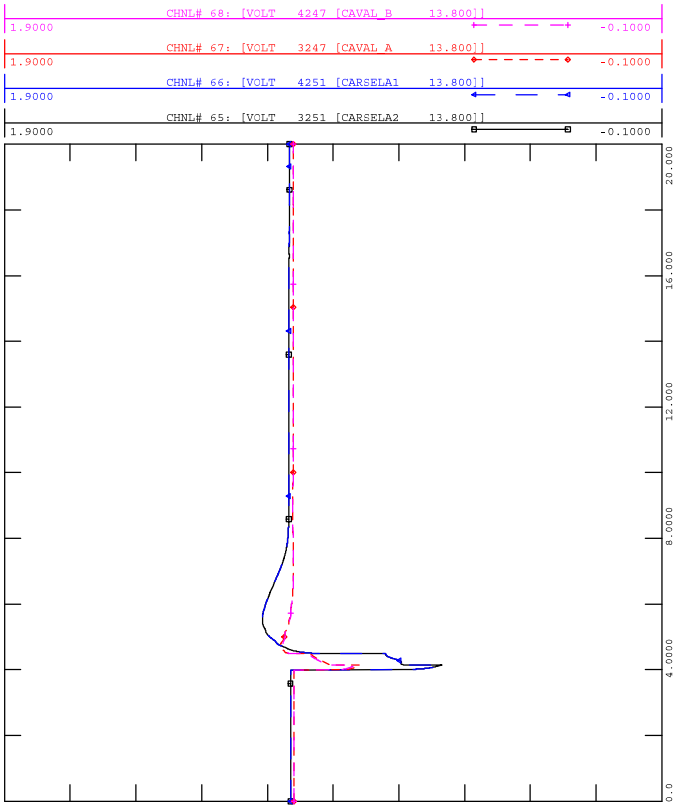

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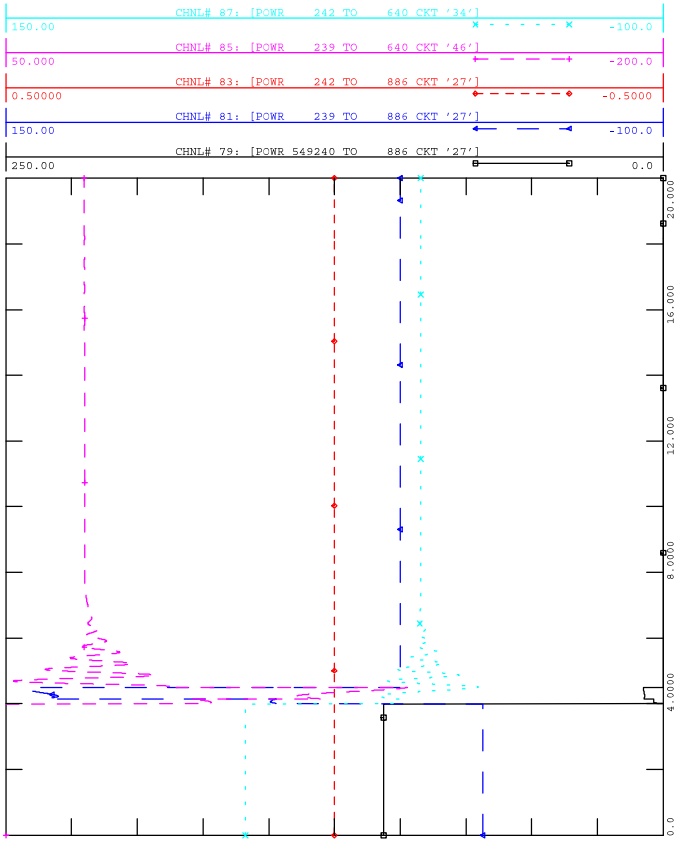

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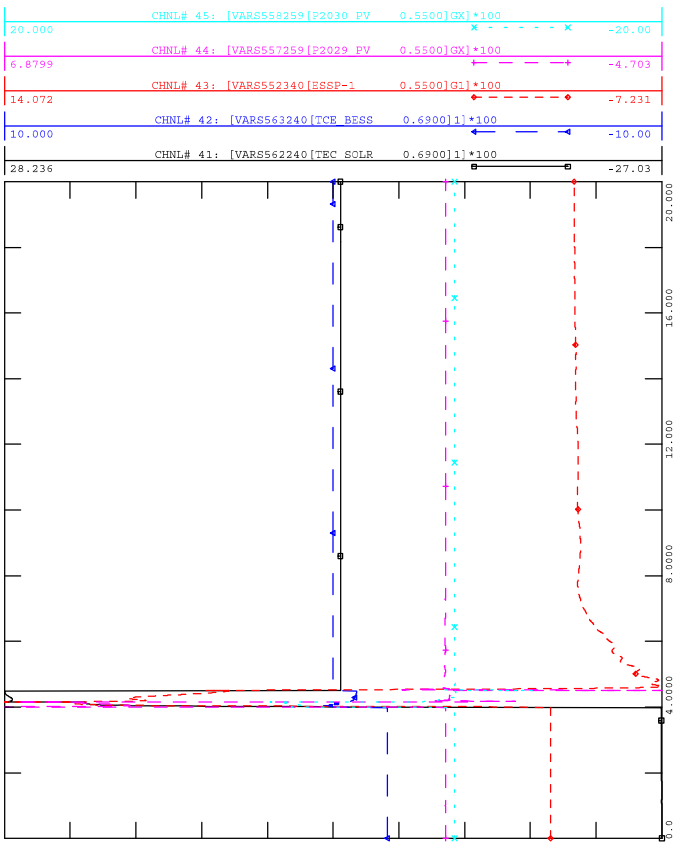

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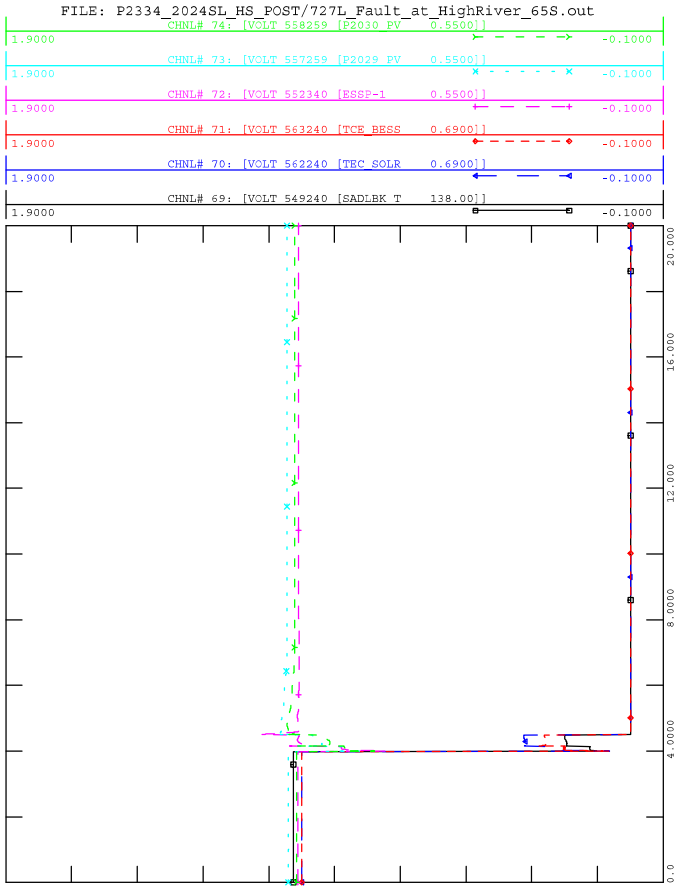

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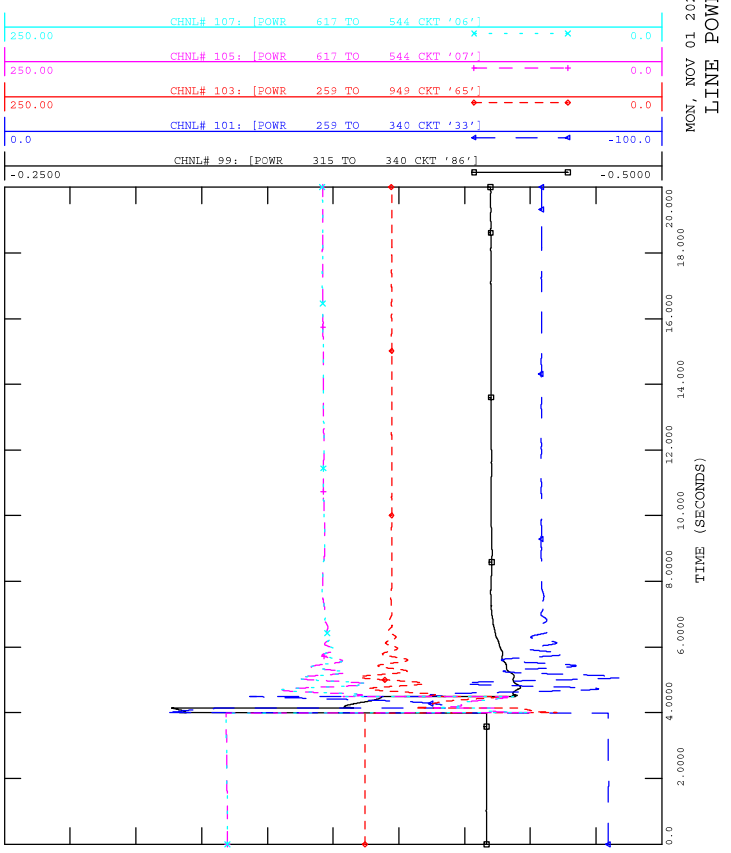

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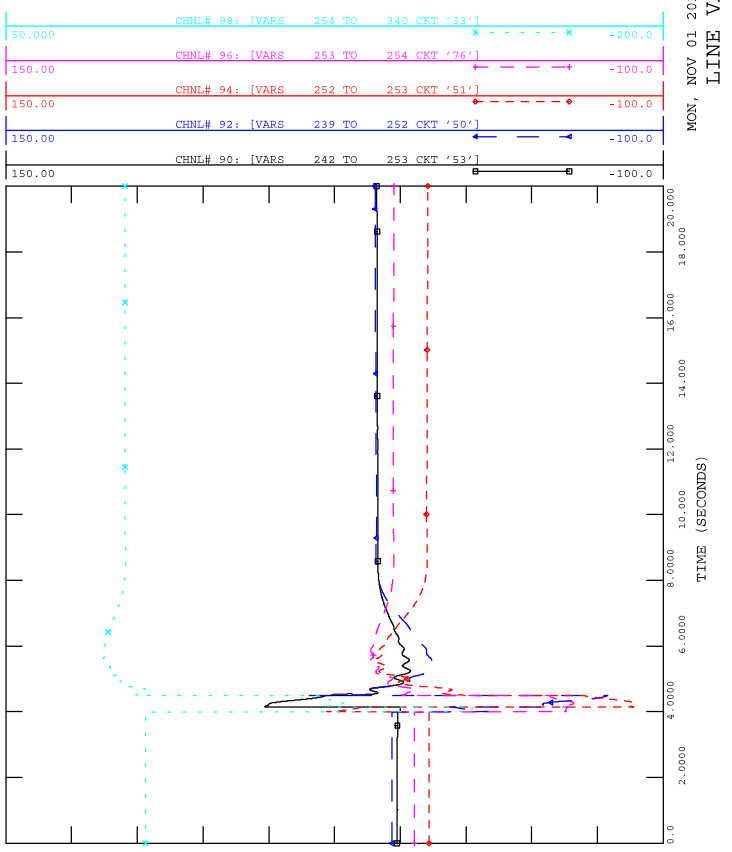

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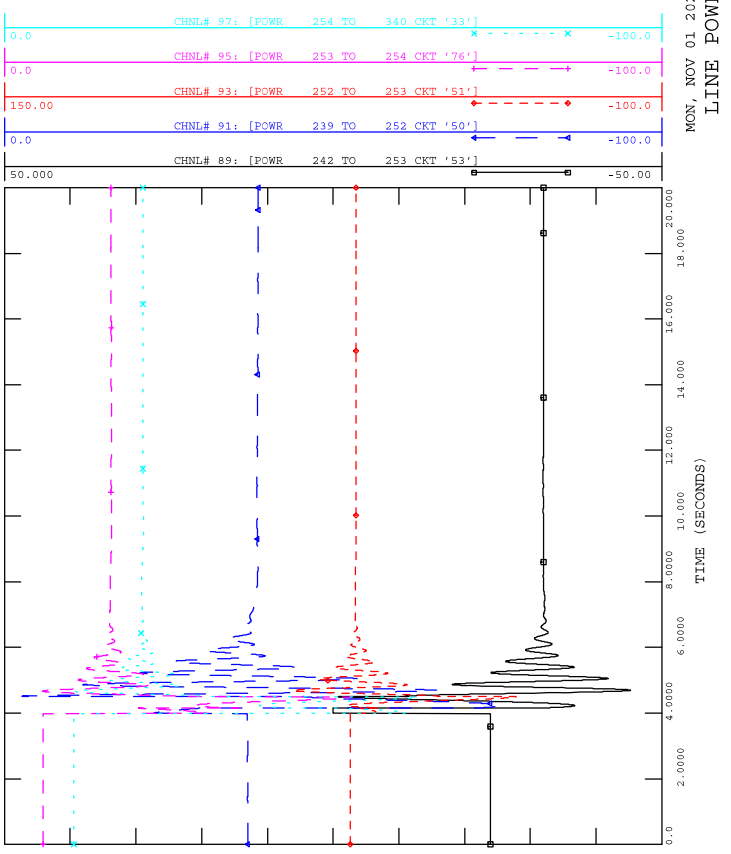

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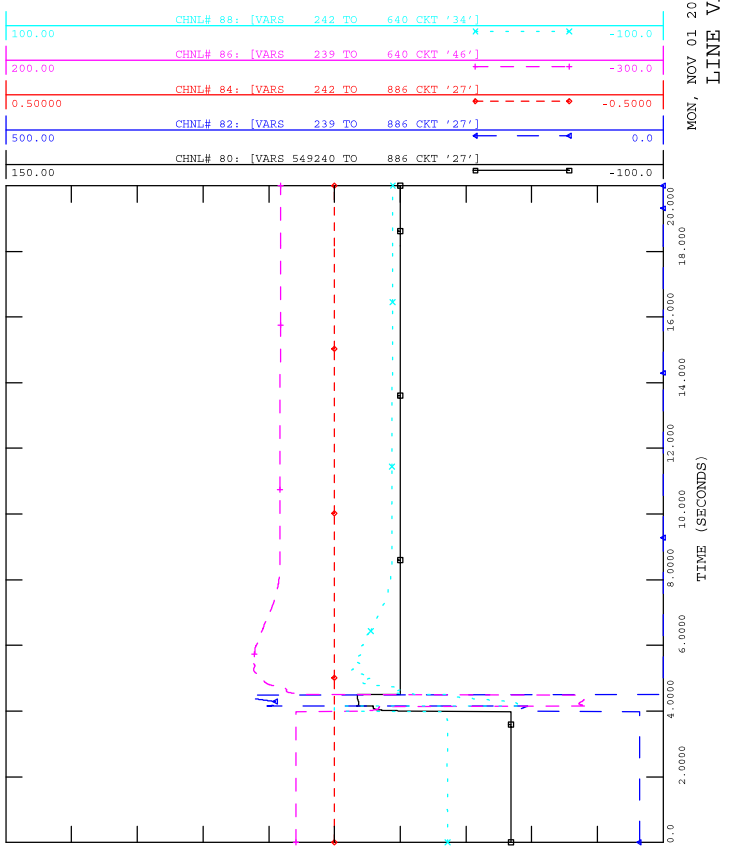

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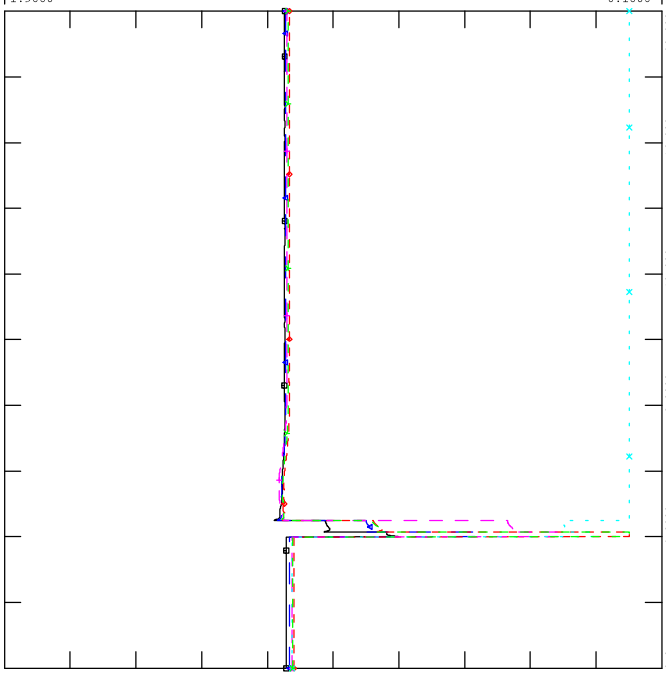

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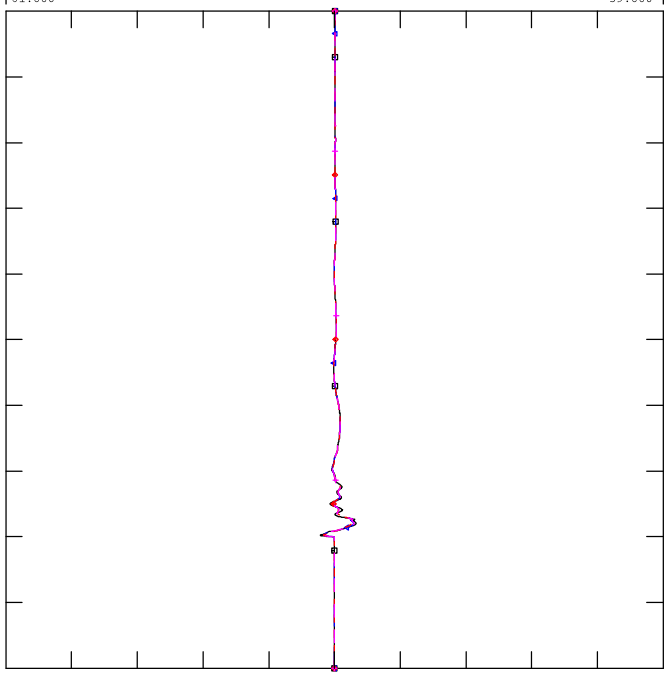

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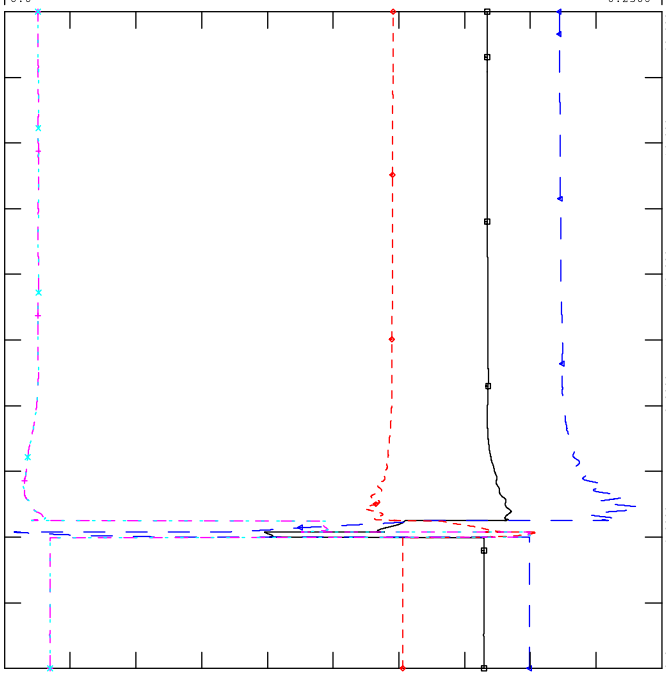

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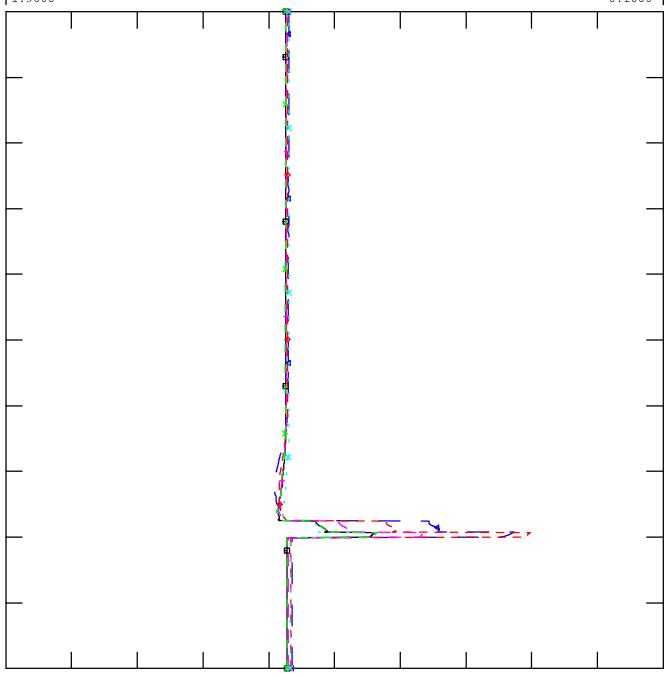

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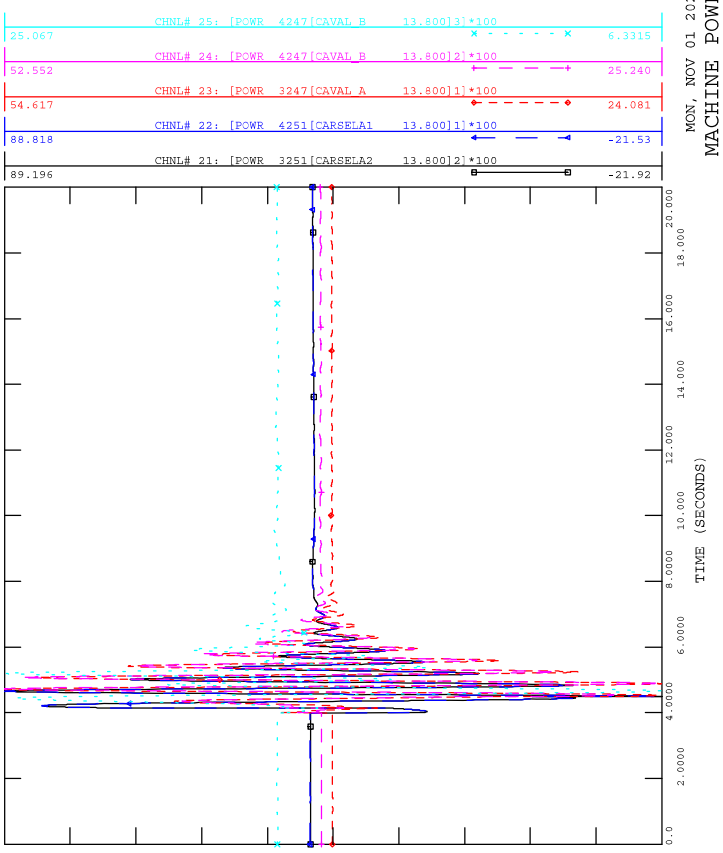

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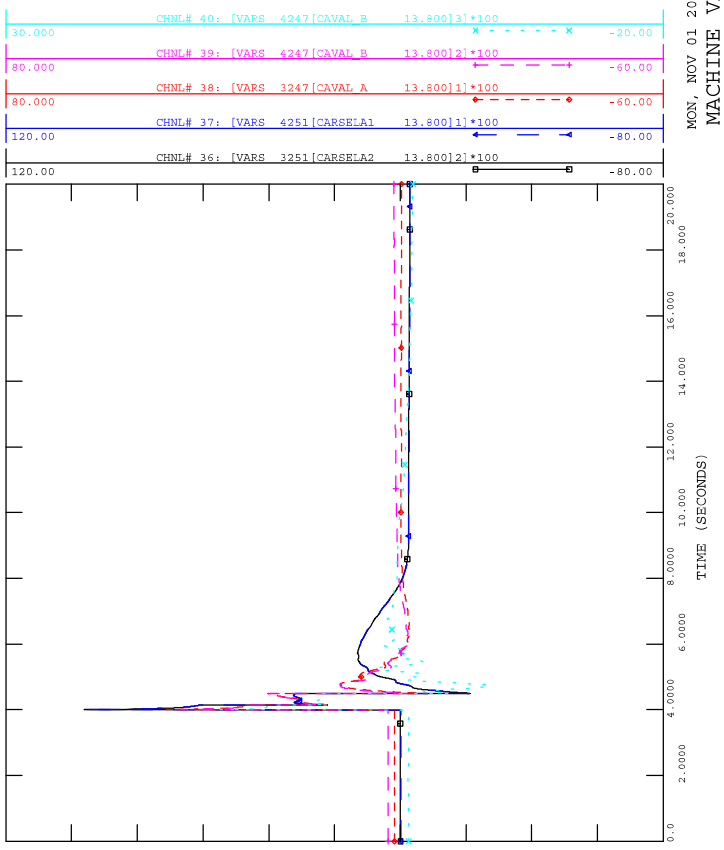

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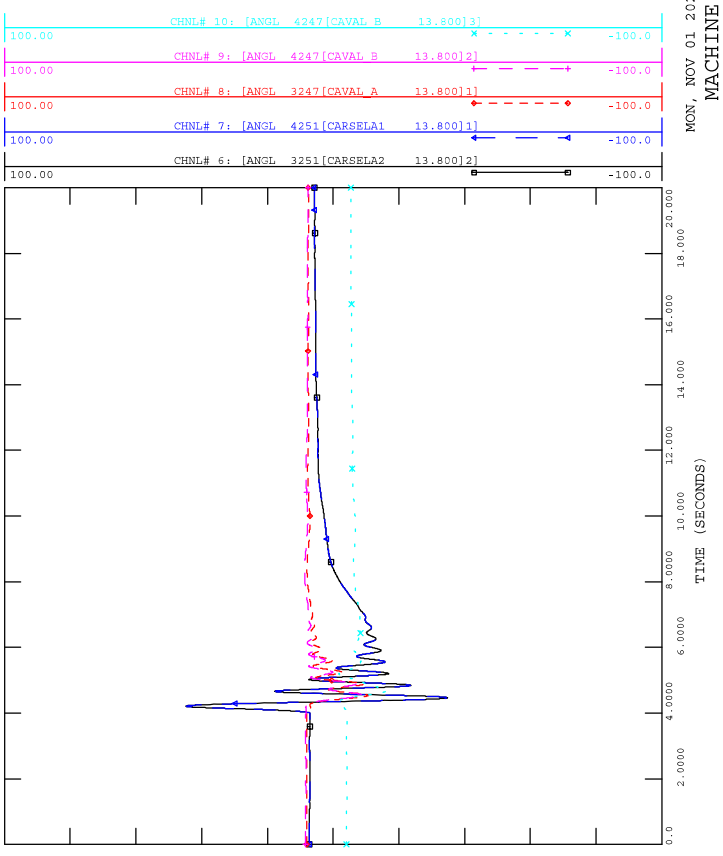

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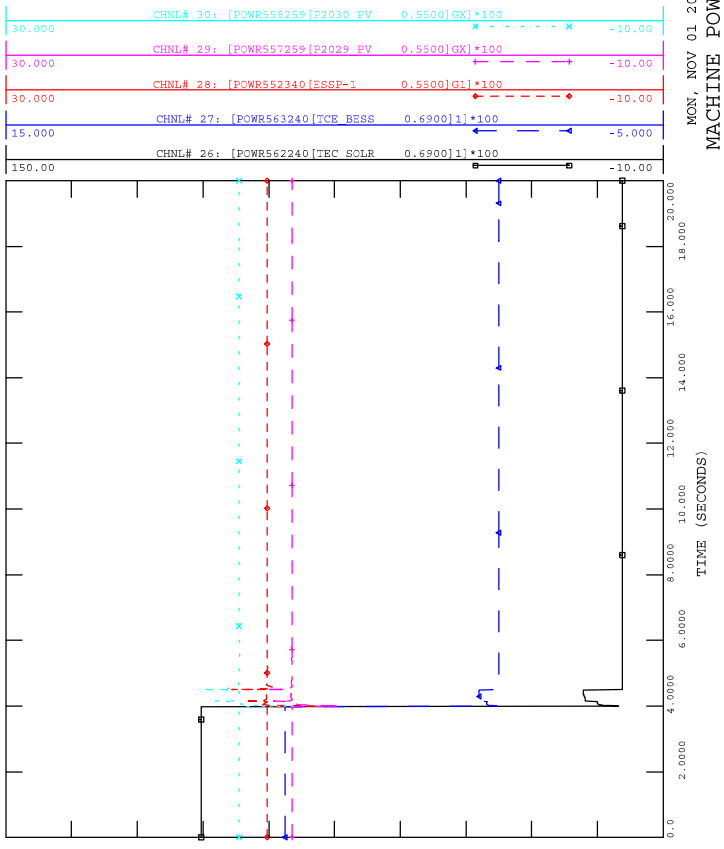
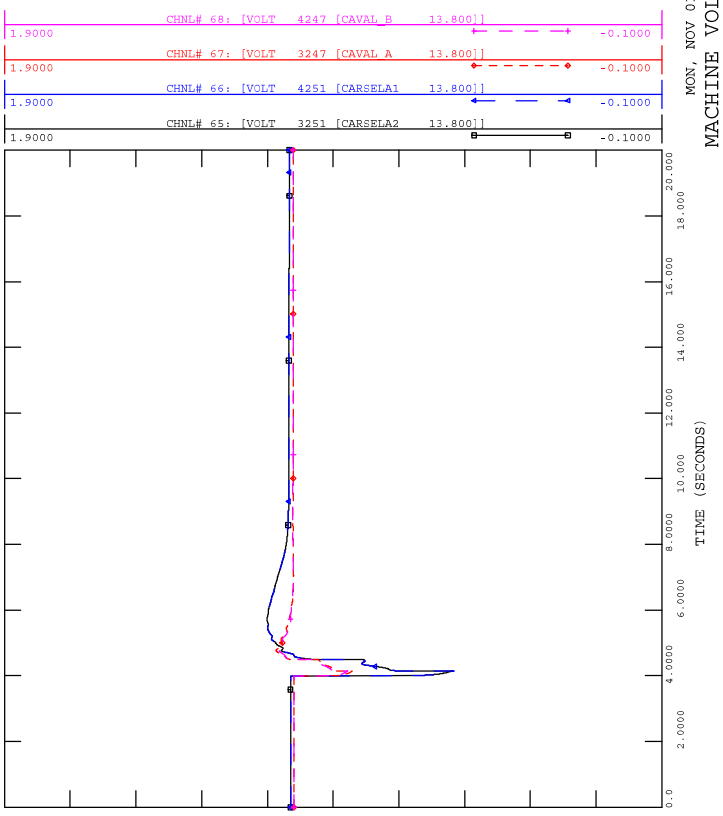
MACHINE POWER (2)



P2334_2024SL_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

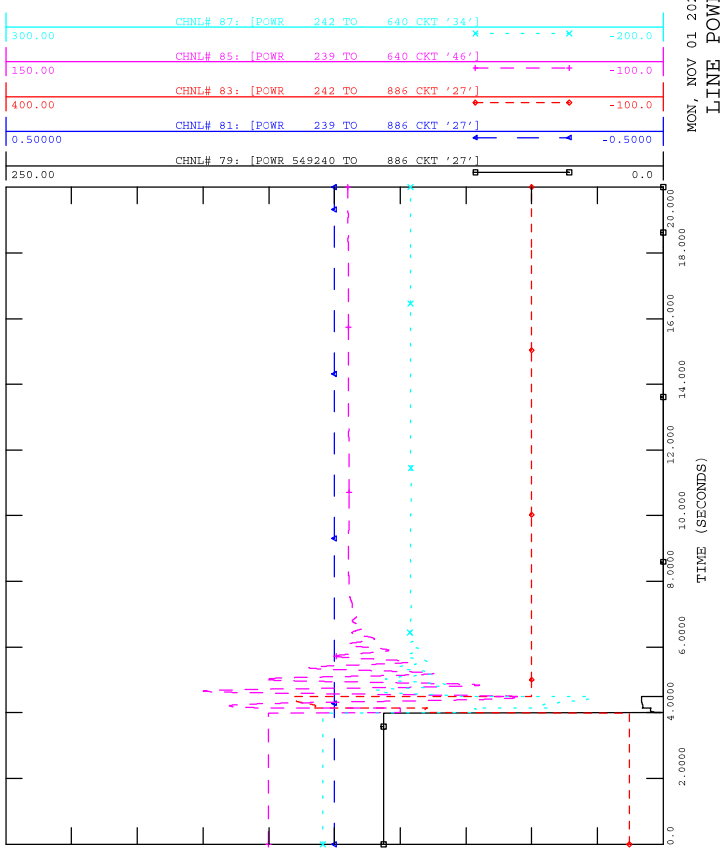
FILE: P2334_2024SL_HS_POST/727L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
MACHINE VOLTAGE (1)

P2334_2024SL_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

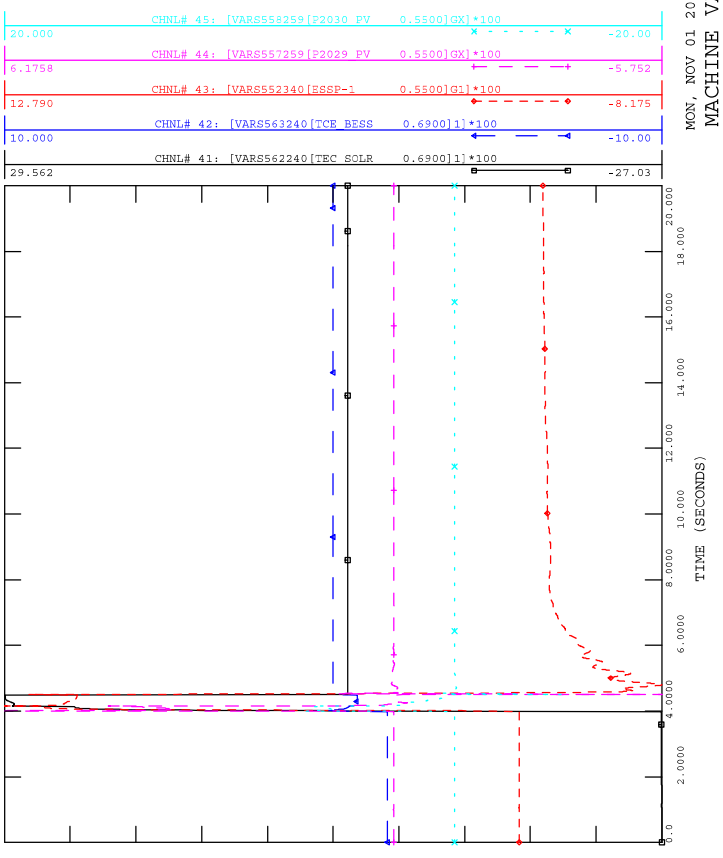
FILE: P2334_2024SL_HS_POST/727L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
LINE POWER (1)

P2334_2024SL_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

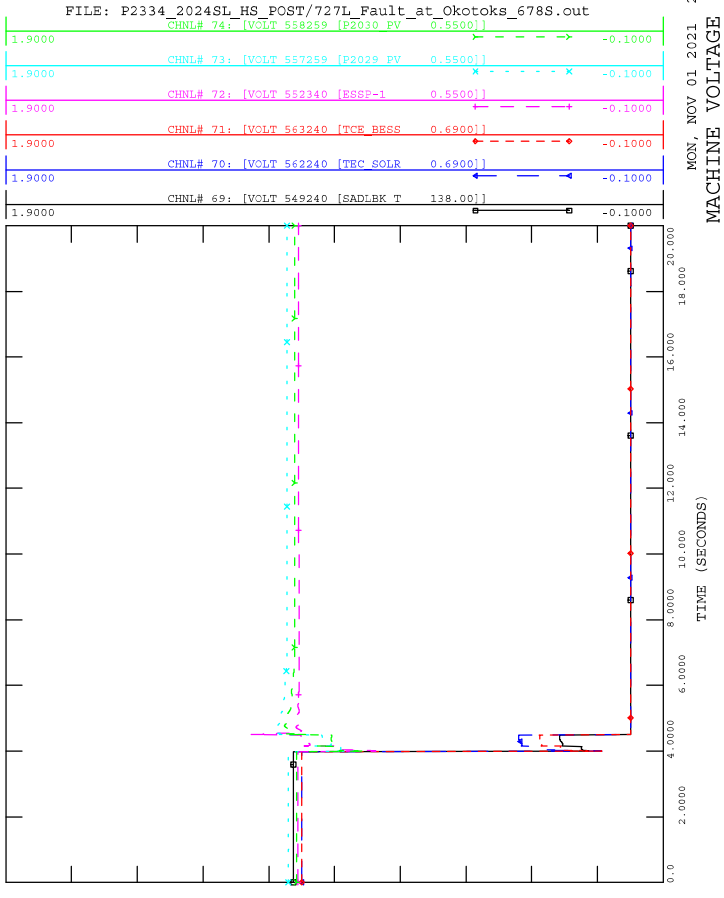
FILE: P2334_2024SL_HS_POST/727L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
MACHINE VAR (2)

P2334_2024SL_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/727L_Fault_at_Okotoks_678S.out

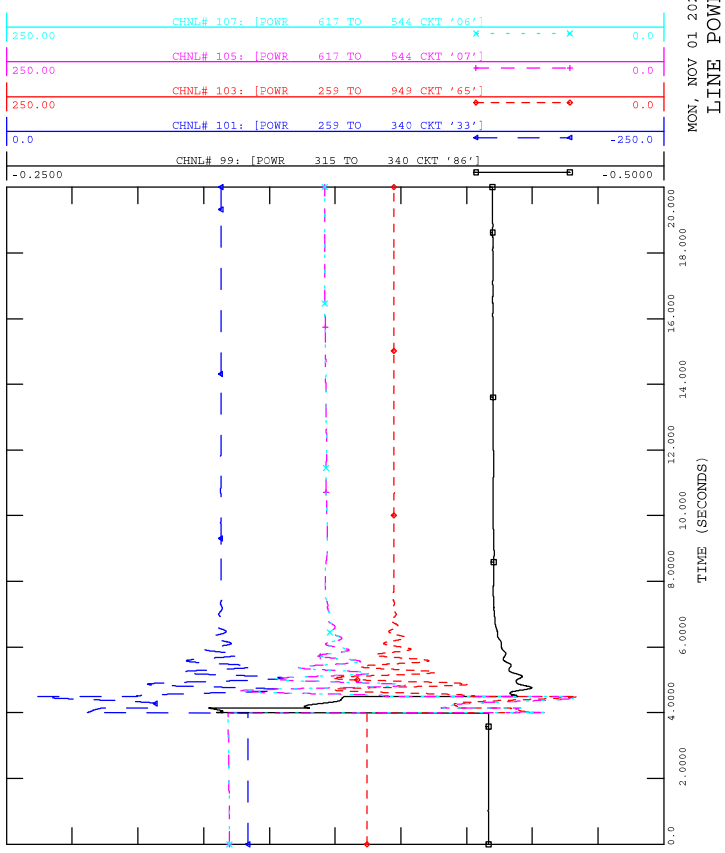


MON, NOV 01 2021 21:04
MACHINE VOLTAGE (2)

P2334_2024SL_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/727L_Fault_at_Okotoks_678S.out

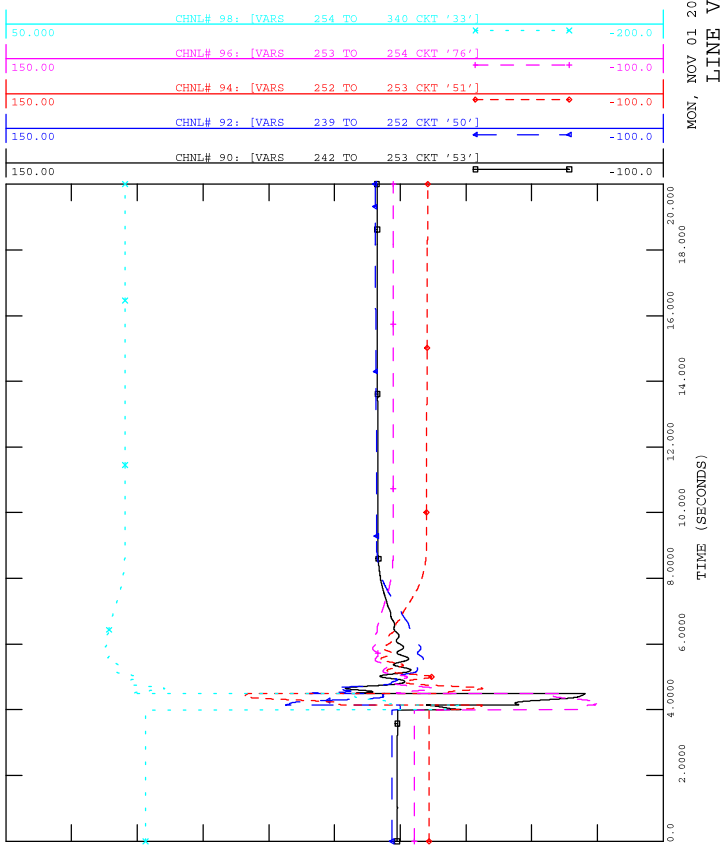
MON, NOV 01 2021 21:04
LINE POWER (3)



P2334_2024SL_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/727L_Fault_at_Okotoks_678S.out

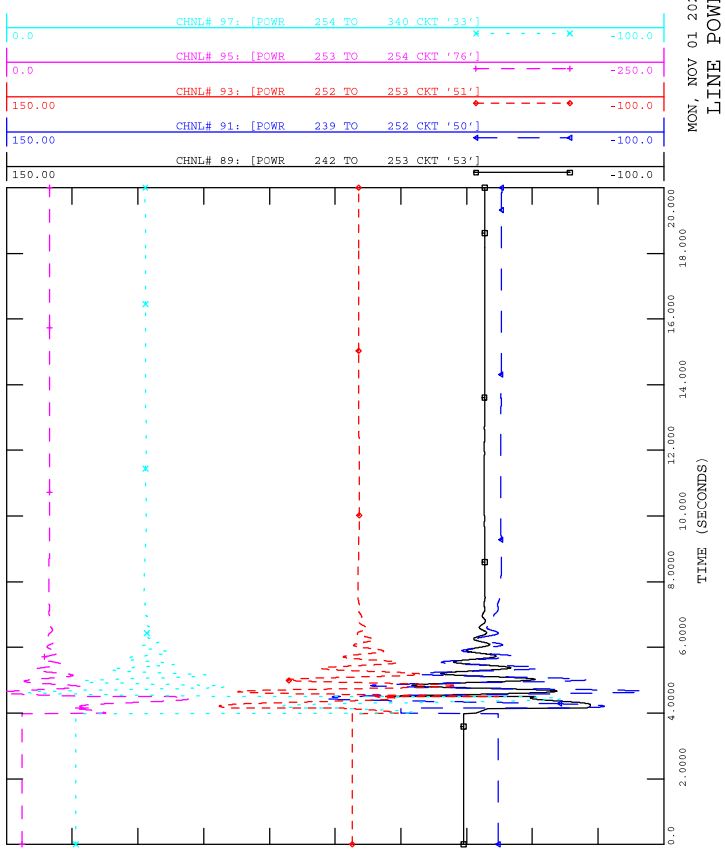
MON, NOV 01 2021 21:04
LINE VAR (2)



P2334_2024SL_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/727L_Fault_at_Okotoks_678S.out

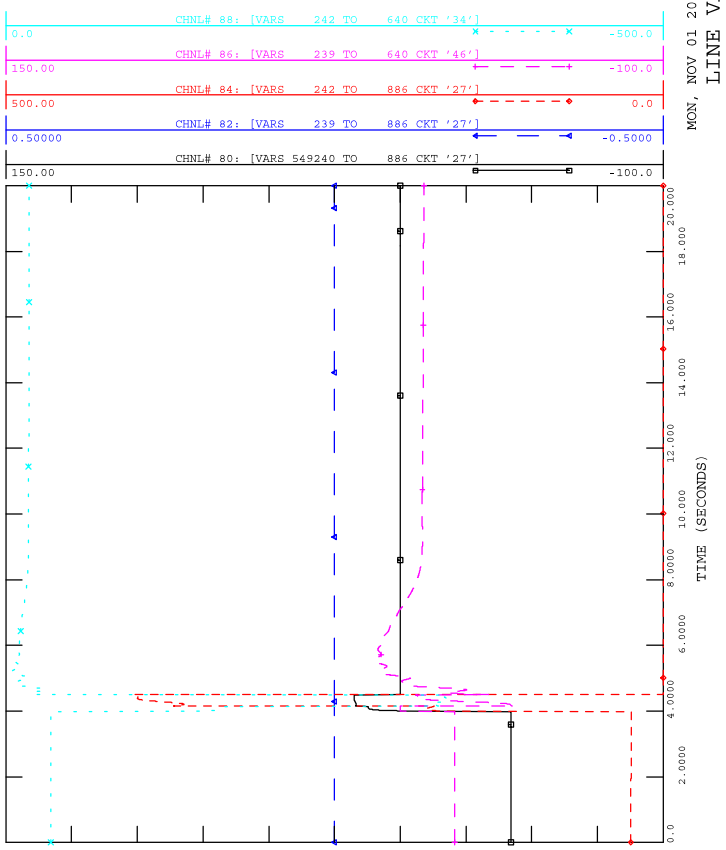
MON, NOV 01 2021 21:04
LINE POWER (2)



P2334_2024SL_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/727L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04
LINE VAR (1)

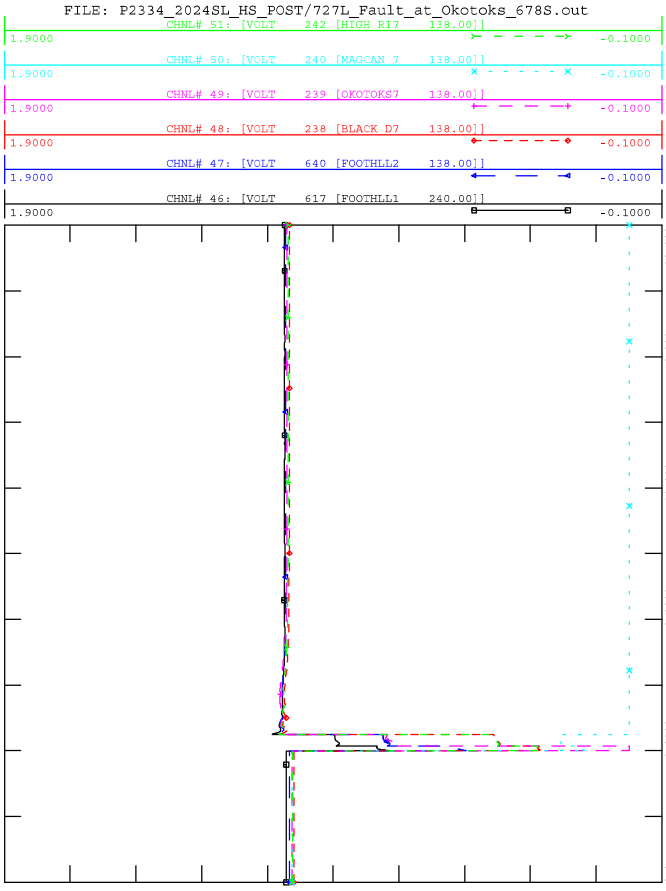


P2334_2024SL_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/727L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

BUS VOLTAGE (1)

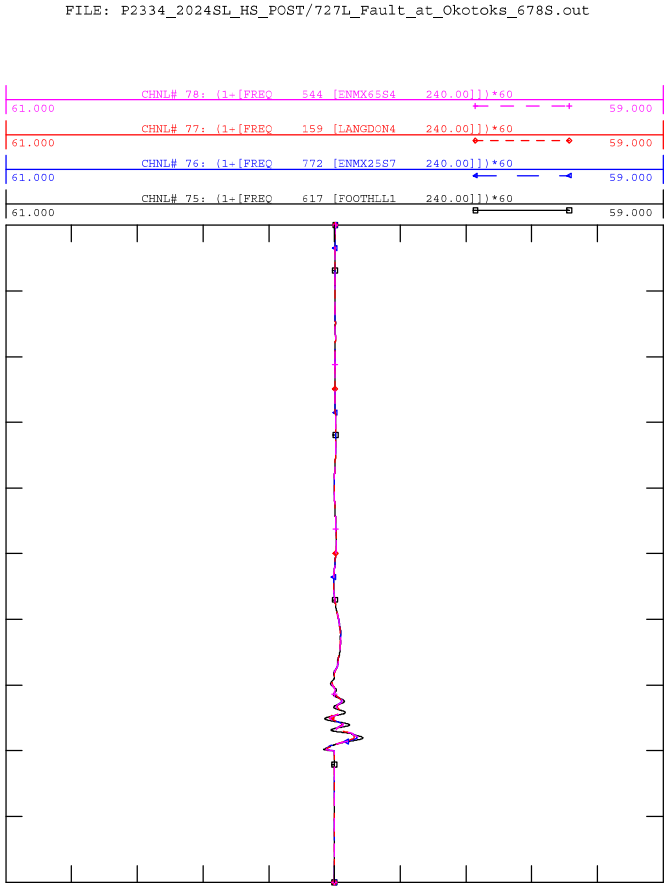


P2334_2024SL_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/727L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

FREQUENCY

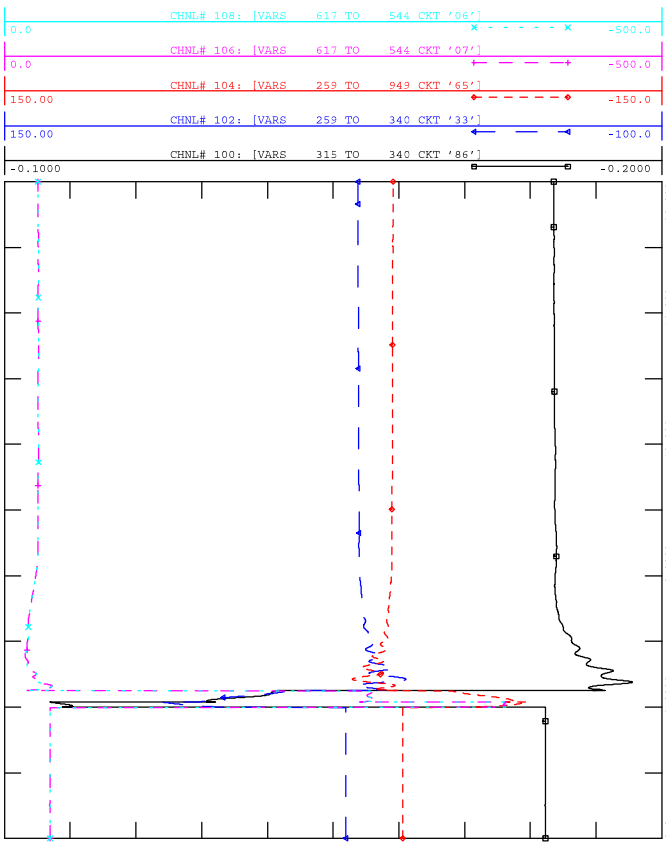


P2334_2024SL_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/727L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

LINE VAR (3)

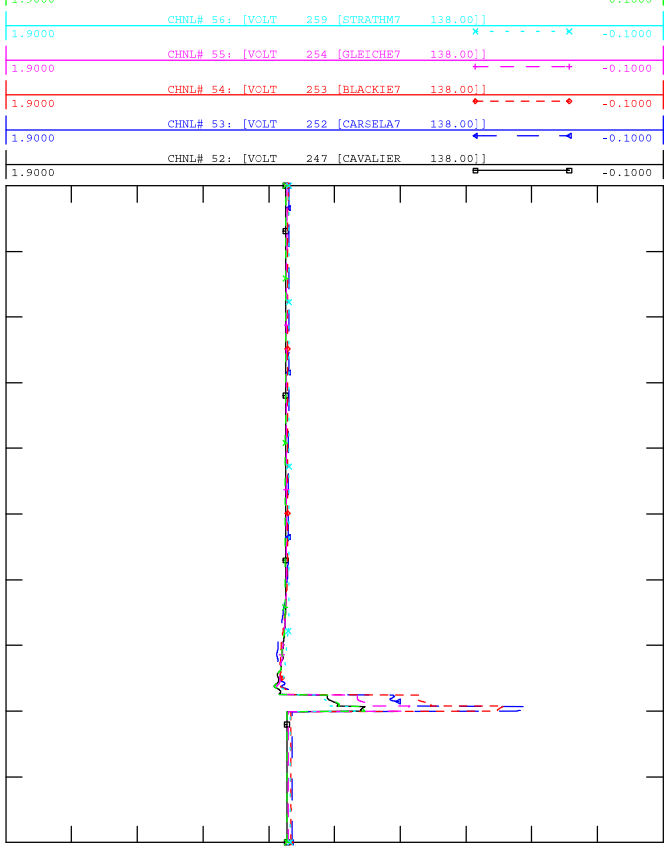


P2334_2024SL_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/727L_Fault_at_Okotoks_678S.out

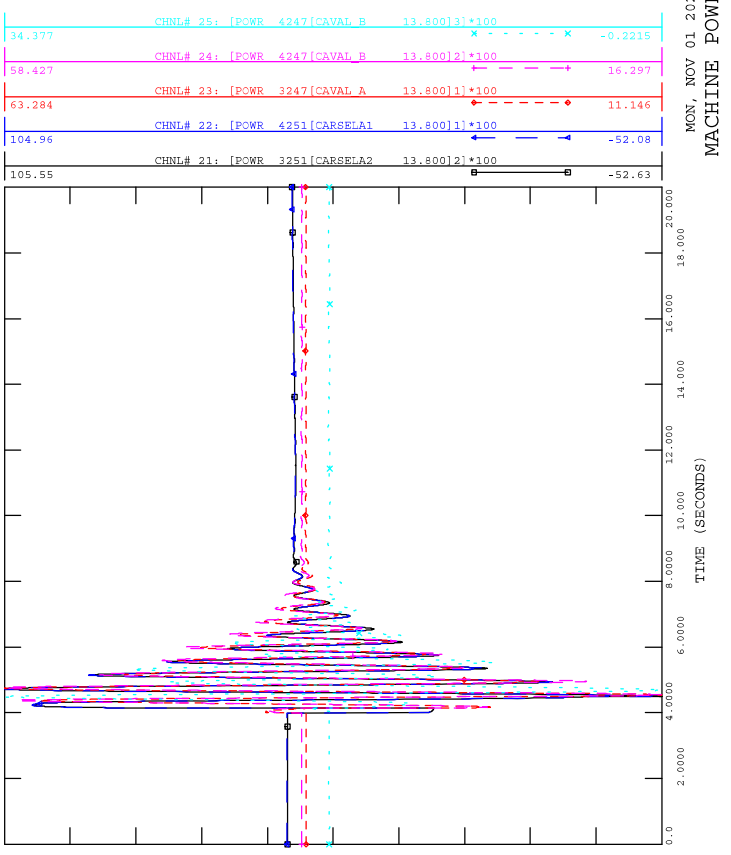
MON, NOV 01 2021 21:04

BUS VOLTAGE (2)



P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

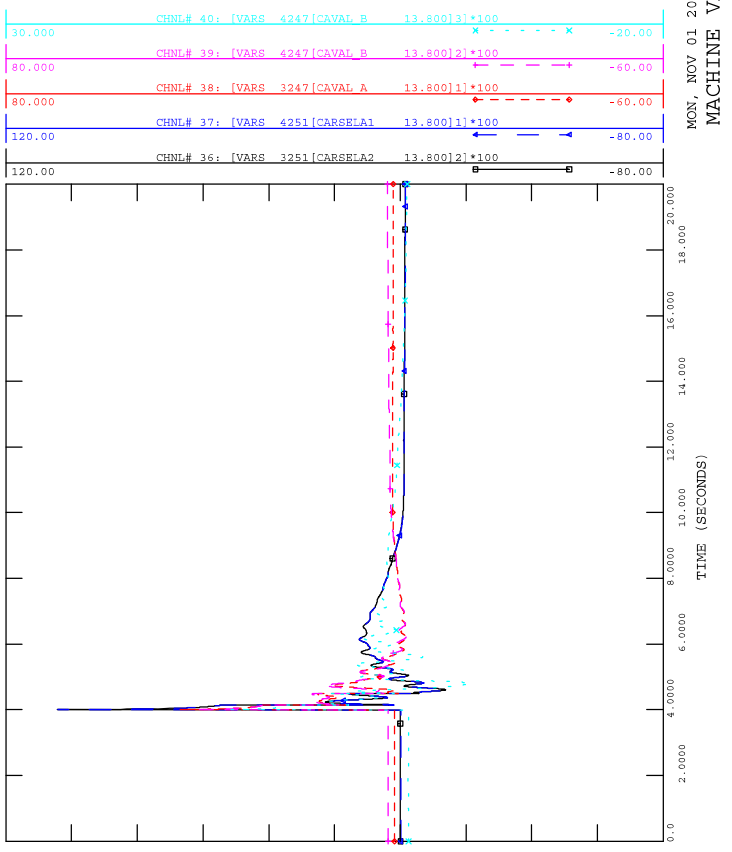
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Carseland_525S.out



MON, NOV 01 2021 21:04
MACHINE POWER (1)

P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

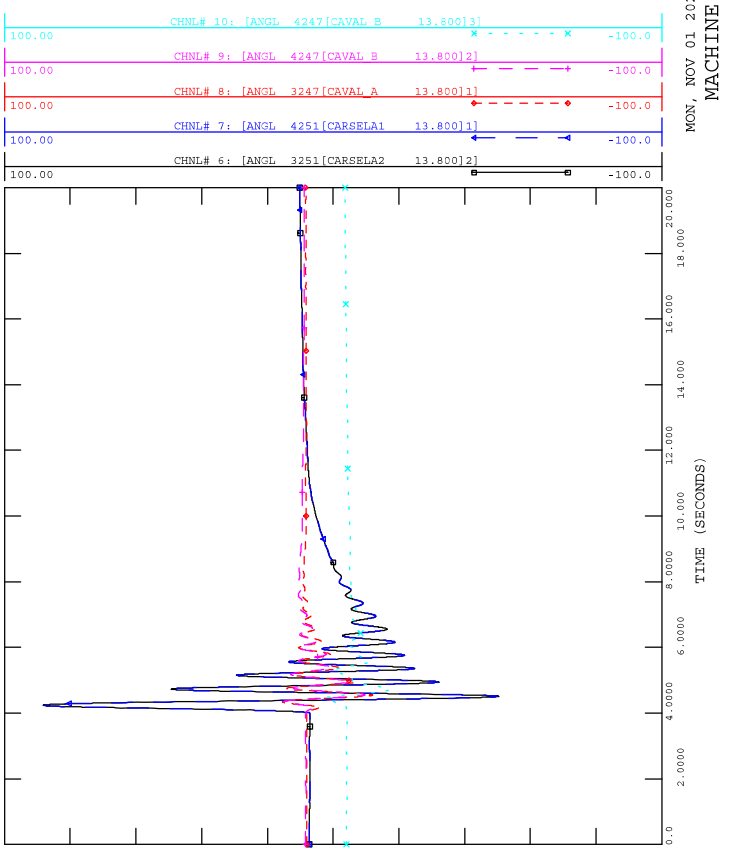
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Carseland_525S.out



MON, NOV 01 2021 21:04
MACHINE VAR (1)

P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

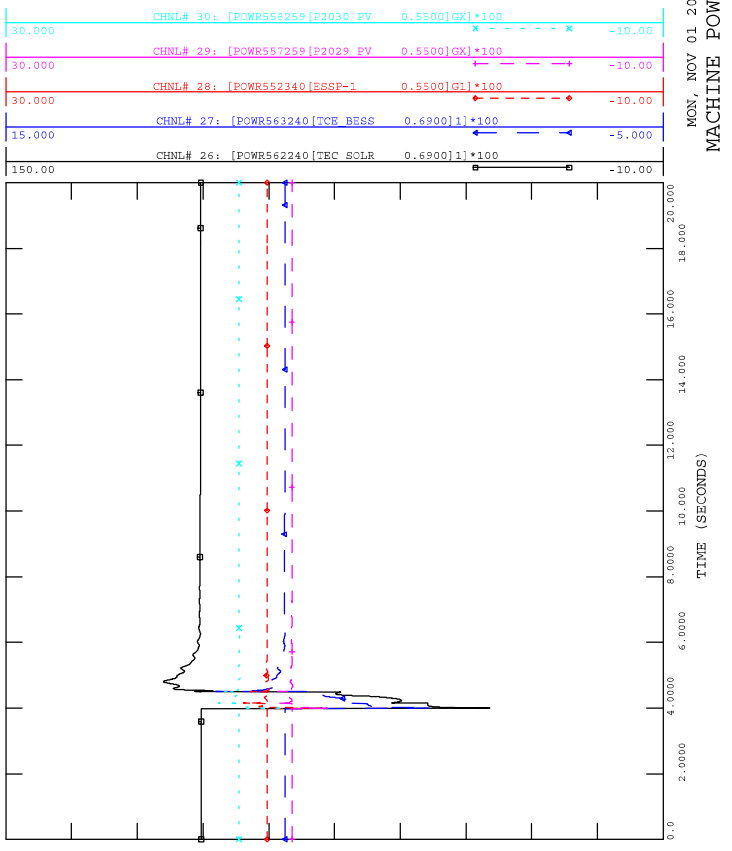
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Carseland_525S.out



MON, NOV 01 2021 21:04
MACHINE ANGEL

P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

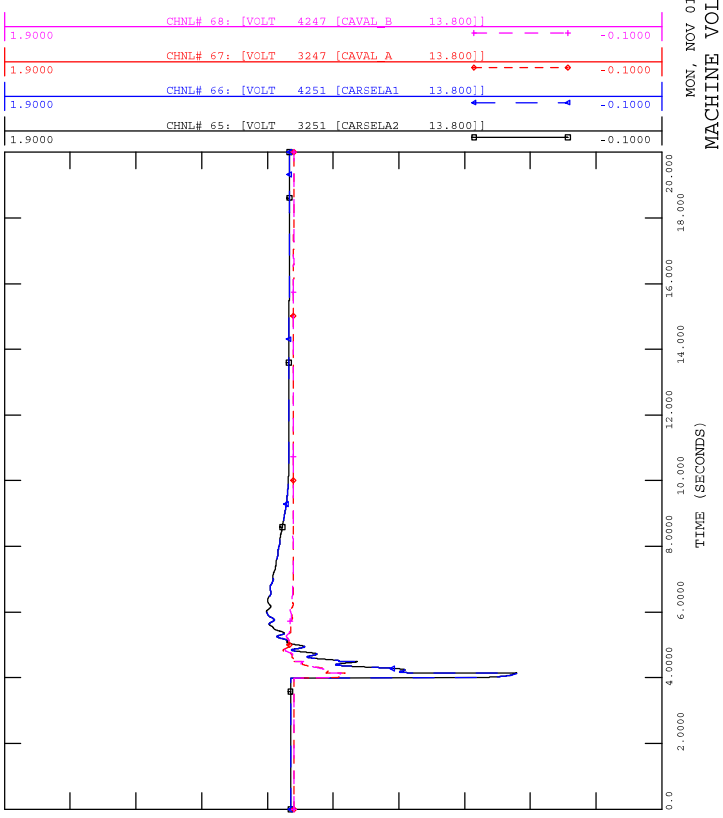
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Carseland_525S.out



MON, NOV 01 2021 21:04
MACHINE POWER (2)

P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

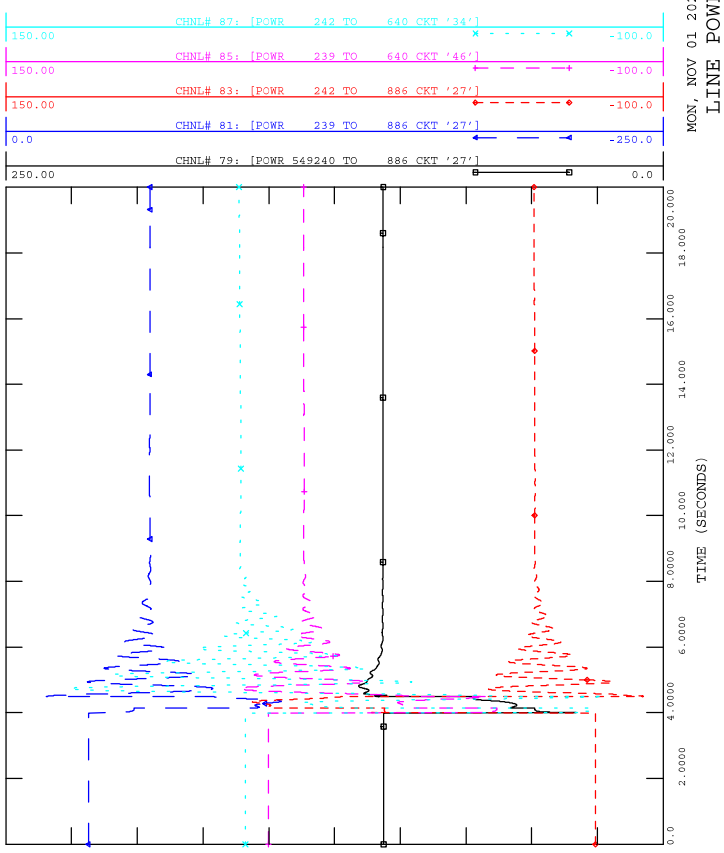
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Carseland_525S.out



MON, NOV 01 2021 21:04
MACHINE VOLTAGE (1)

P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

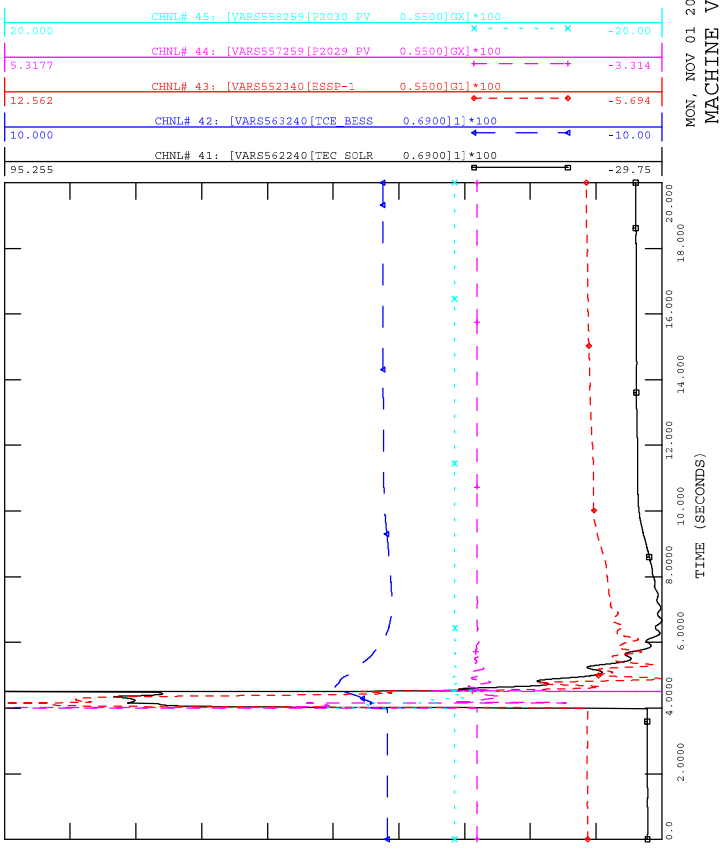
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Carseland_525S.out



MON, NOV 01 2021 21:04
LINE POWER (1)

P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

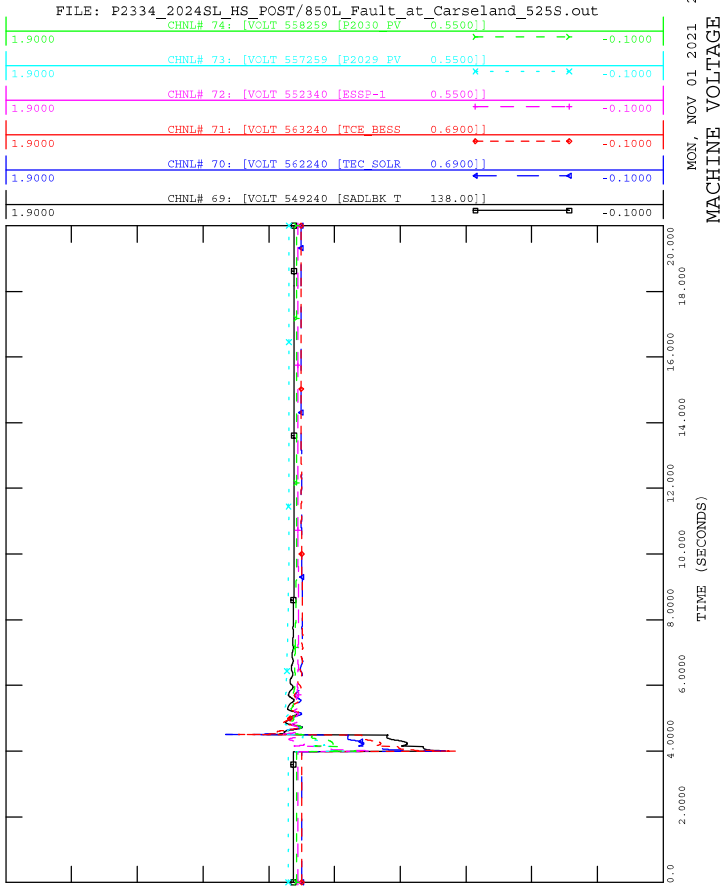
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Carseland_525S.out



MON, NOV 01 2021 21:04
MACHINE VAR (2)

P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

FILE: P2334_2024SL_HS_POST/850L_Fault_at_Carseland_525S.out



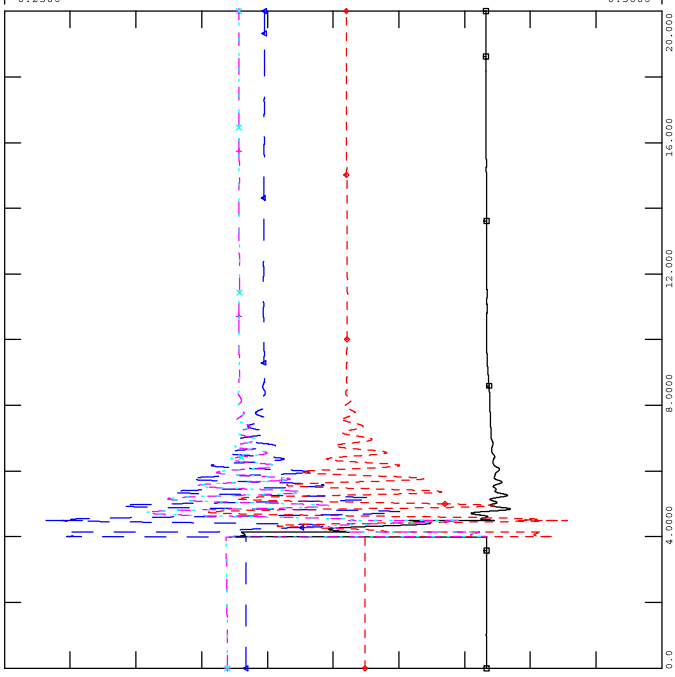
MON, NOV 01 2021 21:04
MACHINE VOLTAGE (2)

P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

FILE: P2334_2024SL_HS_POST/850L_Fault_at_Carseland_525S.out

MON, NOV 01 2021 21:04
LINE POWER (3)

CHNL# 107: [POWR 617 TO 544 CKT '06'] 250.00 / 0.0
CHNL# 105: [POWR 617 TO 544 CKT '07'] 250.00 / 0.0
CHNL# 103: [POWR 259 TO 949 CKT '65'] 250.00 / 0.0
CHNL# 101: [POWR 259 TO 340 CKT '33'] 0.0 / -250.0
CHNL# 99: [POWR 315 TO 340 CKT '86'] -0.2500 / -0.5000

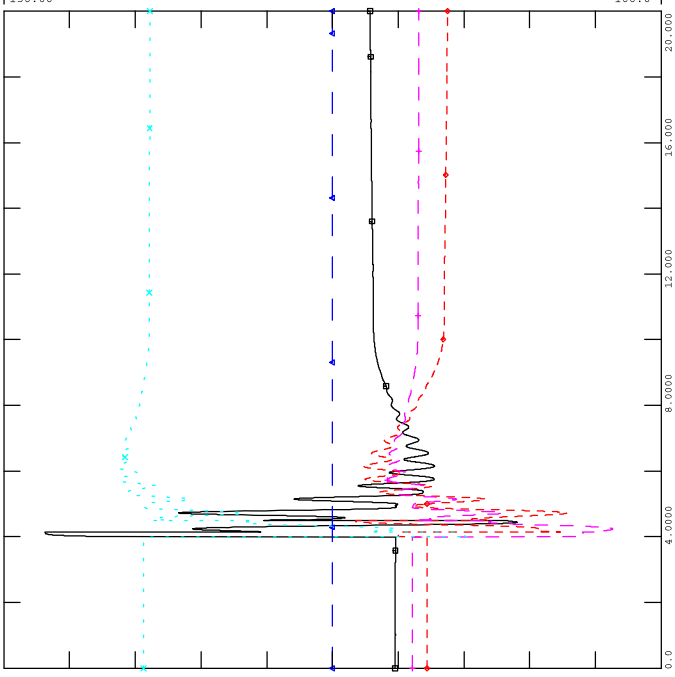


P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

FILE: P2334_2024SL_HS_POST/850L_Fault_at_Carseland_525S.out

MON, NOV 01 2021 21:04
LINE VAR (2)

CHNL# 98: [VARS 254 TO 340 CKT '33'] 50.000 / -200.0
CHNL# 96: [VARS 253 TO 254 CKT '76'] 150.00 / -100.0
CHNL# 94: [VARS 252 TO 253 CKT '51'] 150.00 / -100.0
CHNL# 92: [VARS 239 TO 252 CKT '50'] 0.50000 / -0.5000
CHNL# 90: [VARS 242 TO 253 CKT '53'] 150.00 / -100.0

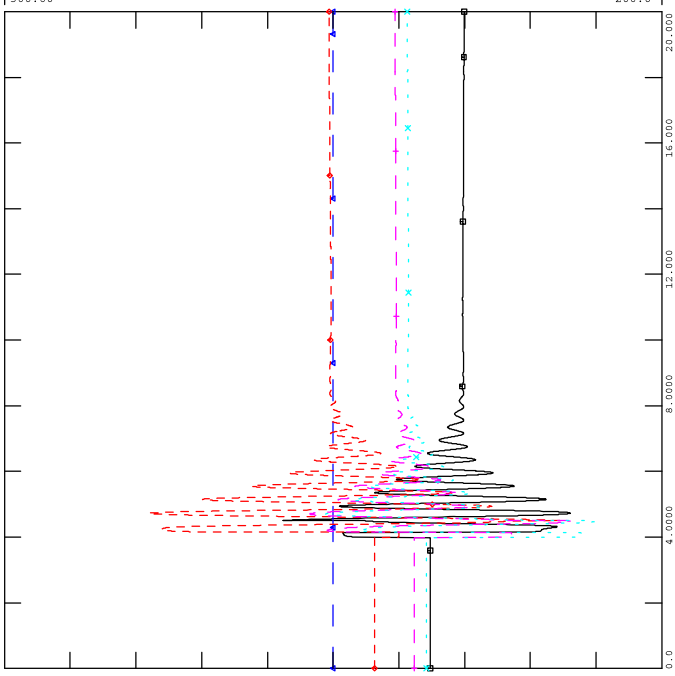


P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

FILE: P2334_2024SL_HS_POST/850L_Fault_at_Carseland_525S.out

MON, NOV 01 2021 21:04
LINE POWER (2)

CHNL# 97: [POWR 254 TO 340 CKT '33'] 150.00 / -100.0
CHNL# 95: [POWR 253 TO 254 CKT '76'] 150.00 / -100.0
CHNL# 93: [POWR 252 TO 253 CKT '51'] 300.00 / -200.0
CHNL# 91: [POWR 239 TO 252 CKT '50'] 0.50000 / -0.5000
CHNL# 89: [POWR 242 TO 253 CKT '53'] 300.00 / -200.0

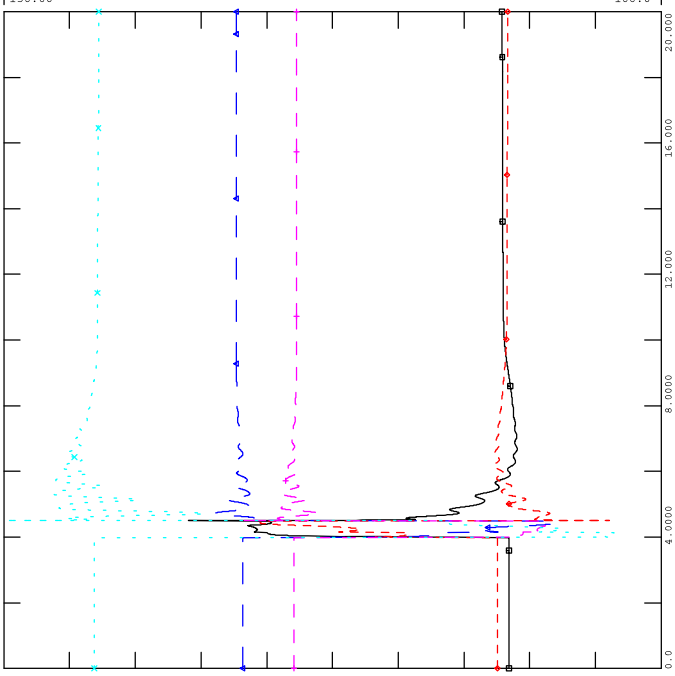


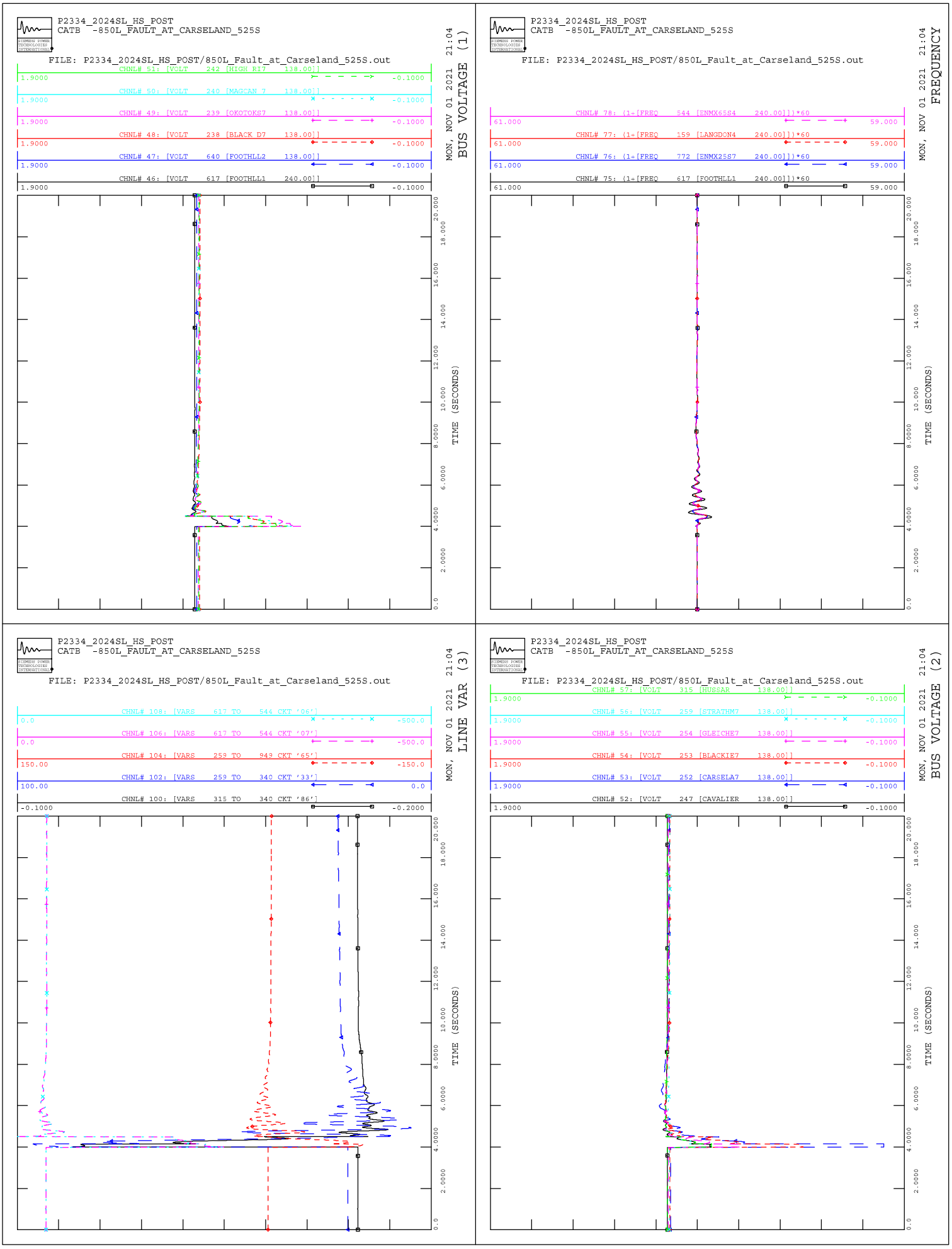
P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

FILE: P2334_2024SL_HS_POST/850L_Fault_at_Carseland_525S.out

MON, NOV 01 2021 21:04
LINE VAR (1)

CHNL# 88: [VARS 242 TO 640 CKT '34'] 0.0 / -250.0
CHNL# 86: [VARS 239 TO 640 CKT '46'] 200.00 / -300.0
CHNL# 84: [VARS 242 TO 886 CKT '27'] 400.00 / -100.0
CHNL# 82: [VARS 239 TO 886 CKT '27'] 200.00 / -300.0
CHNL# 80: [VARS 549240 TO 886 CKT '27'] 150.00 / -100.0




P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Carseland_525S.out
CHNL# 51: [VOLT 242 [HIGH RI7 138.00]]
CHNL# 50: [VOLT 240 [MAGCAN 7 138.00]]
CHNL# 49: [VOLT 239 [OKOTOKS7 138.00]]
CHNL# 48: [VOLT 238 [BLACK D7 138.00]]
CHNL# 47: [VOLT 640 [FOOTHLL2 138.00]]
CHNL# 46: [VOLT 617 [FOOTHLL1 240.00]]
MON, NOV 01 2021 21:04
BUS VOLTAGE (1)
TIME (SECONDS)
CHNL# 78: (1+[FREQ 544 [ENMX65S4 240.00]])*60
CHNL# 77: (1+[FREQ 159 [LANGDON4 240.00]])*60
CHNL# 76: (1+[FREQ 772 [ENMX25S7 240.00]])*60
CHNL# 75: (1+[FREQ 617 [FOOTHLL1 240.00]])*60
MON, NOV 01 2021 21:04
FREQUENCY
TIME (SECONDS)
CHNL# 108: [VARS 617 TO 544 CKT '06']
CHNL# 106: [VARS 617 TO 544 CKT '07']
CHNL# 104: [VARS 259 TO 943 CKT '65']
CHNL# 102: [VARS 259 TO 340 CKT '33']
CHNL# 100: [VARS 315 TO 340 CKT '86']
MON, NOV 01 2021 21:04
LINE VAR (3)
TIME (SECONDS)
CHNL# 57: [VOLT 315 [HUSSAR 138.00]]
CHNL# 56: [VOLT 259 [STRATHM7 138.00]]
CHNL# 55: [VOLT 254 [GLEICHE7 138.00]]
CHNL# 54: [VOLT 253 [BLACKIE7 138.00]]
CHNL# 53: [VOLT 252 [CARSELA7 138.00]]
CHNL# 52: [VOLT 247 [CAVALIER 138.00]]
MON, NOV 01 2021 21:04
BUS VOLTAGE (2)
TIME (SECONDS)

P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

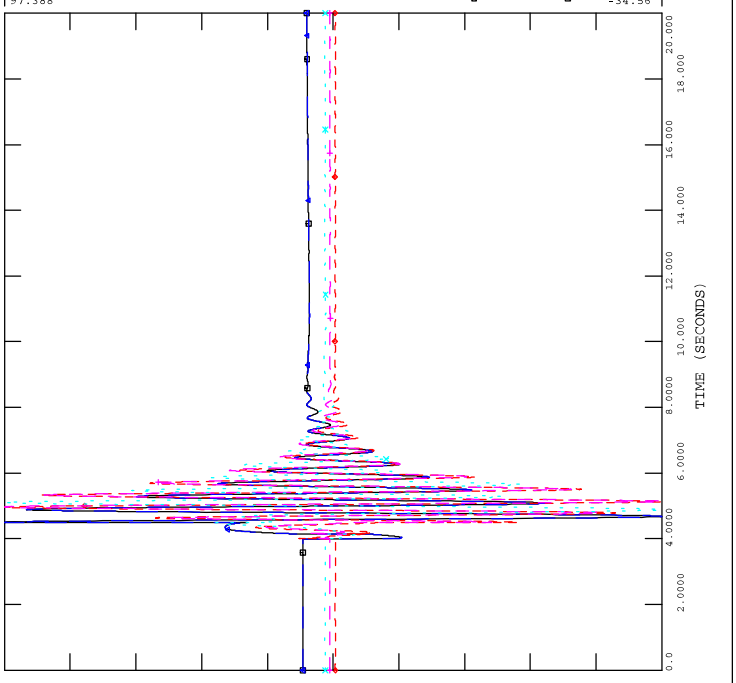
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

MACHINE POWER (1)

CHNL# 25: [POWR 4247[CAVAL B 13.800]3]*100 — 28.848 … 5.1492
CHNL# 24: [POWR 4247[CAVAL B 13.800]2]*100 — 58.343 … 20.034
CHNL# 23: [POWR 3247[CAVAL A 13.800]1]*100 — 61.338 … 17.696
CHNL# 22: [POWR 4251[CARSELA1 13.800]1]*100 — 96.978 … -33.97
CHNL# 21: [POWR 3251[CARSELA2 13.800]2]*100 — 97.388 … -34.56

TIME (SECONDS)



P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

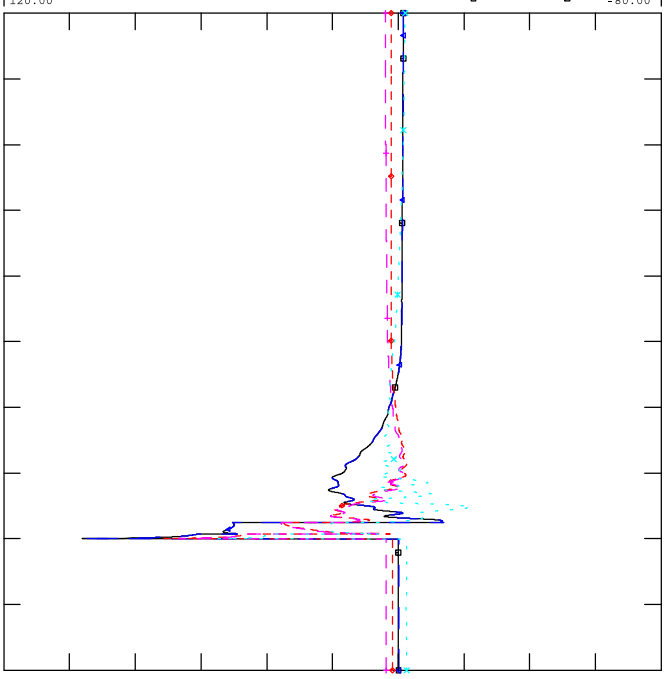
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

MACHINE VAR (1)

CHNL# 40: [VARS 4247[CAVAL B 13.800]3]*100 — 30.000 … -20.00
CHNL# 39: [VARS 4247[CAVAL B 13.800]2]*100 — 80.000 … -60.00
CHNL# 38: [VARS 3247[CAVAL A 13.800]1]*100 — 80.000 … -60.00
CHNL# 37: [VARS 4251[CARSELA1 13.800]1]*100 — 120.00 … -80.00
CHNL# 36: [VARS 3251[CARSELA2 13.800]2]*100 — 120.00 … -80.00

TIME (SECONDS)



P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

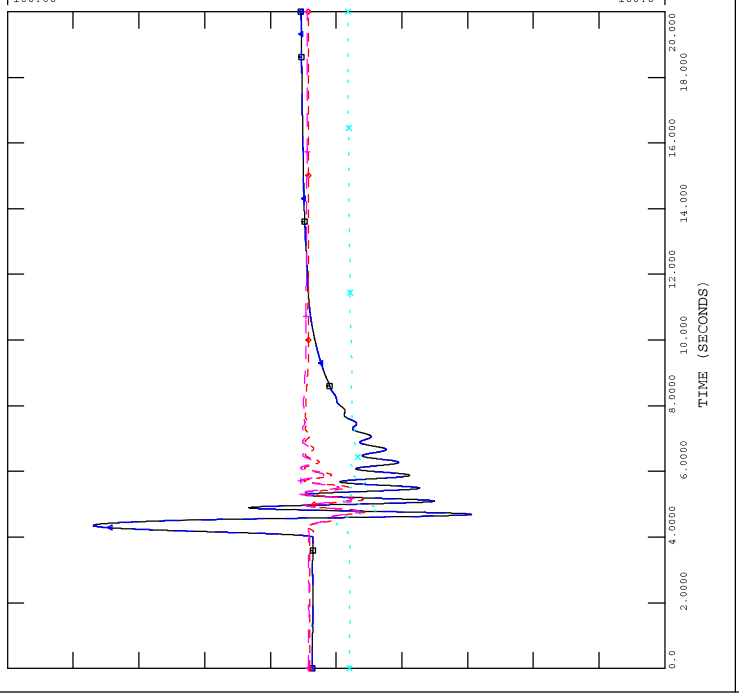
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

MACHINE ANGEL

CHNL# 10: [ANGL 4247[CAVAL B 13.800]3] — 100.00 … -100.0
CHNL# 9: [ANGL 4247[CAVAL B 13.800]2] — 100.00 … -100.0
CHNL# 8: [ANGL 3247[CAVAL A 13.800]1] — 100.00 … -100.0
CHNL# 7: [ANGL 4251[CARSELA1 13.800]1] — 100.00 … -100.0
CHNL# 6: [ANGL 3251[CARSELA2 13.800]2] — 100.00 … -100.0

TIME (SECONDS)



P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

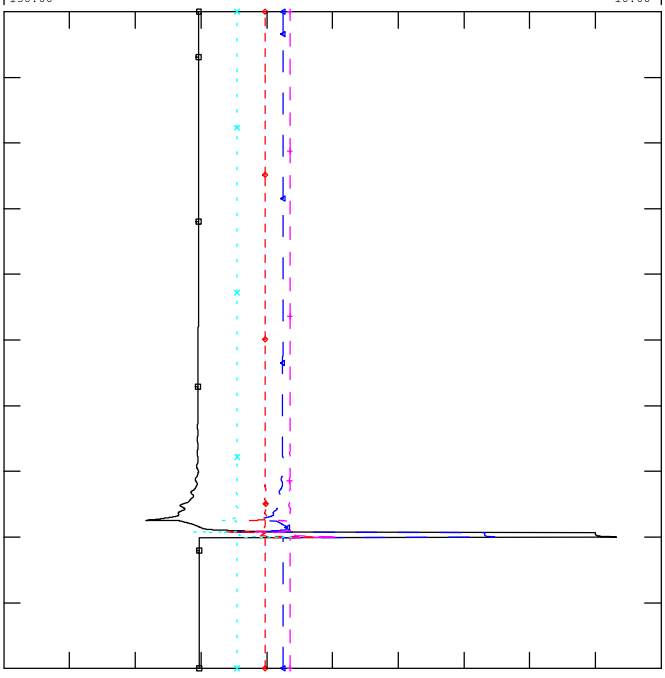
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

MACHINE POWER (2)

CHNL# 30: [POWR558259[P2030_PV 0.5500]GX]*100 — 30.000 … -10.00
CHNL# 29: [POWR557259[P2029_PV 0.5500]GX]*100 — 30.000 … -10.00
CHNL# 28: [POWR552340[ESSP-1 0.5500]G1]*100 — 30.000 … -10.00
CHNL# 27: [POWR563240[TCE_BESS 0.6900]1]*100 — 15.000 … -5.000
CHNL# 26: [POWR562240[TEC_SOLR 0.6900]1]*100 — 150.00 … -10.00

TIME (SECONDS)

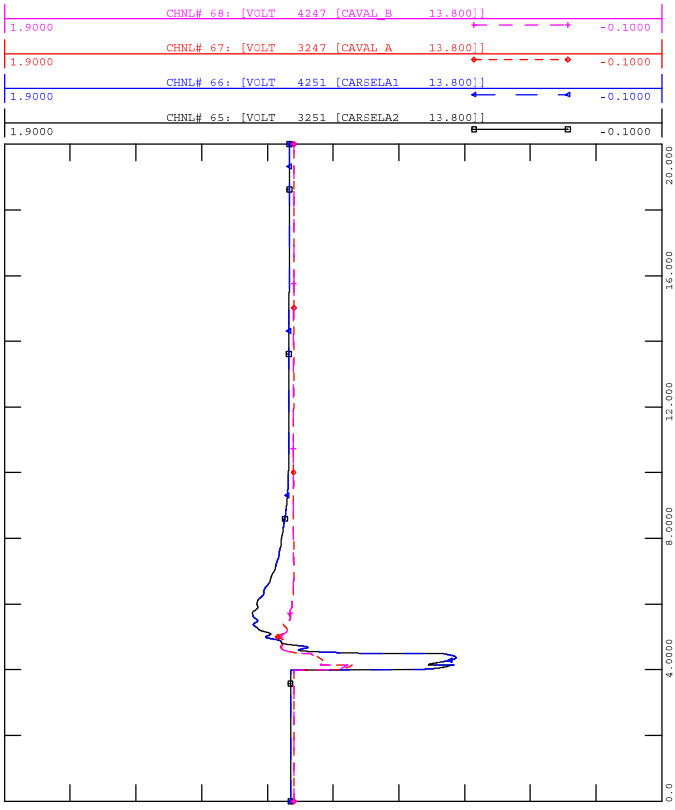


P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (1)

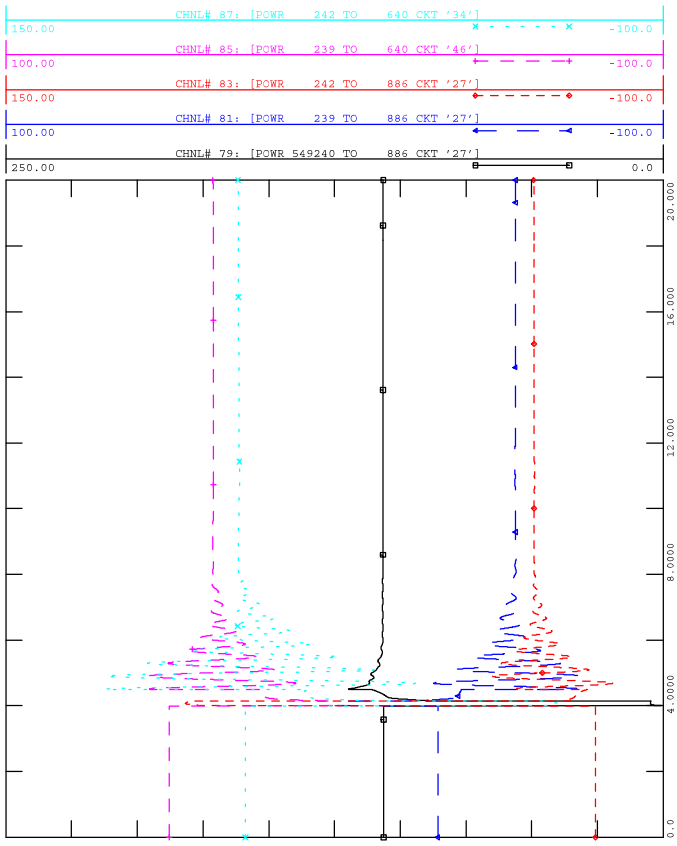


P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

LINE POWER (1)

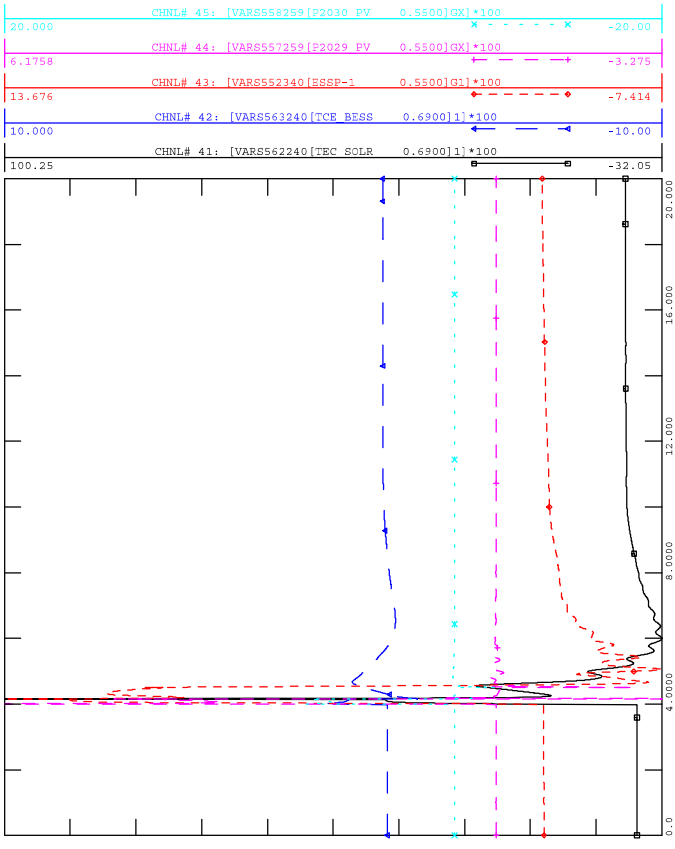


P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

MACHINE VAR (2)

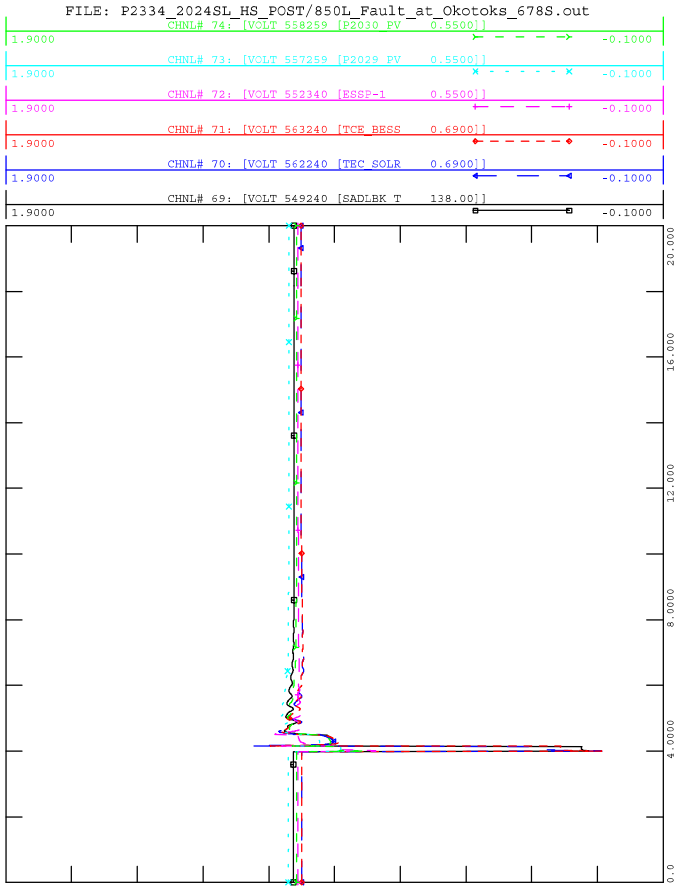


P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

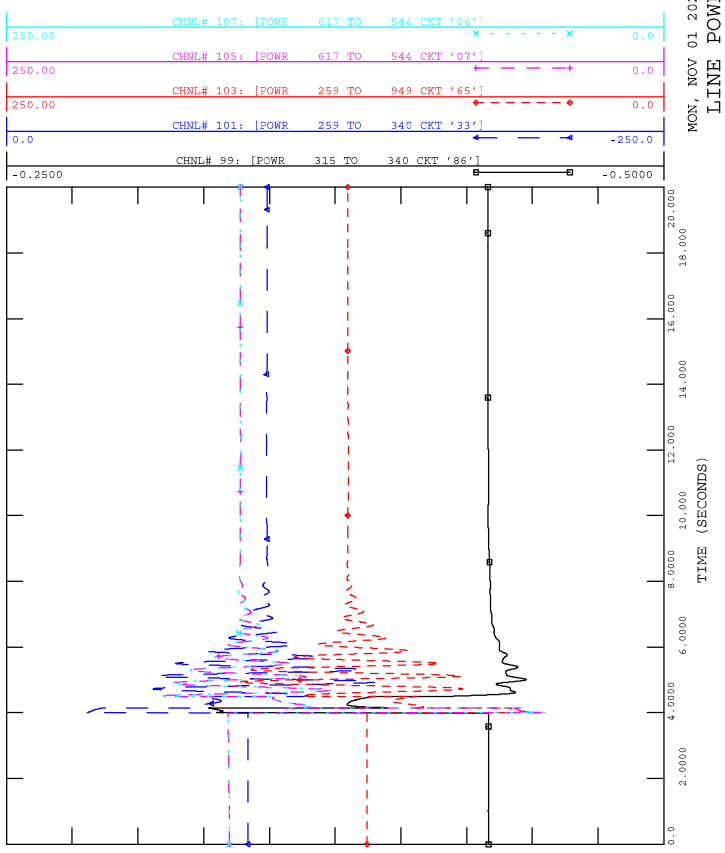
MACHINE VOLTAGE (2)



P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out

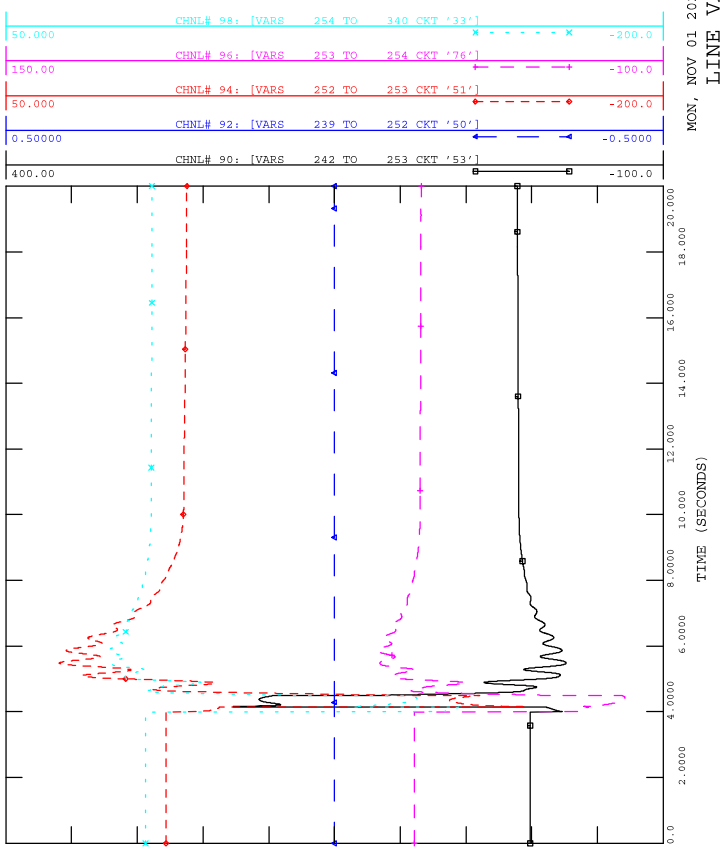
MON, NOV 01 2021 21:04
LINE POWER (3)



P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out

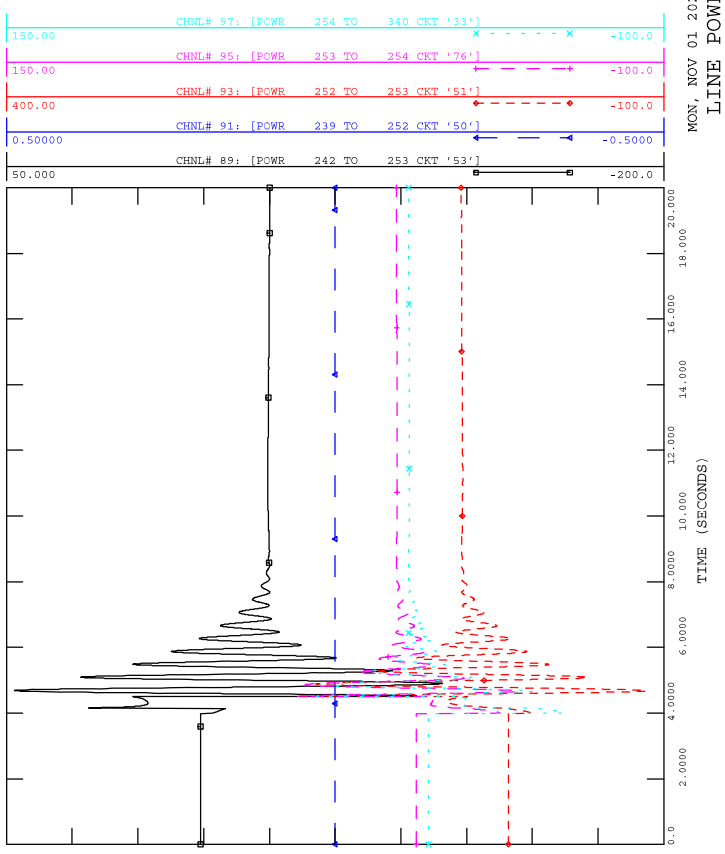
MON, NOV 01 2021 21:04
LINE VAR (2)



P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out

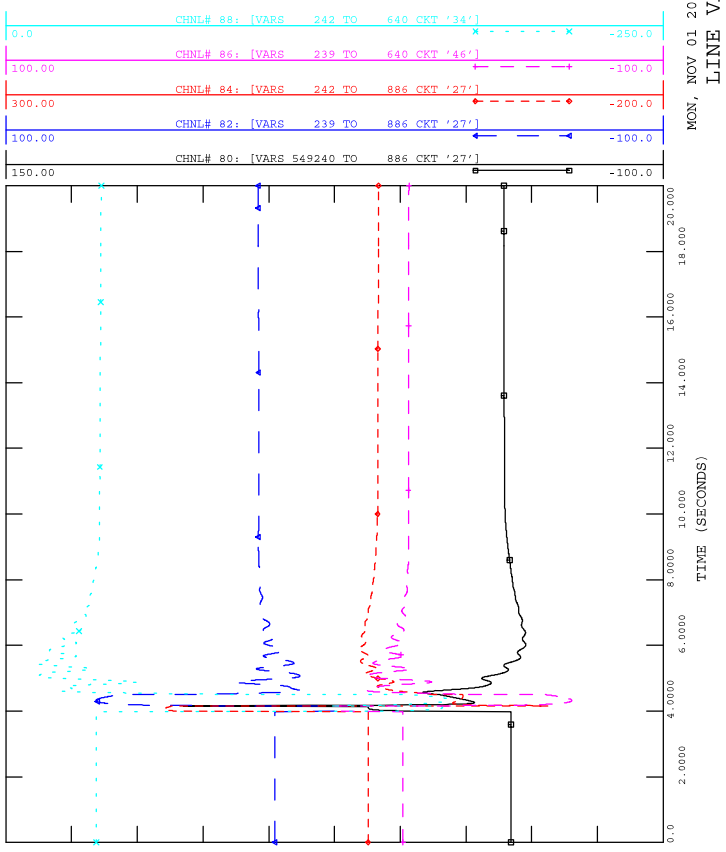
MON, NOV 01 2021 21:04
LINE POWER (2)



P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

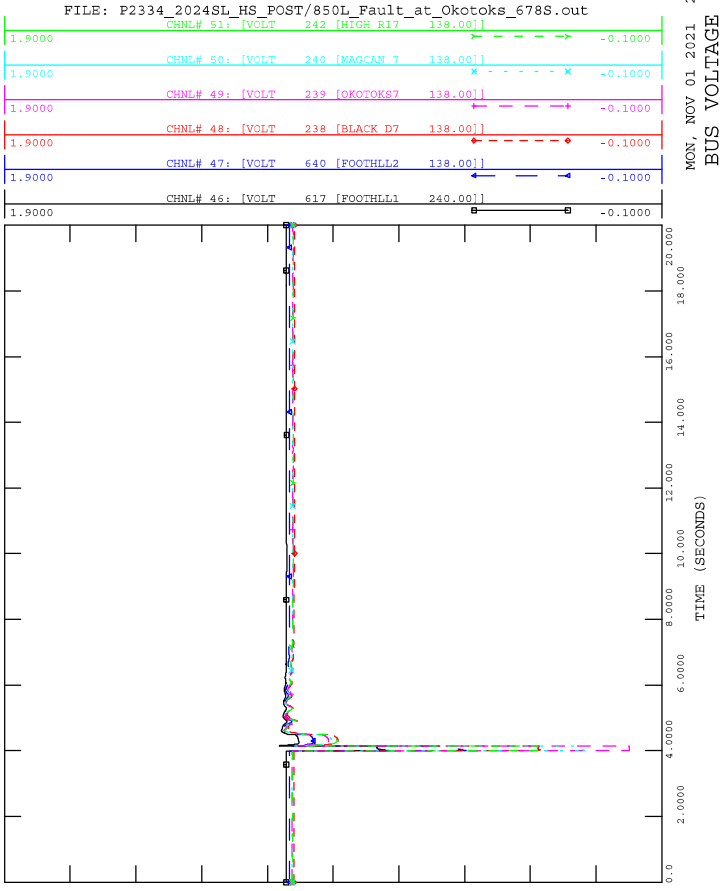
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04
LINE VAR (1)



P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

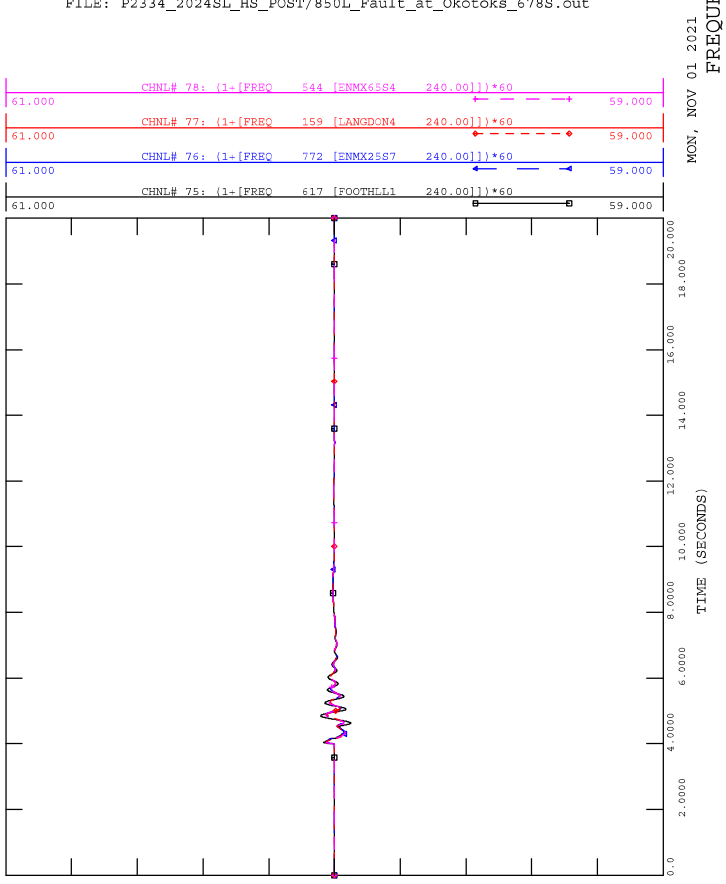
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

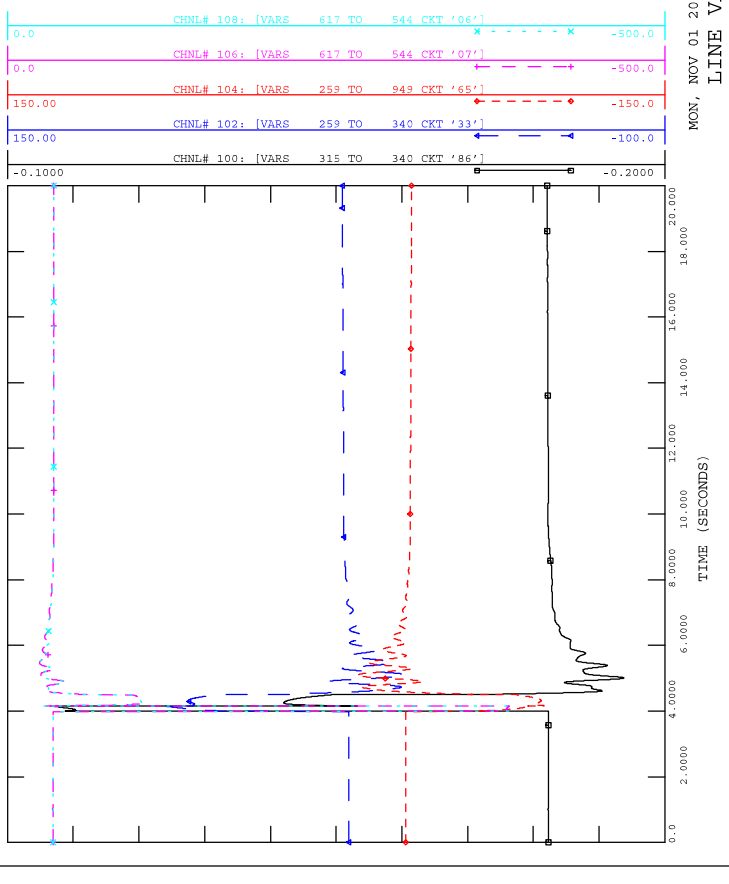
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
FREQUENCY

P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

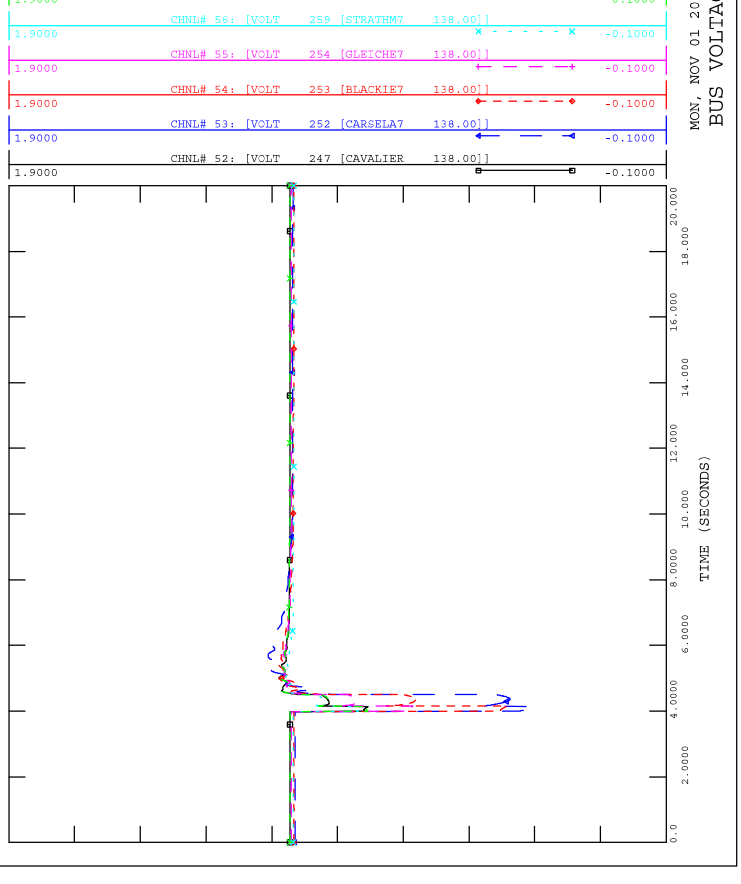
FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
LINE VAR (3)

P2334_2024SL_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/850L_Fault_at_Okotoks_678S.out



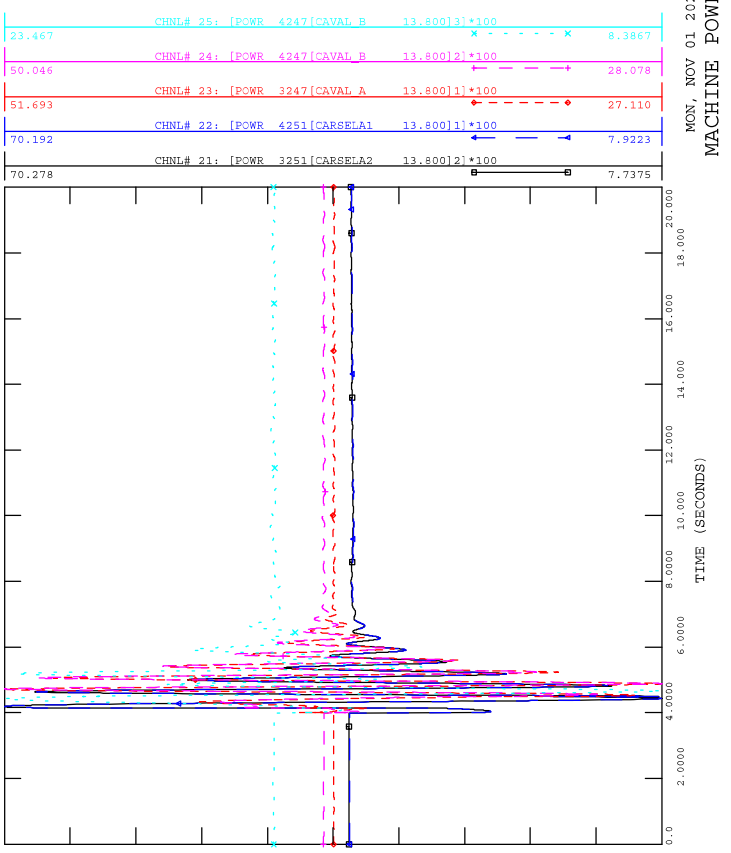
MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04

MACHINE POWER (1)

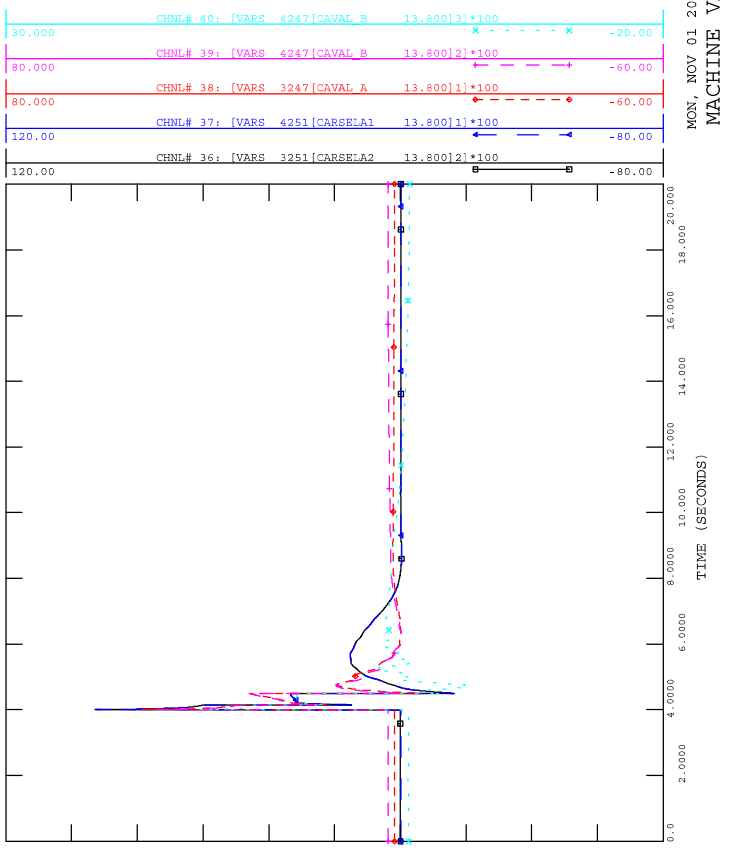


P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04

MACHINE VAR (1)



P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out

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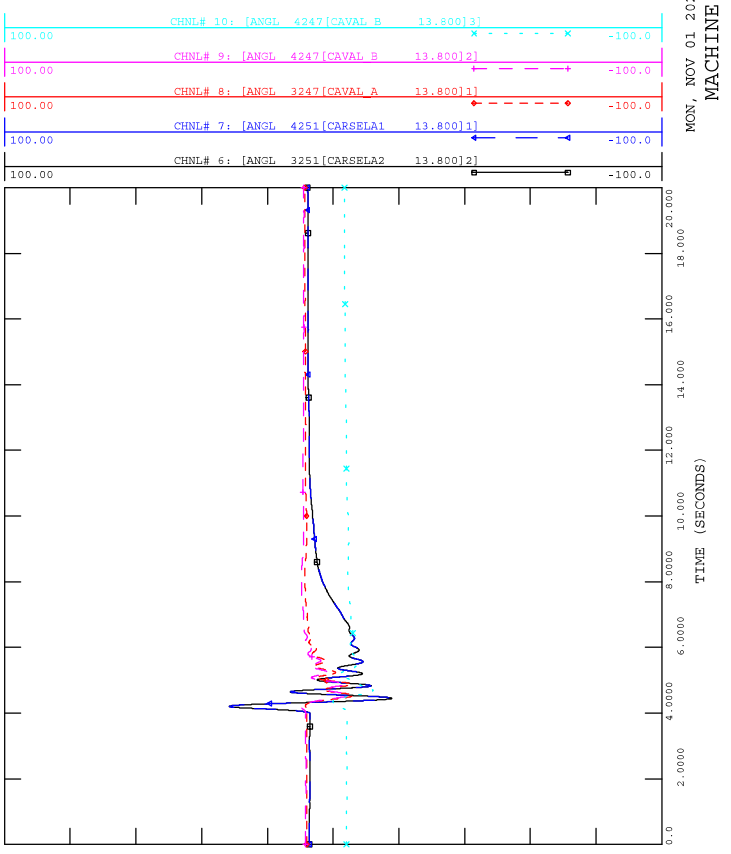
MACHINE ANGEL

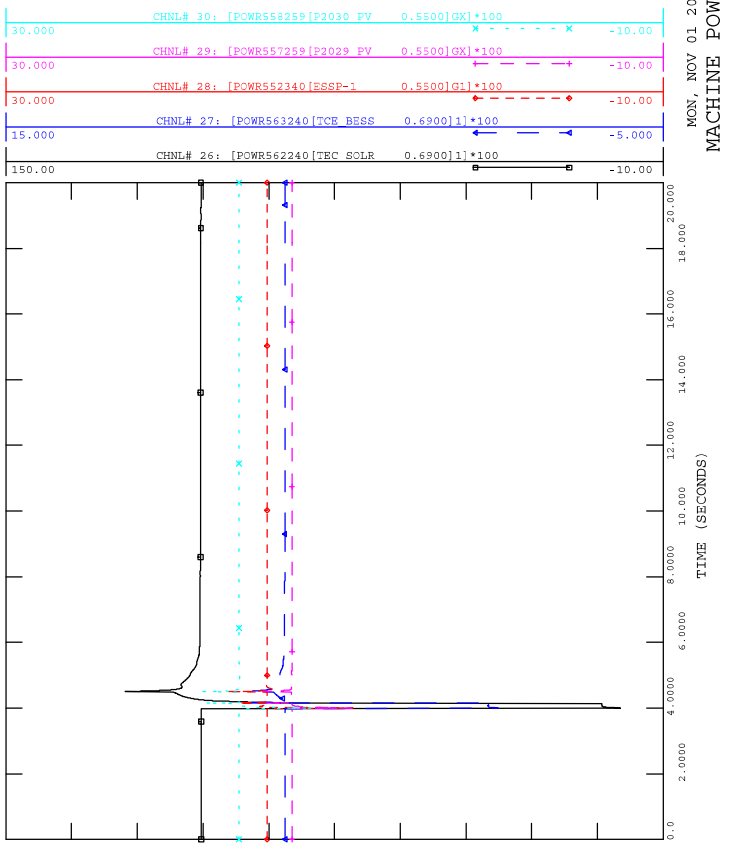


P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out

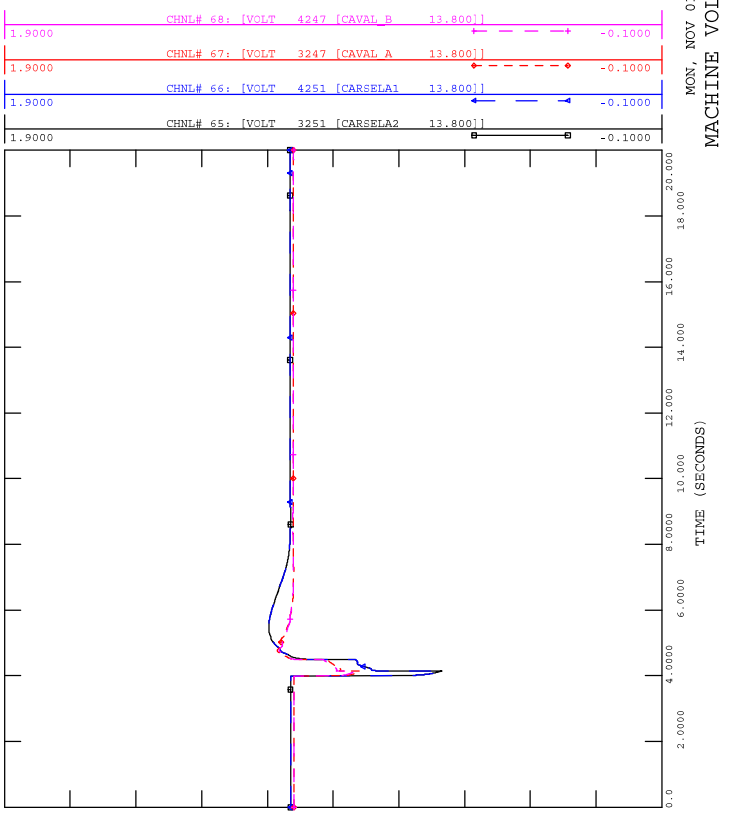
MON, NOV 01 2021 21:04

MACHINE POWER (2)



P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

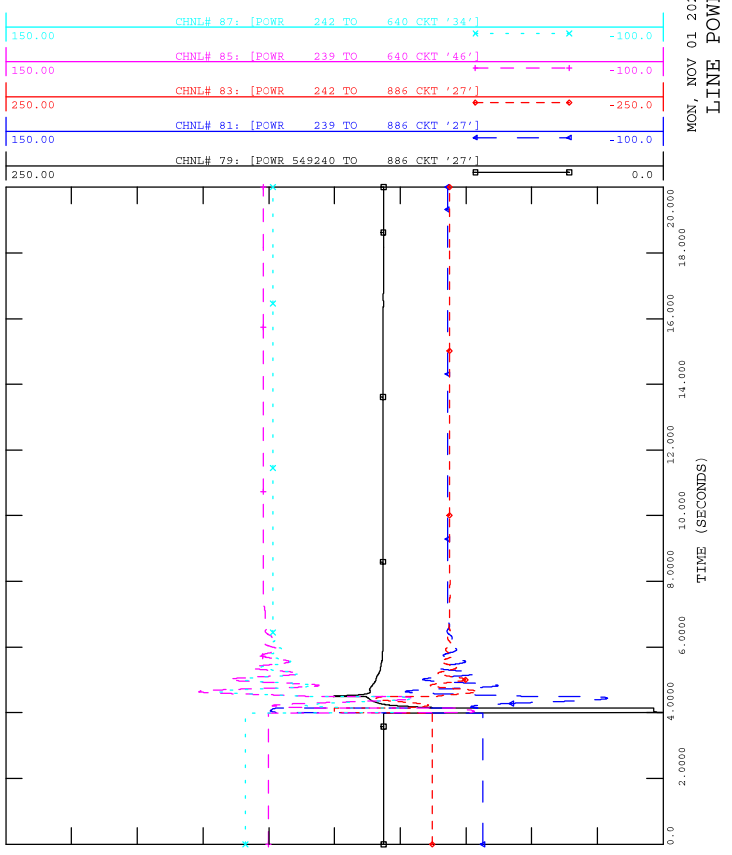
FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
MACHINE VOLTAGE (1)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

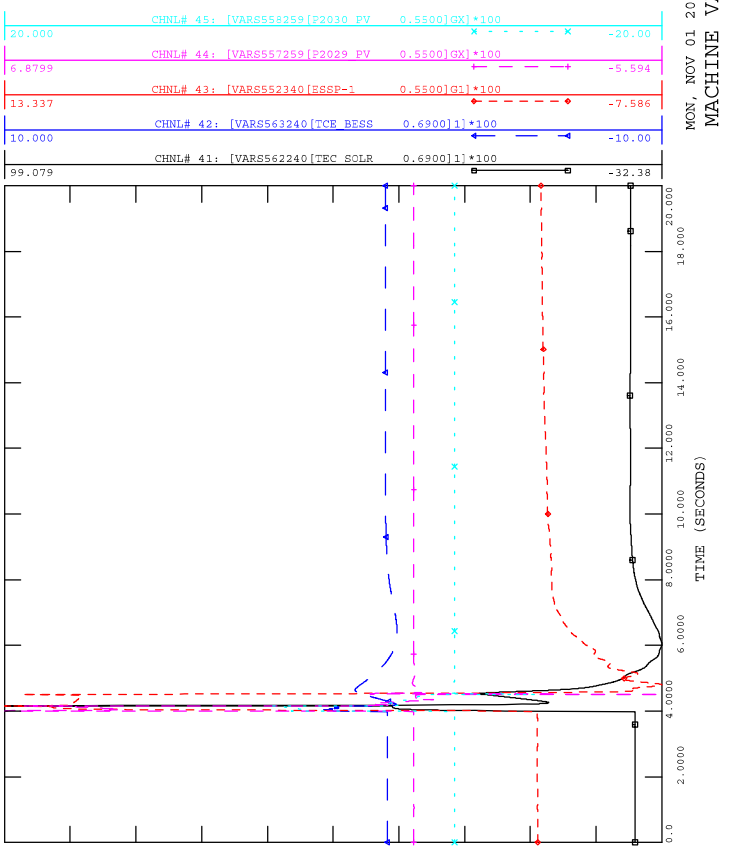
FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE POWER (1)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

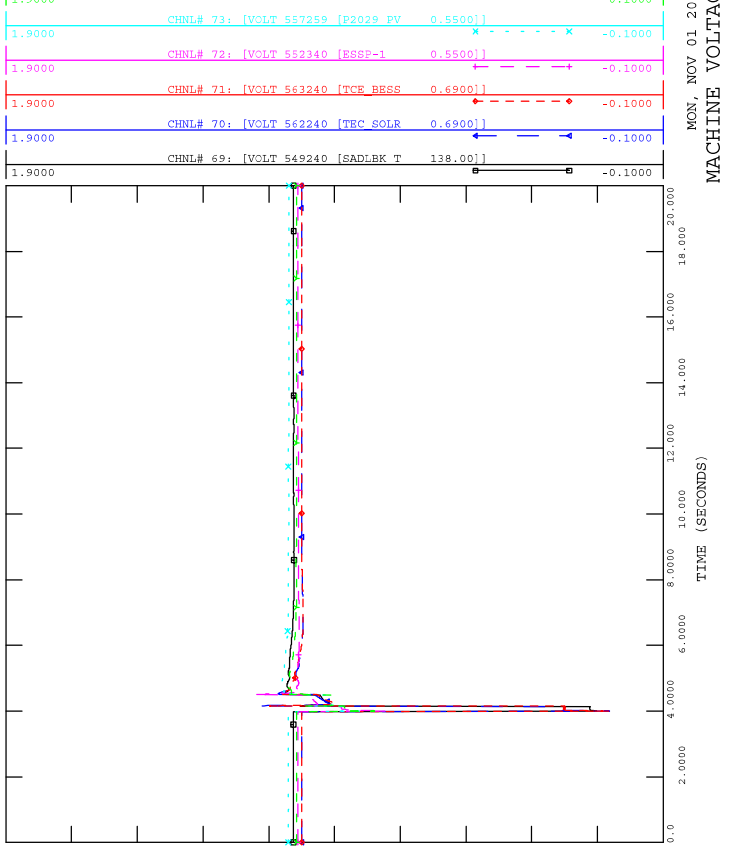
FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
MACHINE VAR (2)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

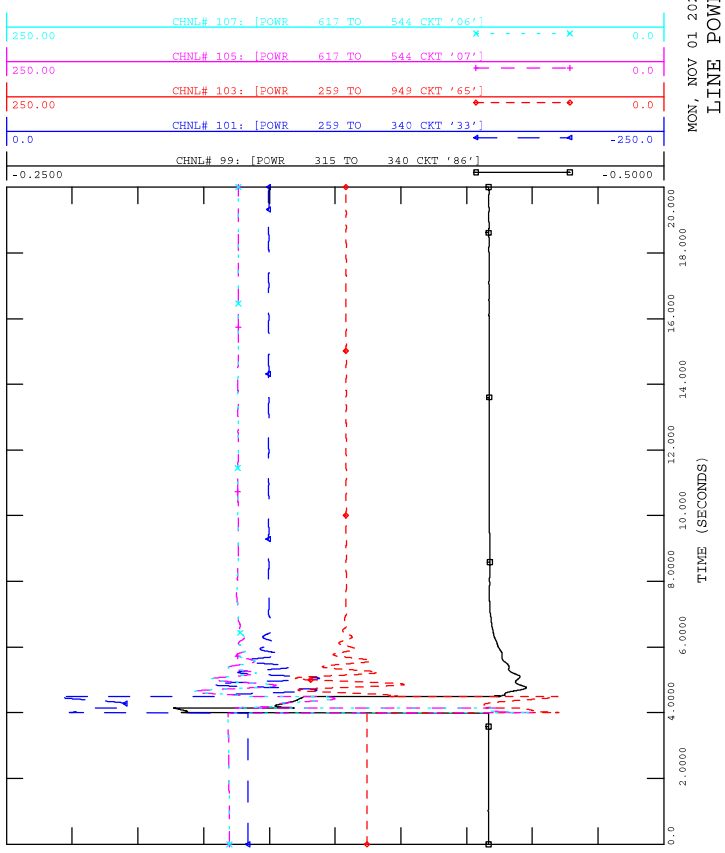
FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
MACHINE VOLTAGE (2)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

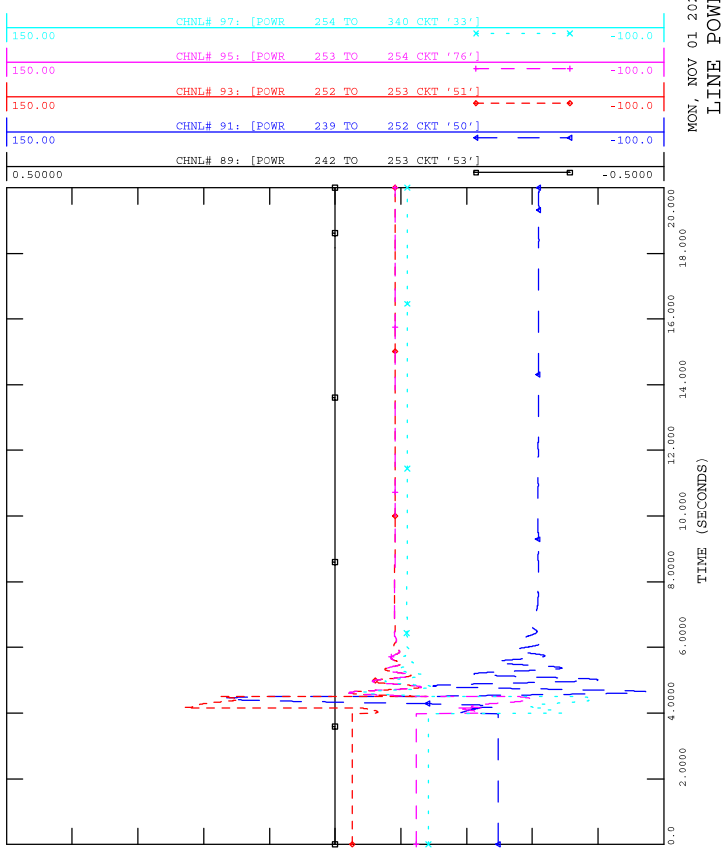
FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE POWER (3)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

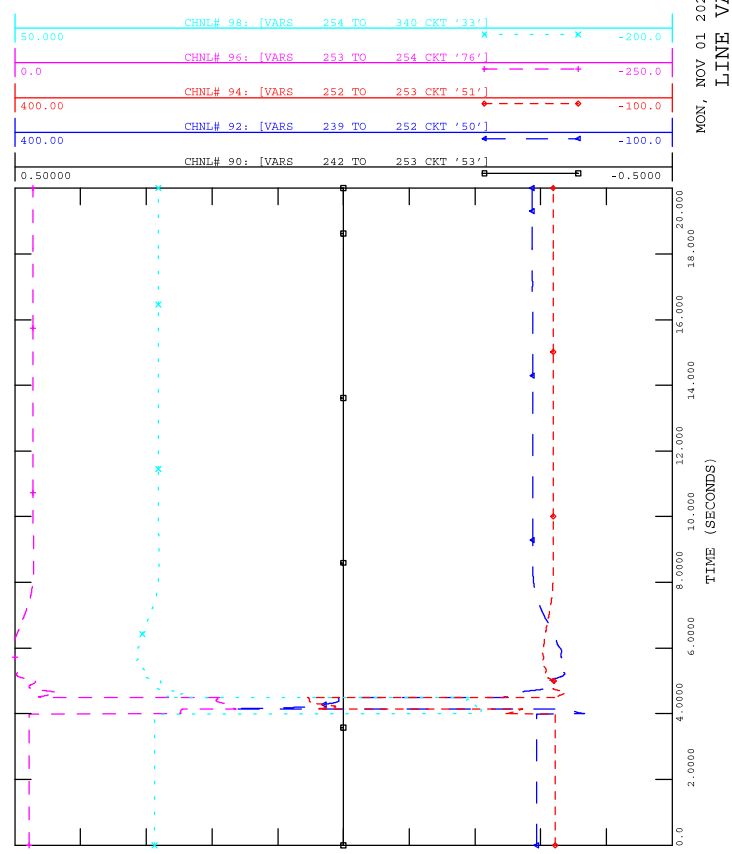
FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE POWER (2)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

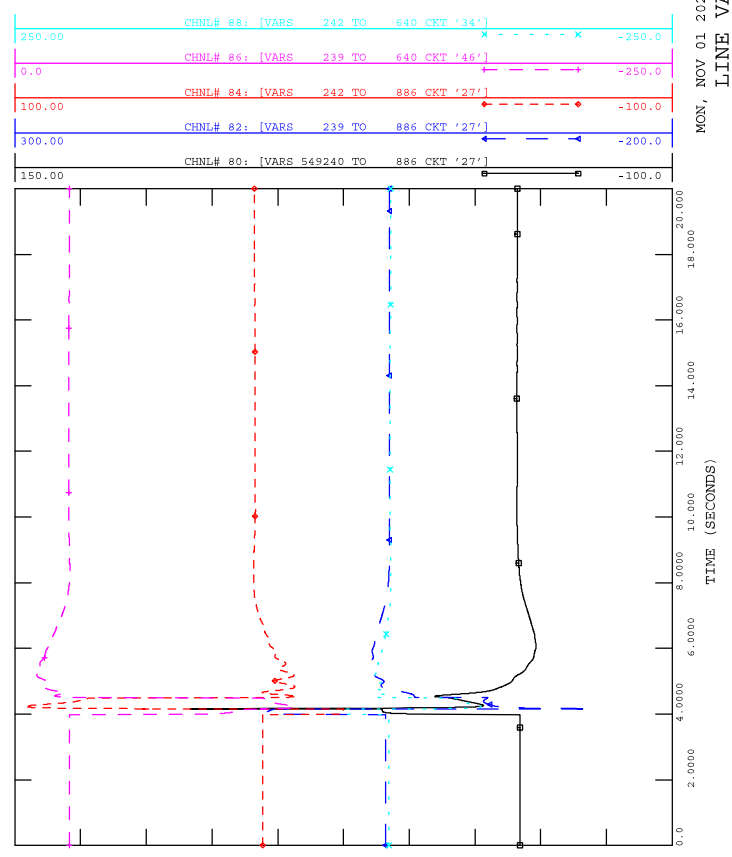
FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE VAR (2)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

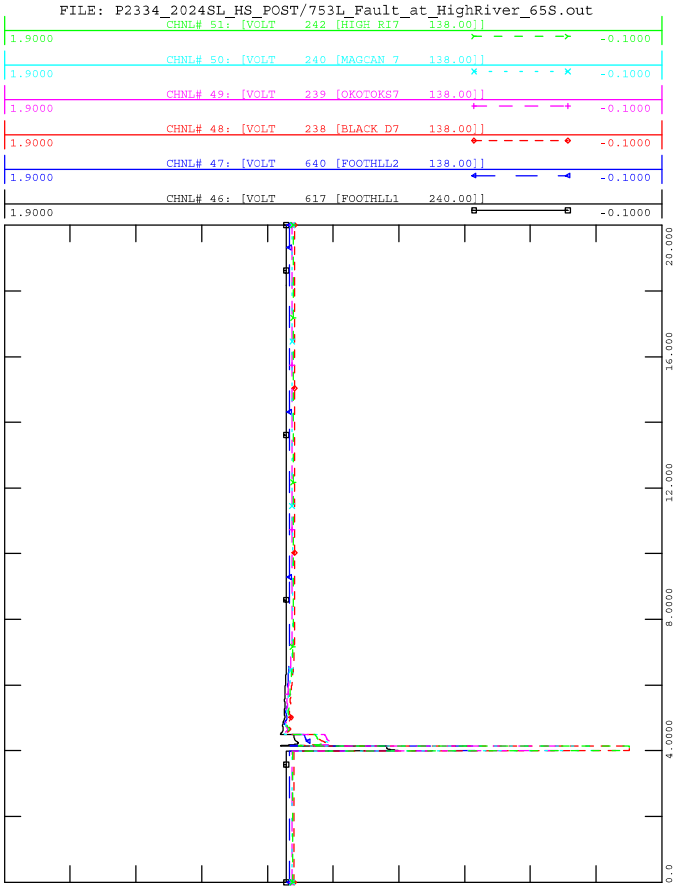
FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE VAR (1)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

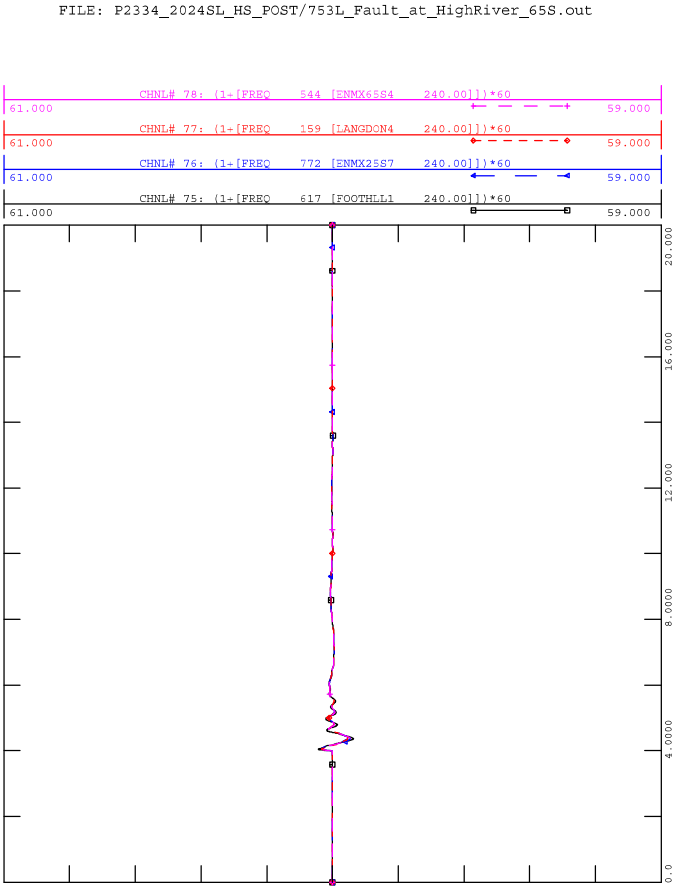
FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

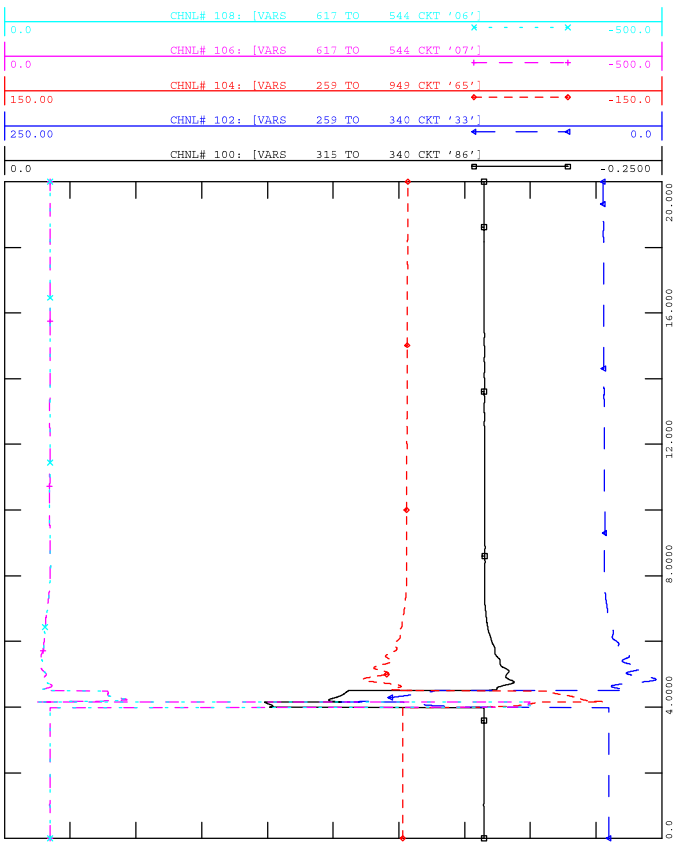
FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
FREQUENCY

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

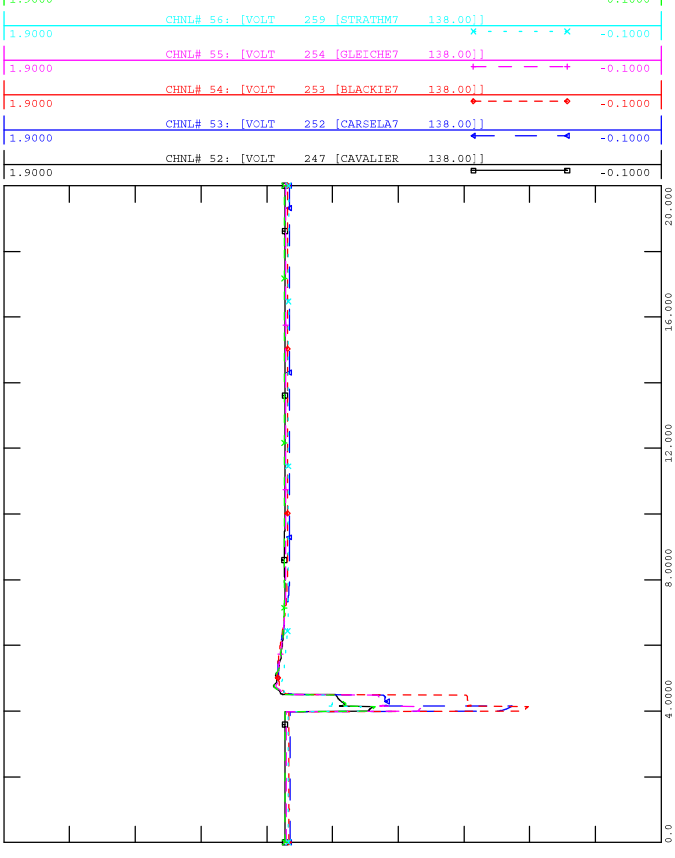
FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE VAR (3)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

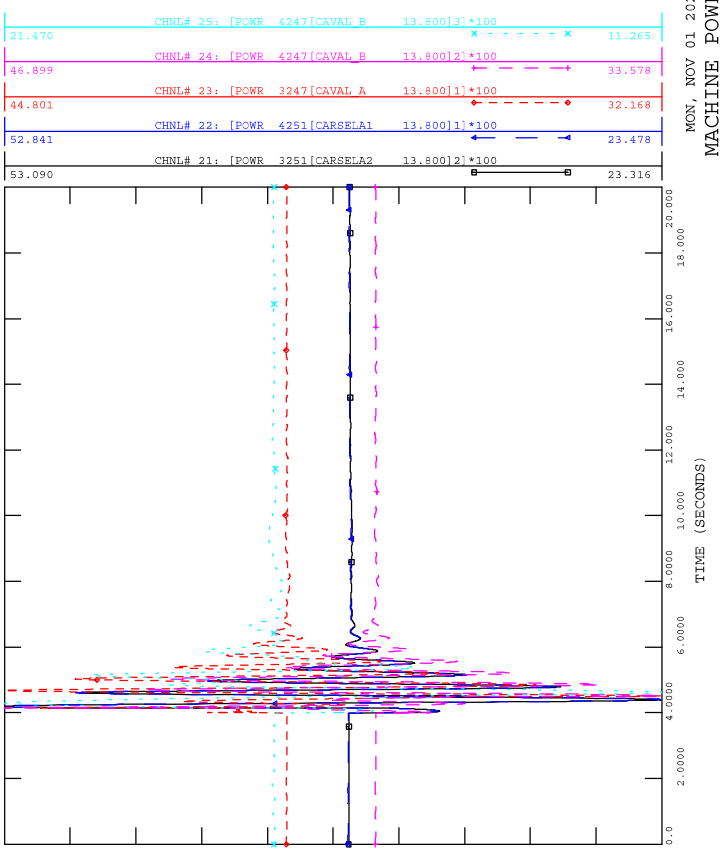
FILE: P2334_2024SL_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

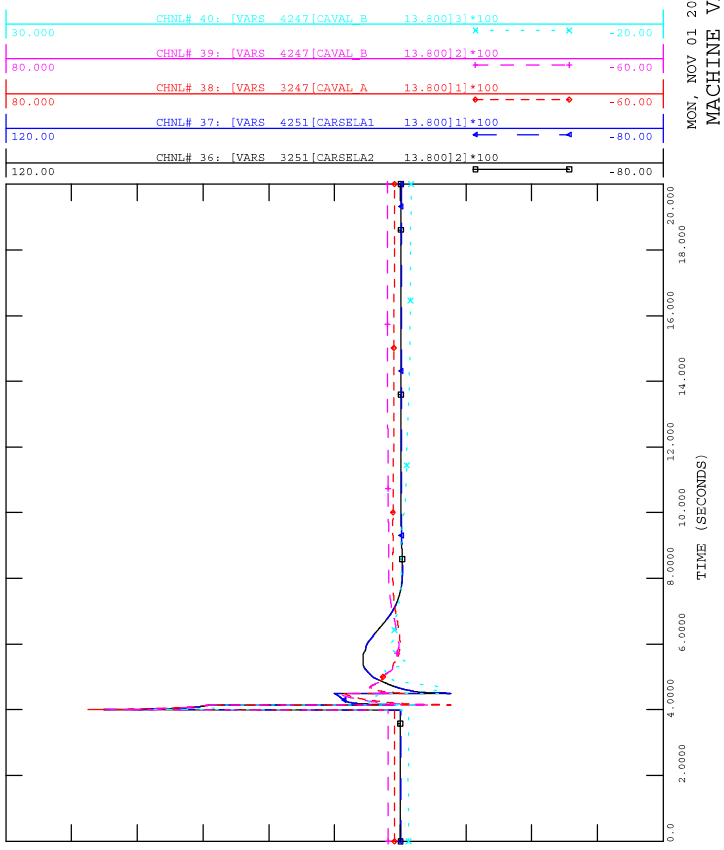
FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out



MON, NOV 01 2021 21:04
MACHINE POWER (1)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

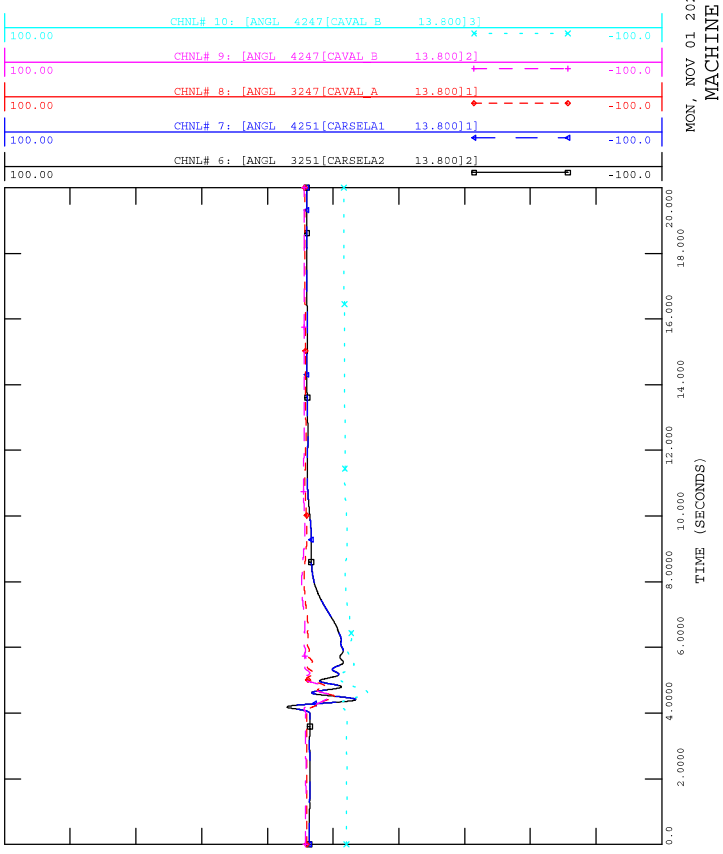
FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out



MON, NOV 01 2021 21:04
MACHINE VAR (1)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

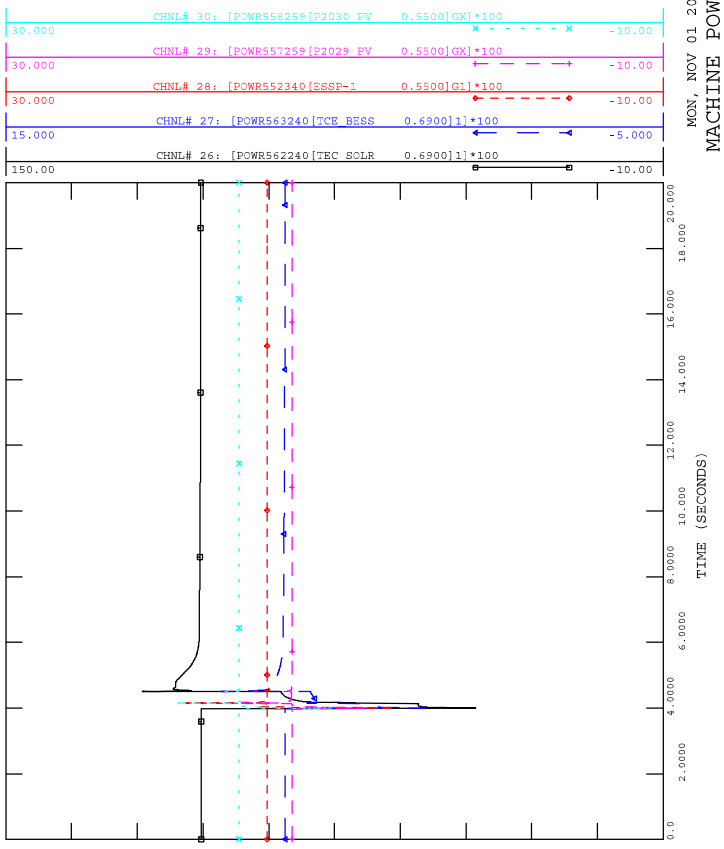
FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out



MON, NOV 01 2021 21:04
MACHINE ANGEL

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out



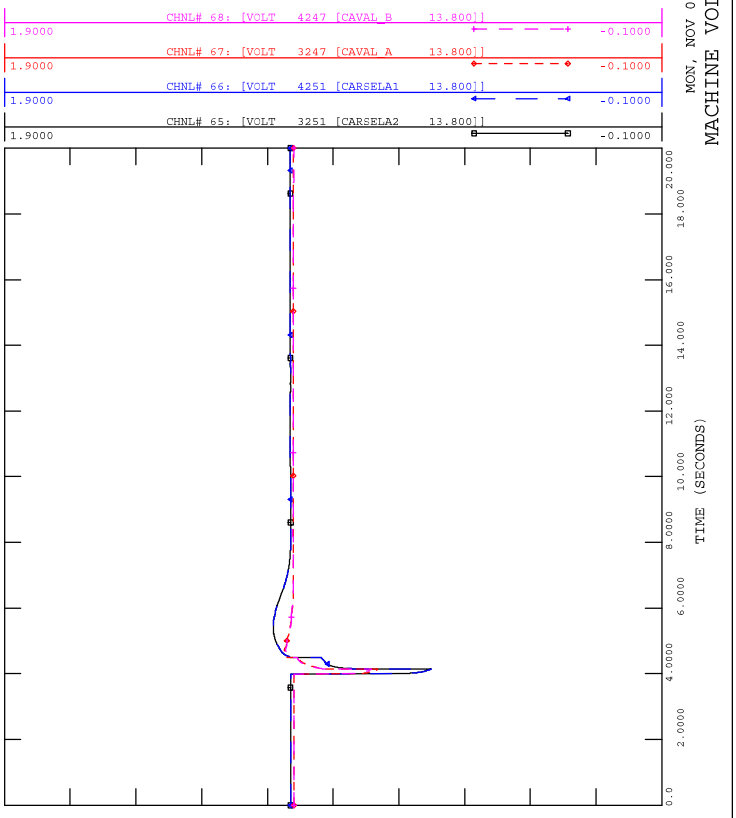
MON, NOV 01 2021 21:04
MACHINE POWER (2)

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (1)

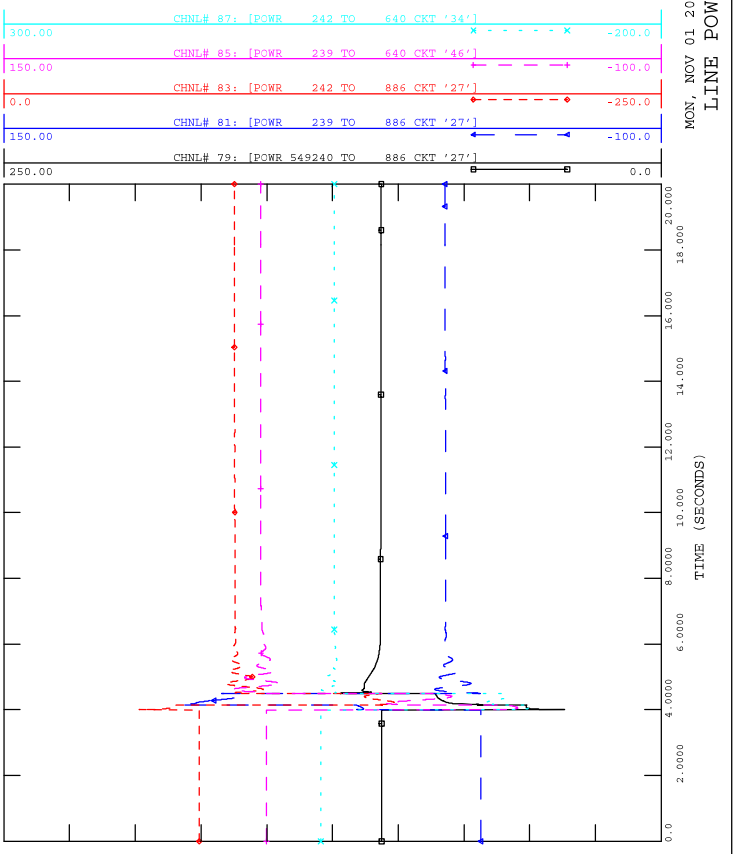


P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out

MON, NOV 01 2021 21:04

LINE POWER (1)

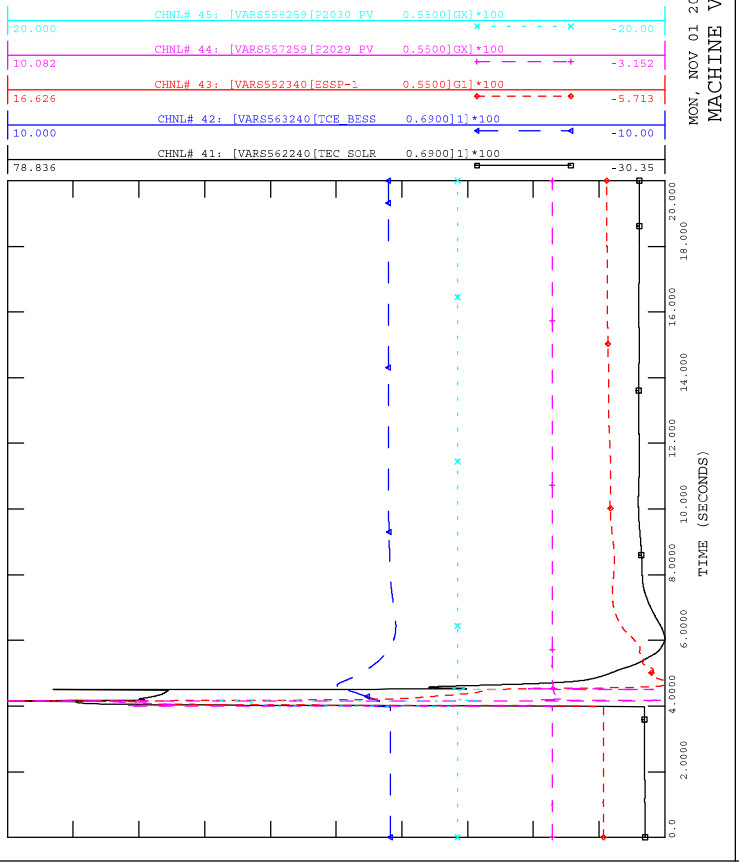


P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out

MON, NOV 01 2021 21:04

MACHINE VAR (2)

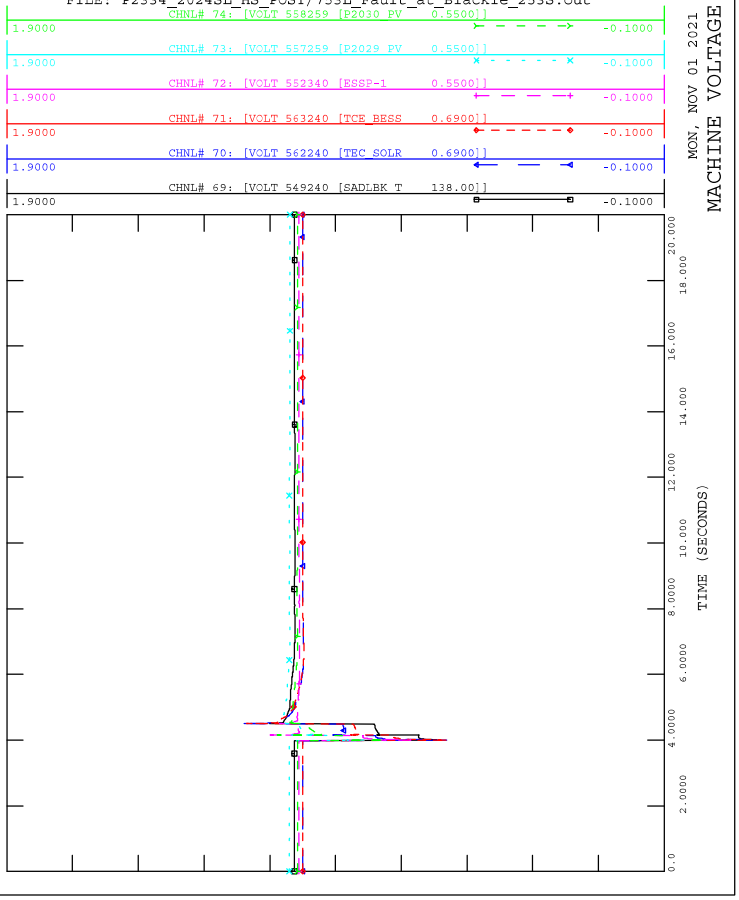


P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out

MON, NOV 01 2021 21:04

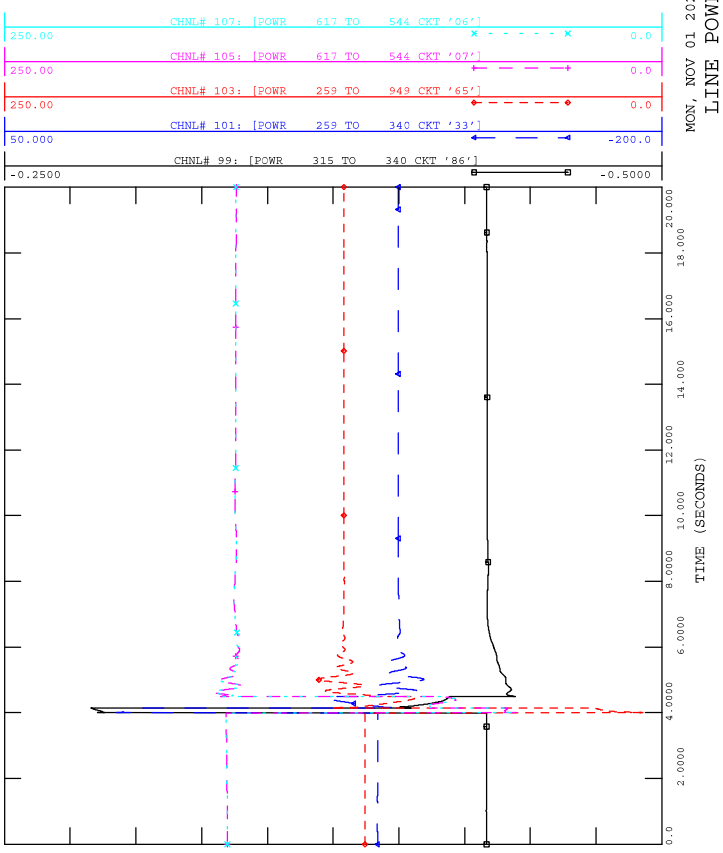
MACHINE VOLTAGE (2)



P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out

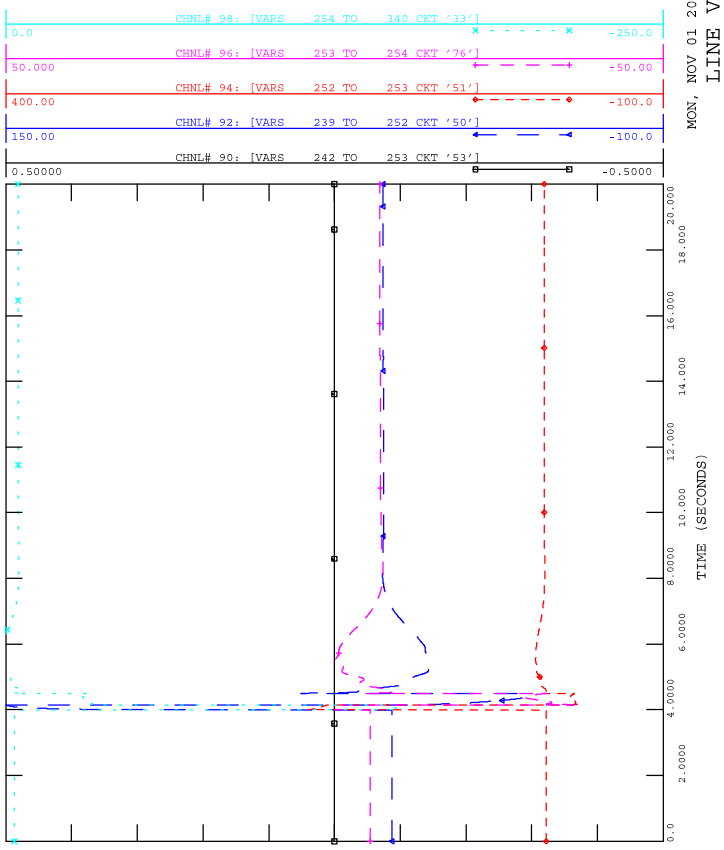
MON, NOV 01 2021 21:04
LINE POWER (3)



P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out

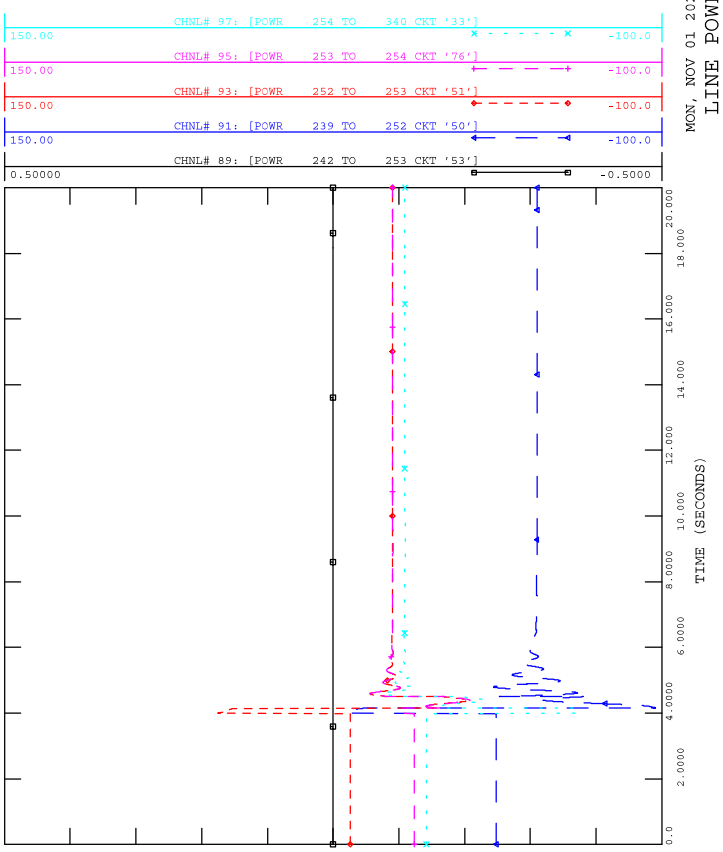
MON, NOV 01 2021 21:04
LINE VAR (2)



P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out

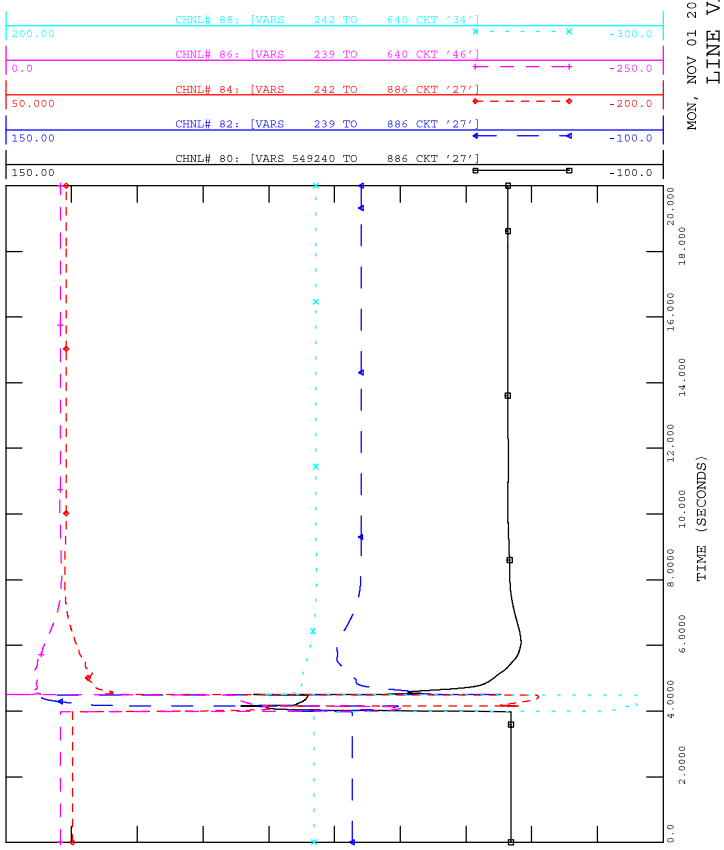
MON, NOV 01 2021 21:04
LINE POWER (2)

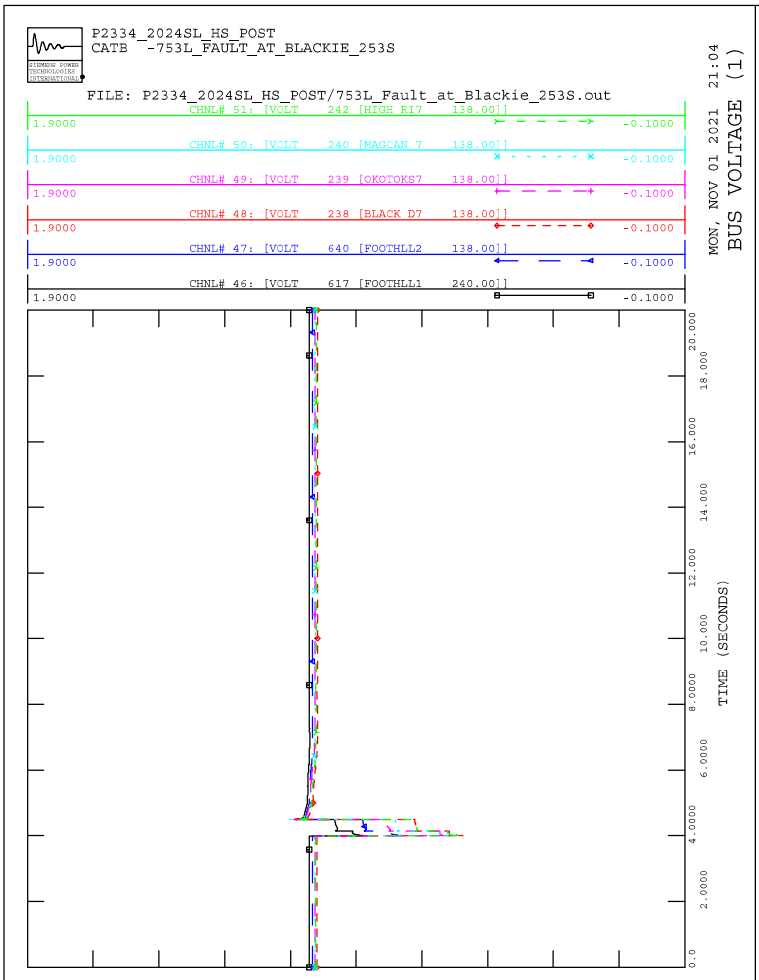


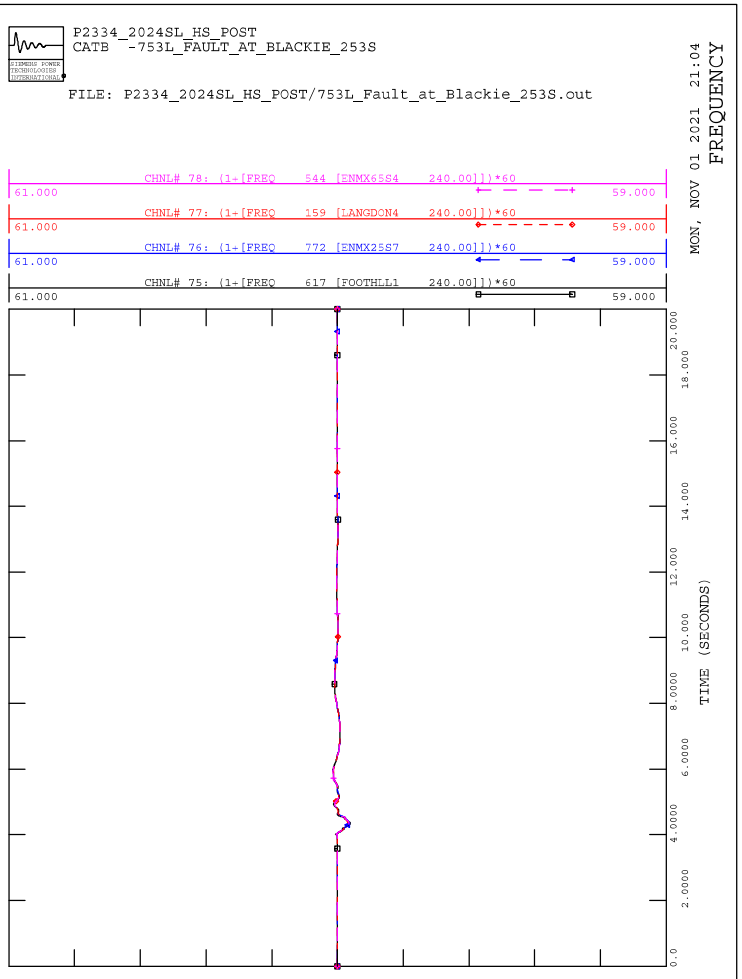
P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

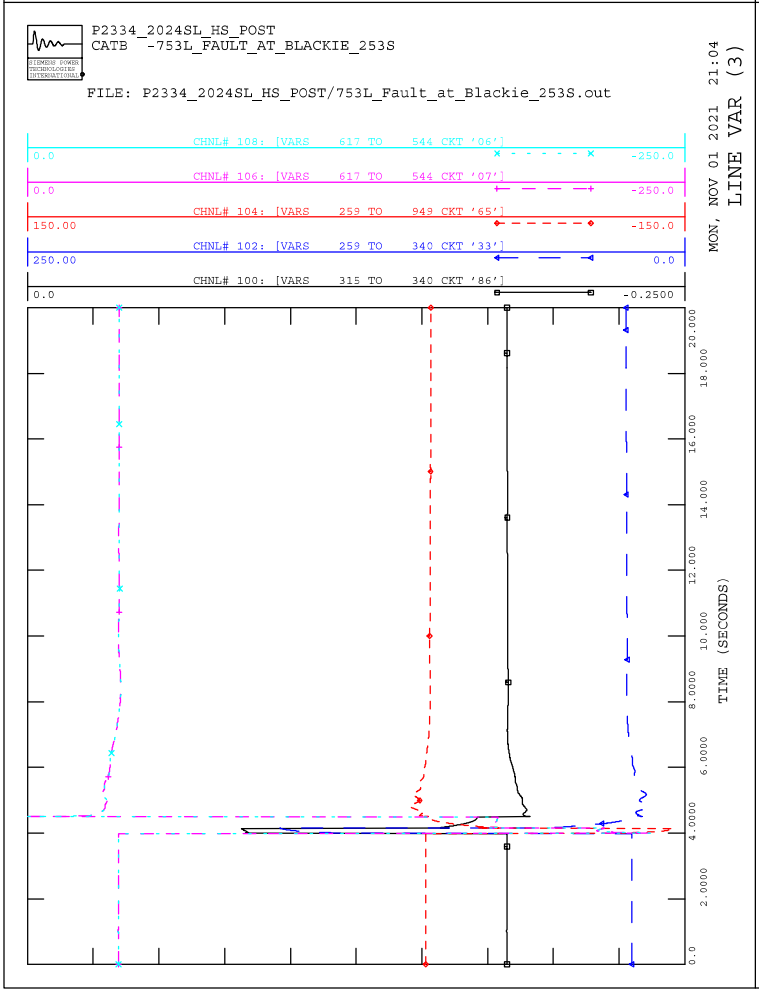
FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out

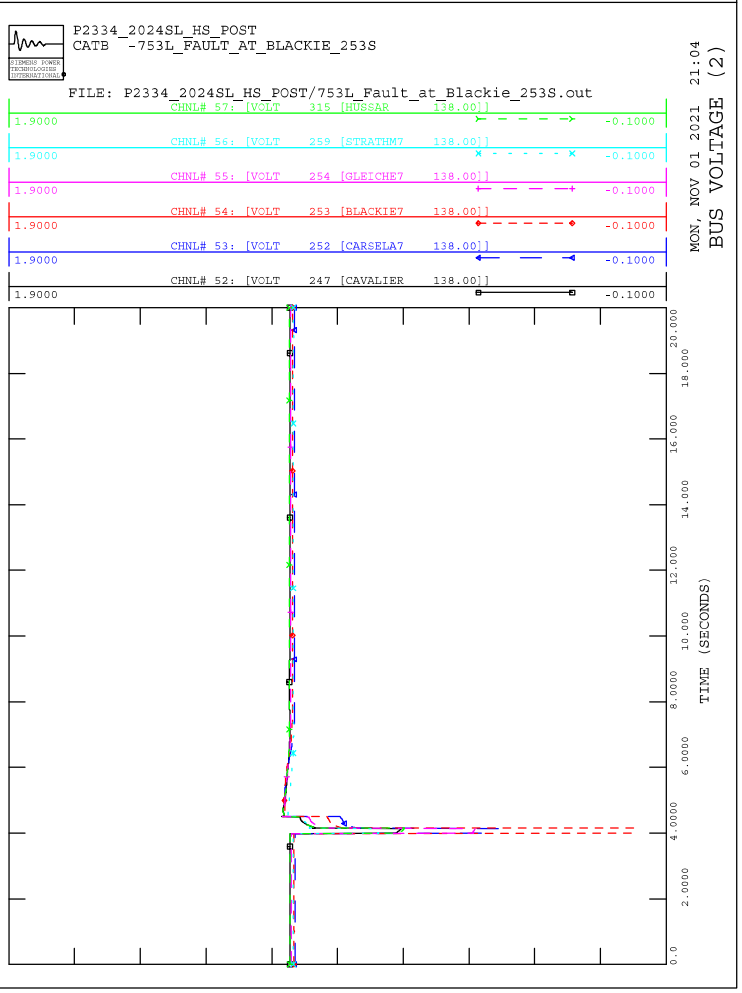
MON, NOV 01 2021 21:04
LINE VAR (1)




P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S
FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out
CHNL# 51: [VOLT 242 [HIGH RI7 138.00]]
CHNL# 50: [VOLT 240 [MAGCAN 7 138.00]]
CHNL# 49: [VOLT 239 [OKOTOKS7 138.00]]
CHNL# 48: [VOLT 238 [BLACK D7 138.00]]
CHNL# 47: [VOLT 640 [FOOTHLL2 138.00]]
CHNL# 46: [VOLT 617 [FOOTHLL1 240.00]]
1.9000
-0.1000
TIME (SECONDS)
MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

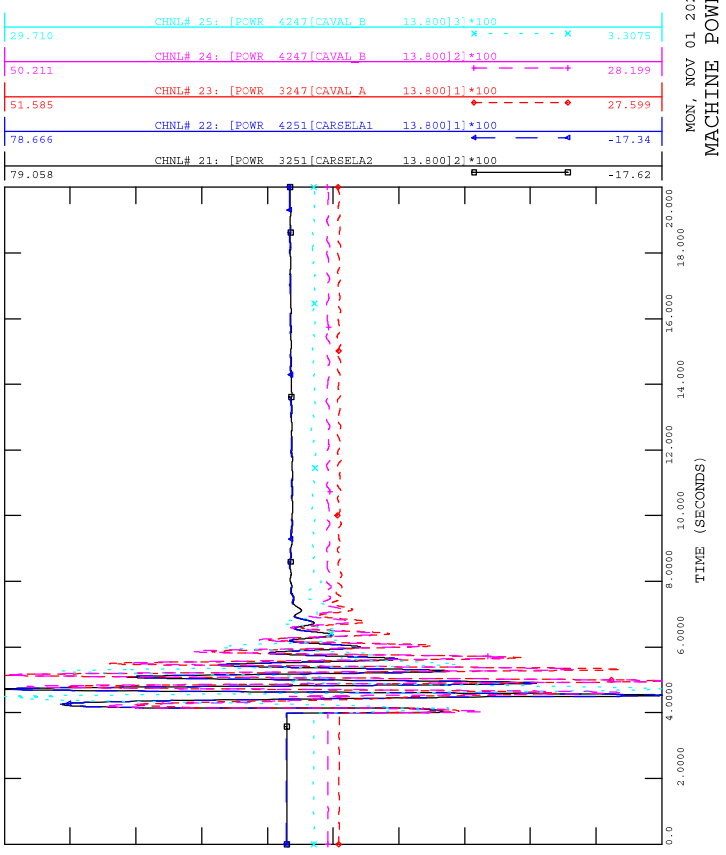

P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S
FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out
CHNL# 78: (1+[FREQ 544 [ENMX65S4 240.00]])*60
CHNL# 77: (1+[FREQ 159 [LANGDON4 240.00]])*60
CHNL# 76: (1+[FREQ 772 [ENMX25S7 240.00]])*60
CHNL# 75: (1+[FREQ 617 [FOOTHLL1 240.00]])*60
61.000
59.000
TIME (SECONDS)
MON, NOV 01 2021 21:04
FREQUENCY


P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S
FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out
CHNL# 108: [VARS 617 TO 544 CKT '06']
CHNL# 106: [VARS 617 TO 544 CKT '07']
CHNL# 104: [VARS 259 TO 943 CKT '65']
CHNL# 102: [VARS 259 TO 340 CKT '33']
CHNL# 100: [VARS 315 TO 340 CKT '86']
0.0
-250.0
150.00
-150.0
250.00
-0.2500
TIME (SECONDS)
MON, NOV 01 2021 21:04
LINE VAR (3)


P2334_2024SL_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S
FILE: P2334_2024SL_HS_POST/753L_Fault_at_Blackie_253S.out
CHNL# 57: [VOLT 315 [HUSSAR 138.00]]
CHNL# 56: [VOLT 259 [STRATHM7 138.00]]
CHNL# 55: [VOLT 254 [GLEICHE7 138.00]]
CHNL# 54: [VOLT 253 [BLACKIE7 138.00]]
CHNL# 53: [VOLT 252 [CARSELA7 138.00]]
CHNL# 52: [VOLT 247 [CAVALIER 138.00]]
1.9000
-0.1000
TIME (SECONDS)
MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

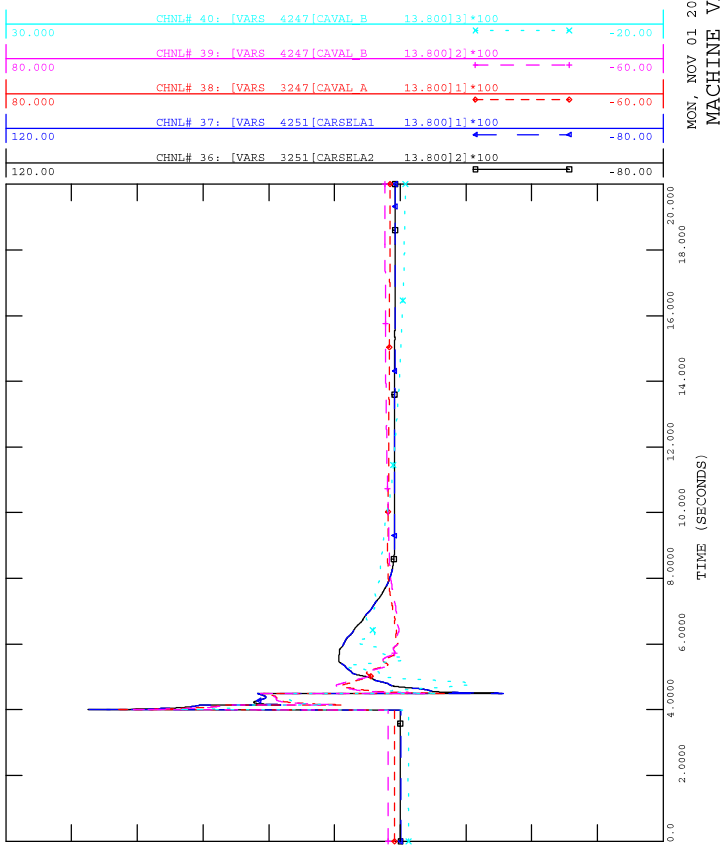
P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out



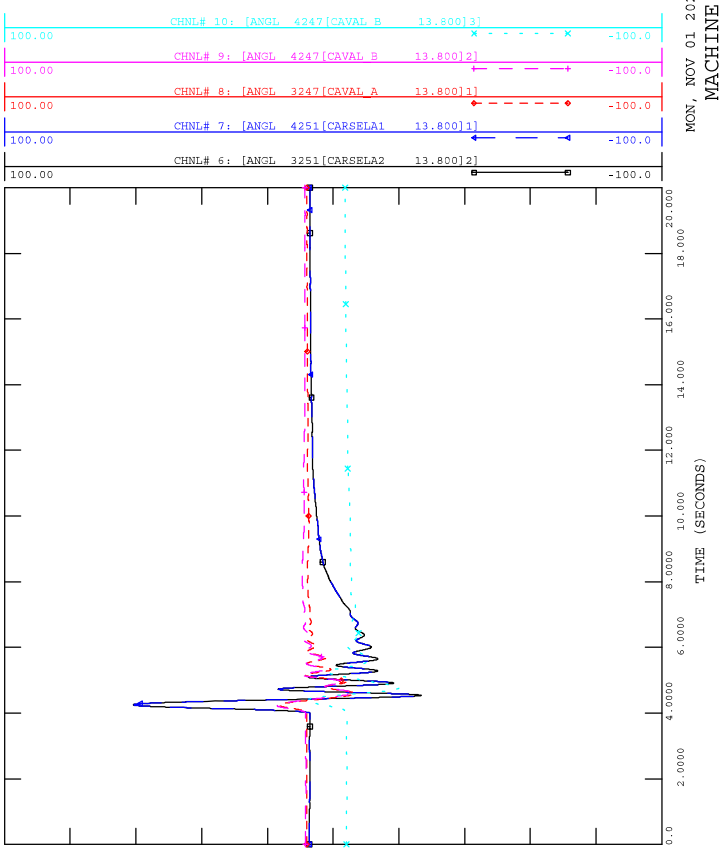
P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out



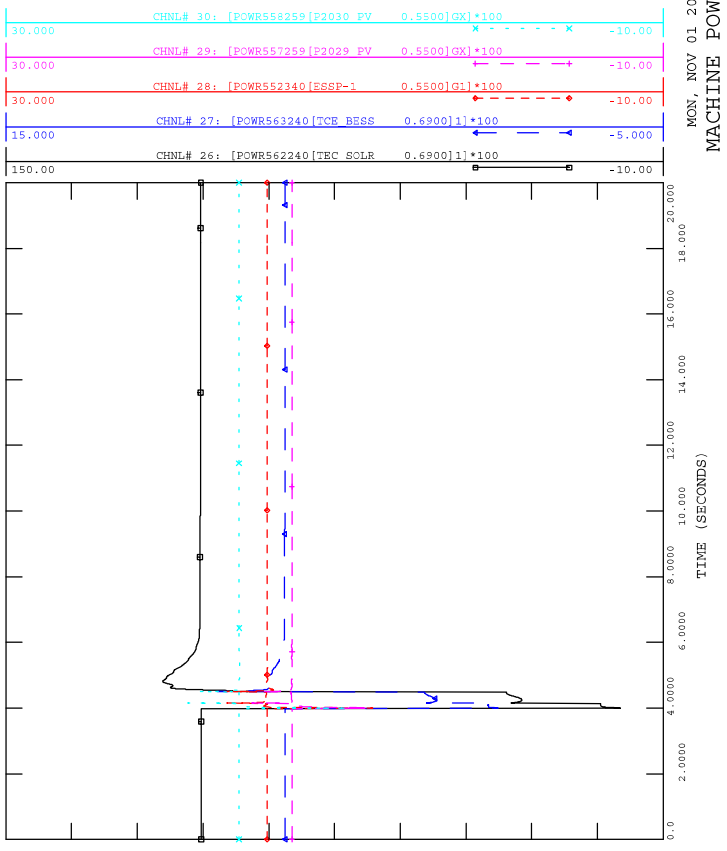
P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out



P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out



P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

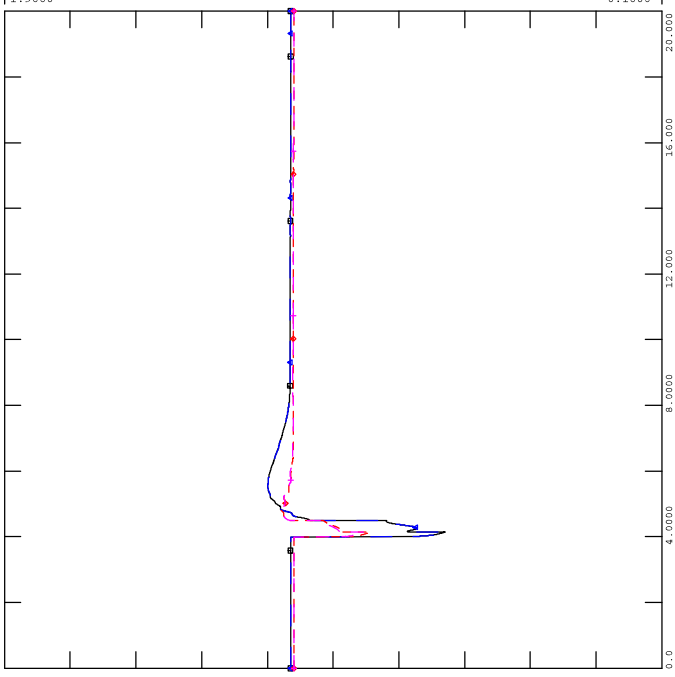
FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (1)

CHNL# 68: [VOLT 4247 [CAVAL_B 13.800]]
CHNL# 67: [VOLT 3247 [CAVAL_A 13.800]]
CHNL# 66: [VOLT 4251 [CARSELA1 13.800]]
CHNL# 65: [VOLT 3251 [CARSELA2 13.800]]

TIME (SECONDS)



P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

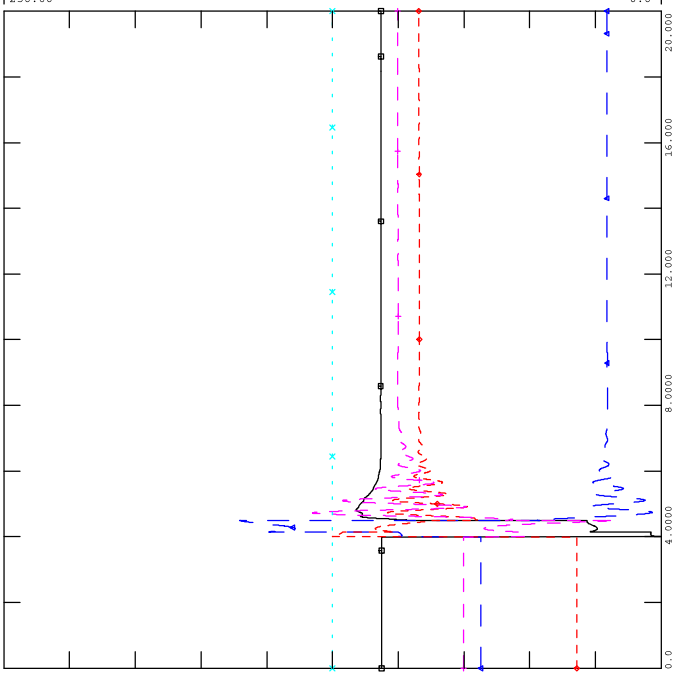
FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

LINE POWER (1)

CHNL# 87: [POWR 242 TO 640 CKT '34']
CHNL# 85: [POWR 239 TO 640 CKT '46']
CHNL# 83: [POWR 242 TO 886 CKT '27']
CHNL# 81: [POWR 239 TO 886 CKT '27']
CHNL# 79: [POWR 549240 TO 886 CKT '27']

TIME (SECONDS)



P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

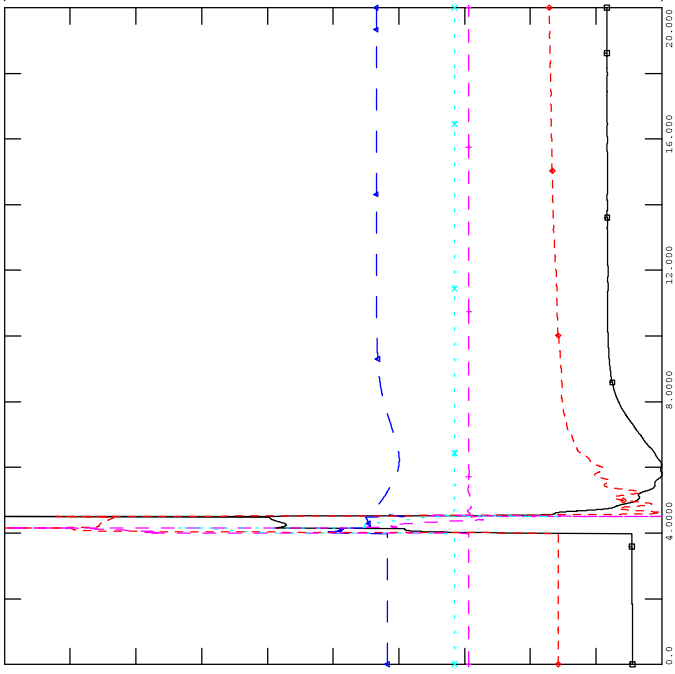
FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

MACHINE VAR (2)

CHNL# 45: [VARS558259[P2030_PV 0.5500]GX]*100
CHNL# 44: [VARS557259[P2029_PV 0.5500]GX]*100
CHNL# 43: [VARS552340[ESSP-1 0.5500]G1]*100
CHNL# 42: [VARS563240[TCE_BESS 0.6900]1]*100
CHNL# 41: [VARS562240[TEC_SOLR 0.6900]1]*100

TIME (SECONDS)



P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

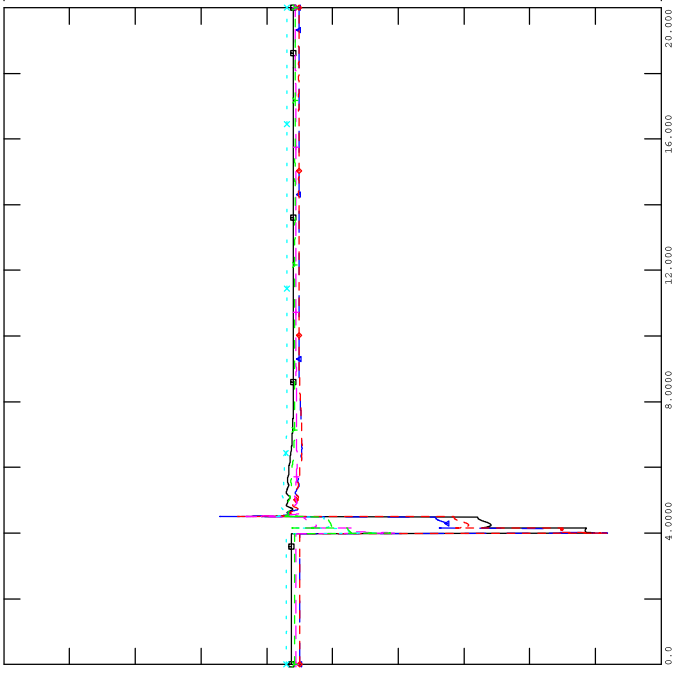
FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (2)

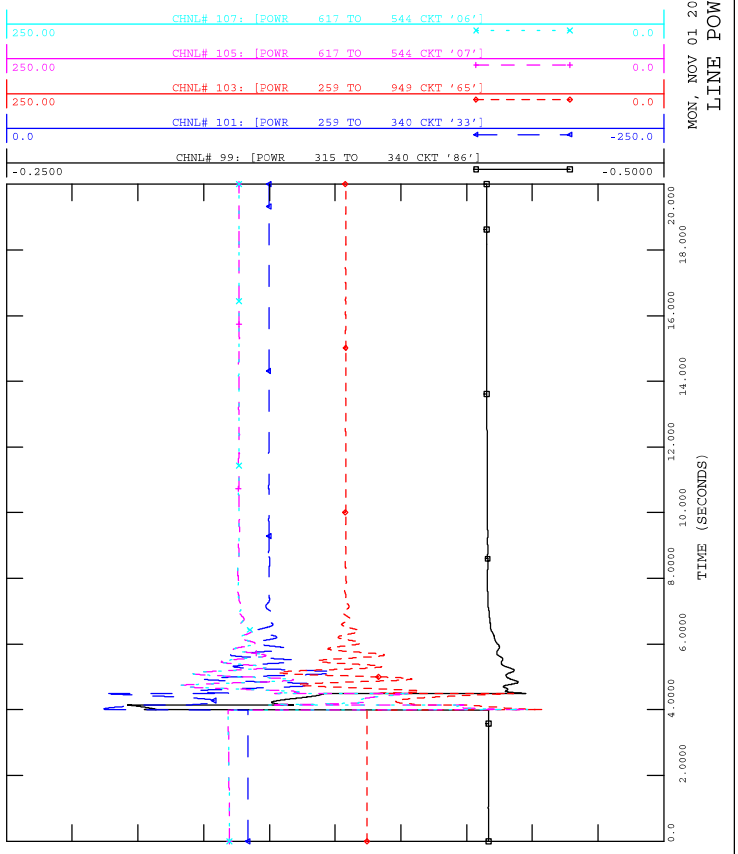
CHNL# 74: [VOLT 558259 [P2030_PV 0.5500]]
CHNL# 73: [VOLT 557259 [P2029_PV 0.5500]]
CHNL# 72: [VOLT 552340 [ESSP-1 0.5500]]
CHNL# 71: [VOLT 563240 [TCE_BESS 0.6900]]
CHNL# 70: [VOLT 562240 [TEC_SOLR 0.6900]]
CHNL# 69: [VOLT 549240 [SADLBK_T 138.00]]

TIME (SECONDS)



P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

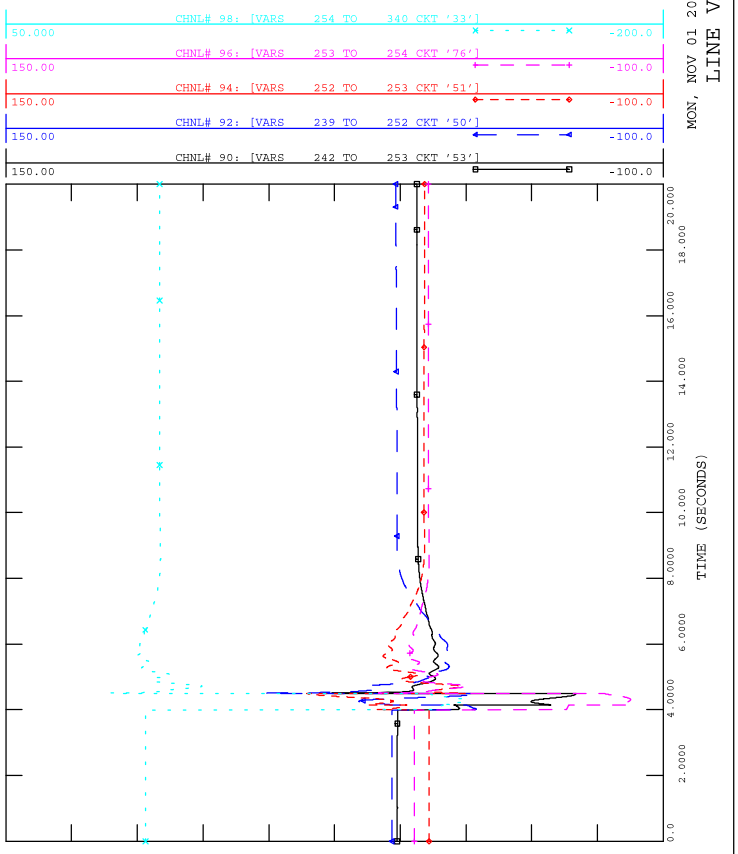
FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE POWER (3)

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

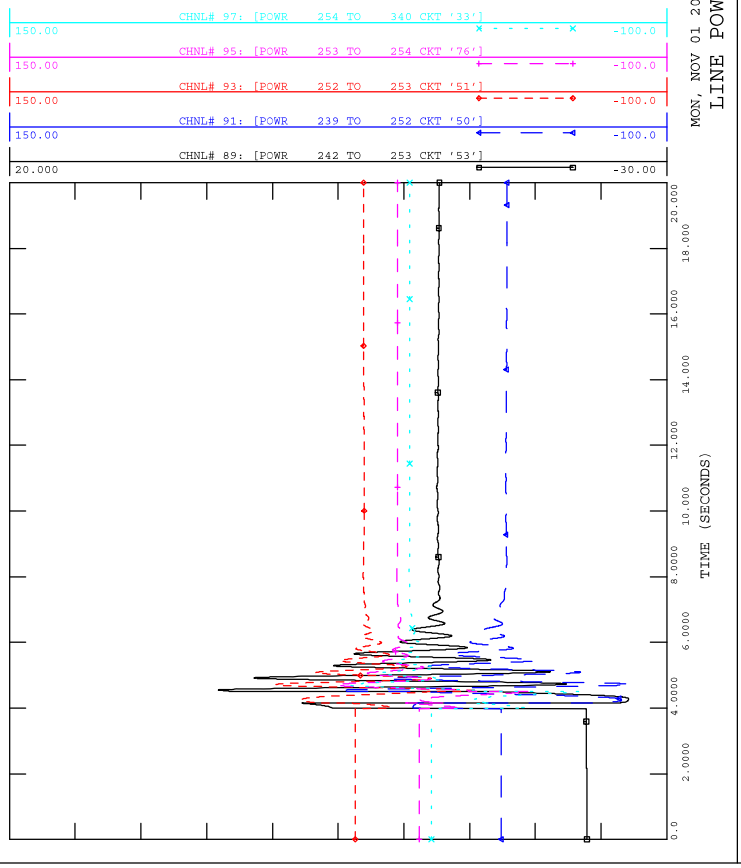
FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE VAR (2)

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

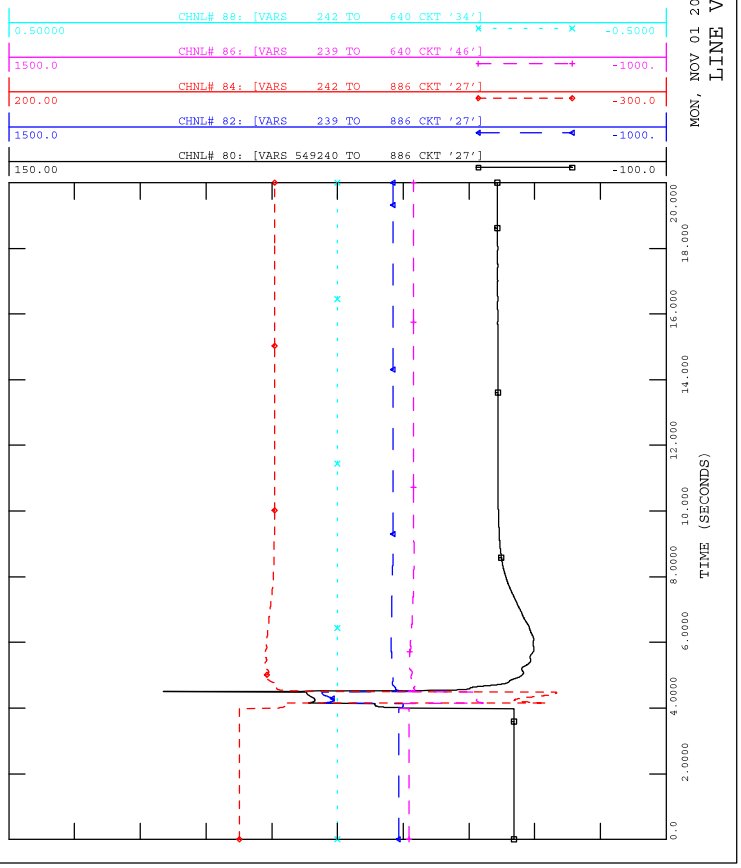
FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE POWER (2)

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

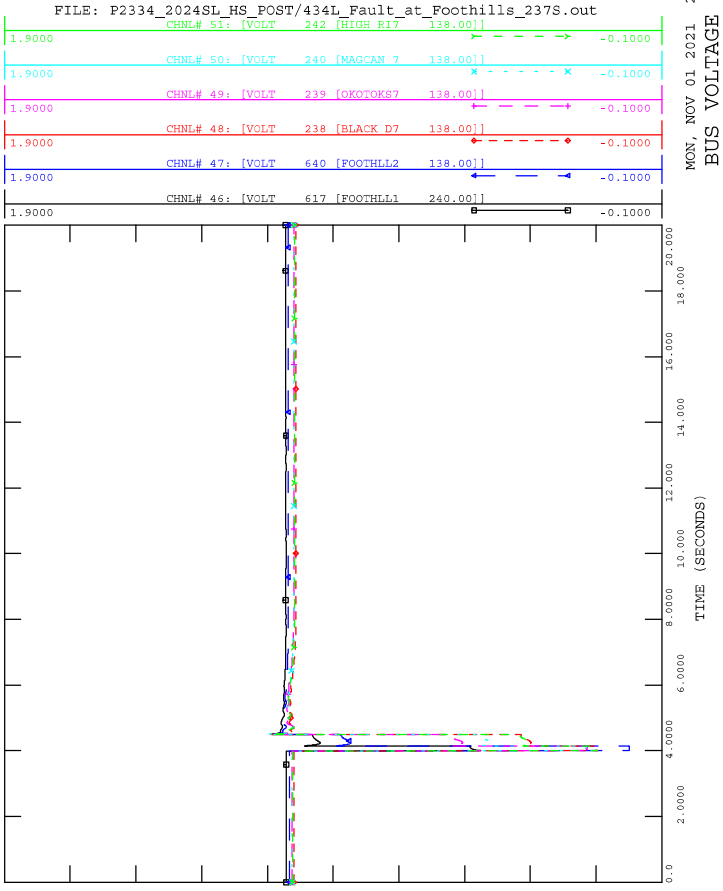
FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE VAR (1)

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

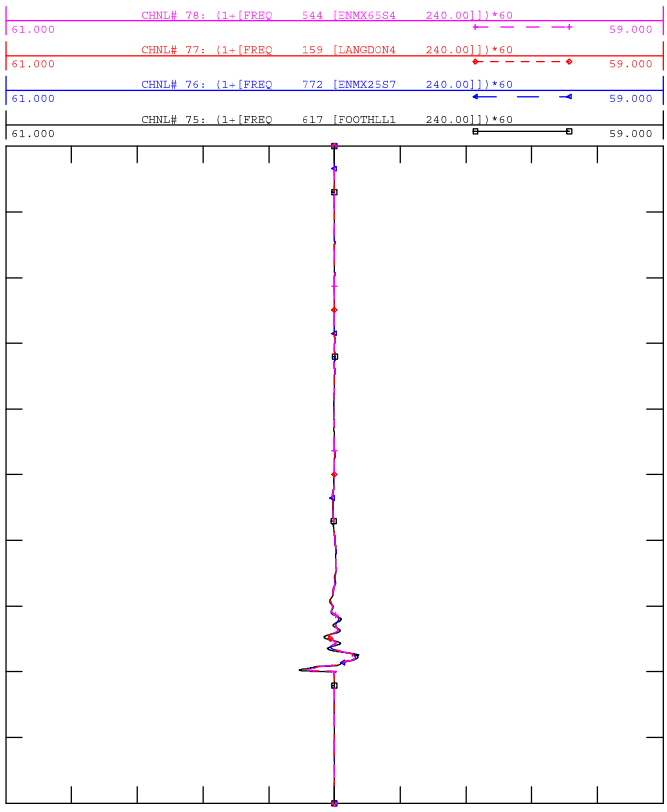
FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

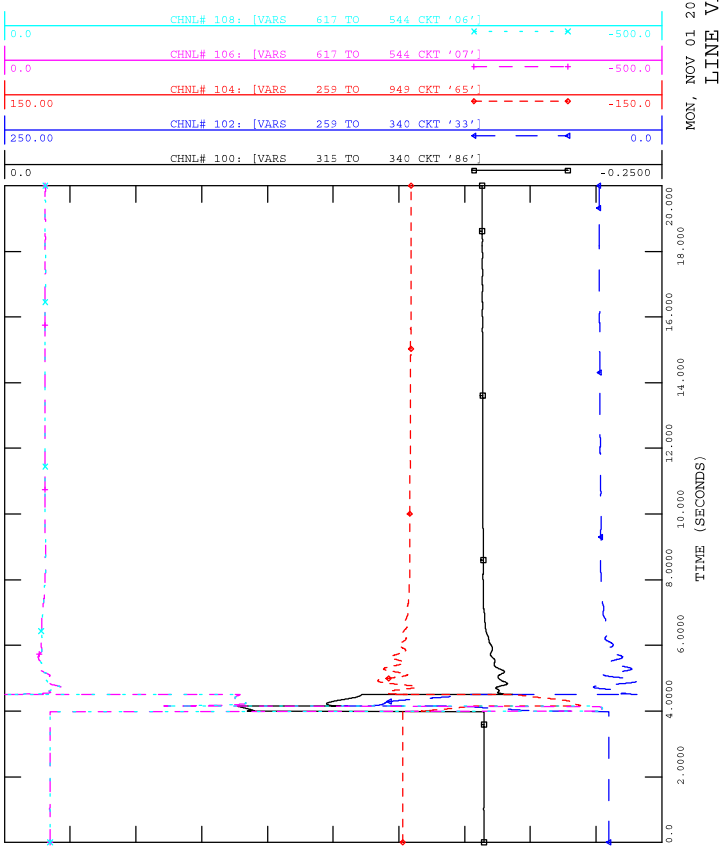
FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
FREQUENCY

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

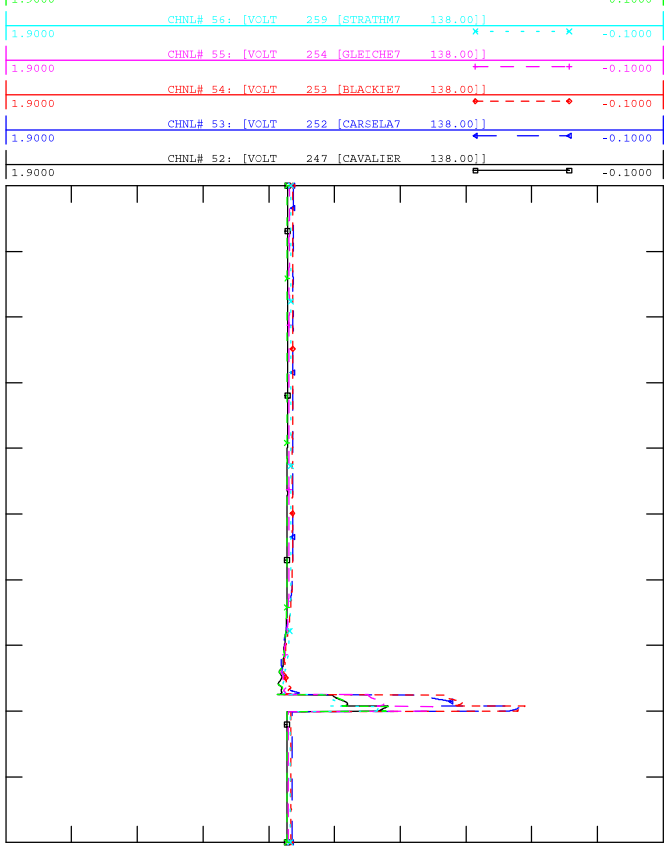
FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE VAR (3)

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/434L_Fault_at_Foothills_237S.out



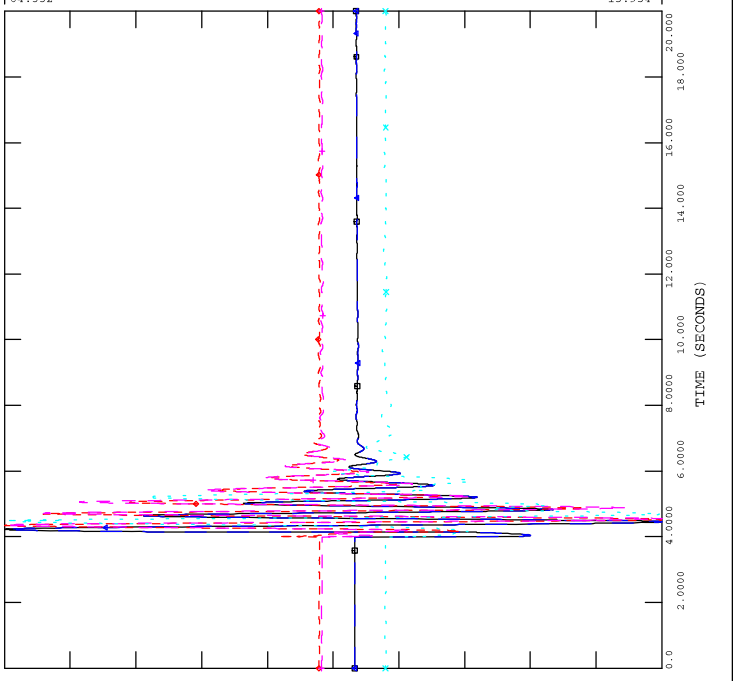
MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04
MACHINE POWER (1)

CHNL# 25: [POWR 4247[CAVAL B 13.800]3]*100 — 26.427 — 10.655
CHNL# 24: [POWR 4247[CAVAL B 13.800]2]*100 — 47.037 — 31.172
CHNL# 23: [POWR 3247[CAVAL A 13.800]1]*100 — 49.288 — 28.589
CHNL# 22: [POWR 4251[CARSELA1 13.800]1]*100 — 64.209 — 14.077
CHNL# 21: [POWR 3251[CARSELA2 13.800]2]*100 — 64.332 — 13.954

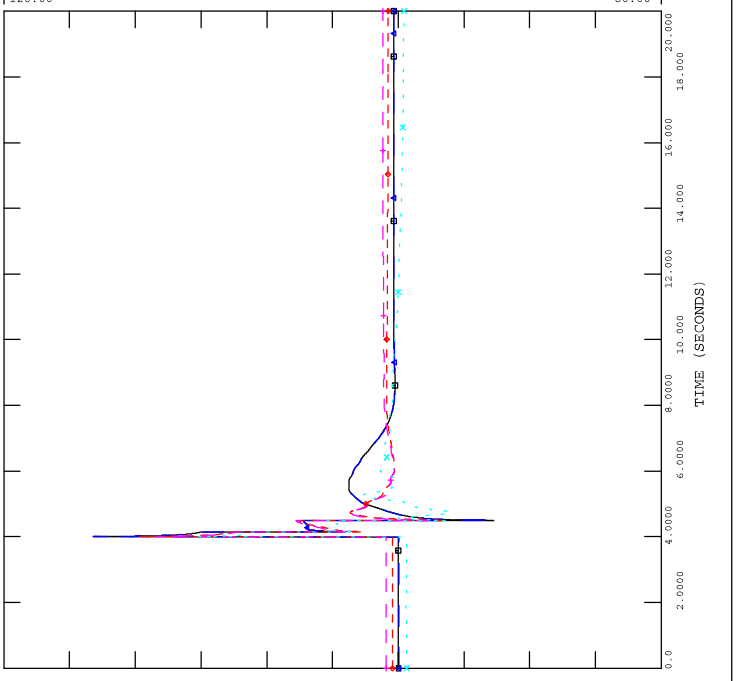


P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04
MACHINE VAR (1)

CHNL# 40: [VARS 4247[CAVAL B 13.800]3]*100 — 30.000 — -20.00
CHNL# 39: [VARS 4247[CAVAL B 13.800]2]*100 — 80.000 — -60.00
CHNL# 38: [VARS 3247[CAVAL A 13.800]1]*100 — 80.000 — -60.00
CHNL# 37: [VARS 4251[CARSELA1 13.800]1]*100 — 120.00 — -80.00
CHNL# 36: [VARS 3251[CARSELA2 13.800]2]*100 — 120.00 — -80.00

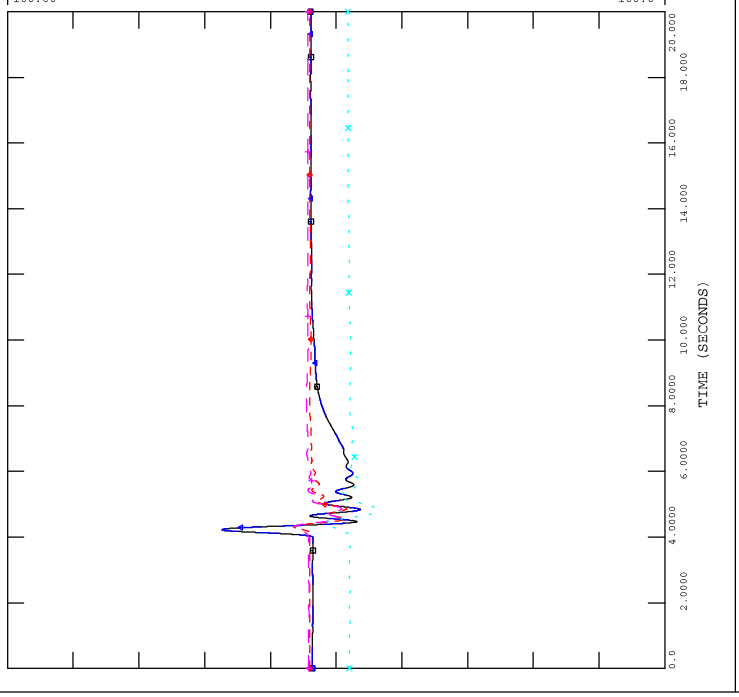


P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04
MACHINE ANGEL

CHNL# 10: [ANGL 4247[CAVAL B 13.800]3] — 100.00 — -100.0
CHNL# 9: [ANGL 4247[CAVAL B 13.800]2] — 100.00 — -100.0
CHNL# 8: [ANGL 3247[CAVAL A 13.800]1] — 100.00 — -100.0
CHNL# 7: [ANGL 4251[CARSELA1 13.800]1] — 100.00 — -100.0
CHNL# 6: [ANGL 3251[CARSELA2 13.800]2] — 100.00 — -100.0

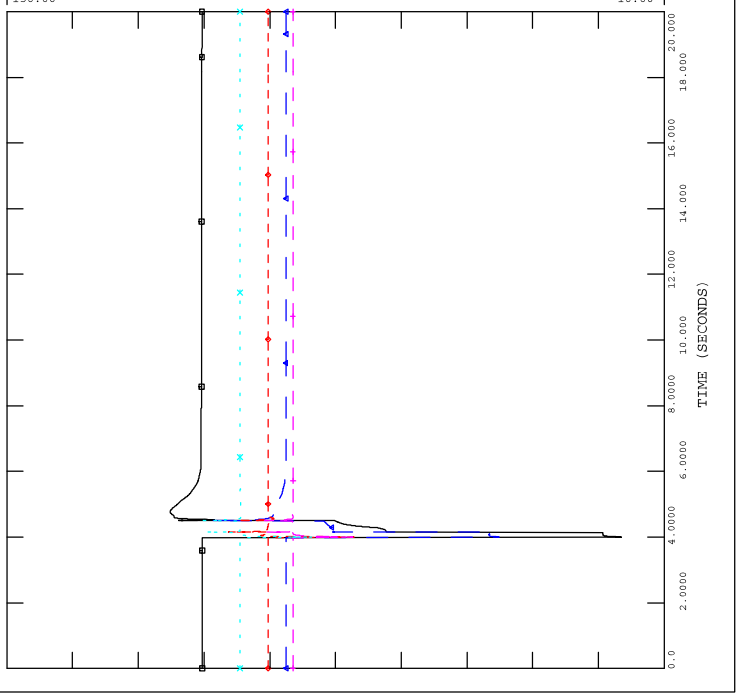


P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04
MACHINE POWER (2)

CHNL# 30: [POWR558259[P2030_PV 0.5500]GX]*100 — 30.000 — -10.00
CHNL# 29: [POWR557259[P2029_PV 0.5500]GX]*100 — 30.000 — -10.00
CHNL# 28: [POWR552340[ESSP-1 0.5500]G1]*100 — 30.000 — -10.00
CHNL# 27: [POWR563240[TCE_BESS 0.6900]1]*100 — 15.000 — -5.000
CHNL# 26: [POWR562240[TEC_SOLR 0.6900]1]*100 — 150.00 — -10.00

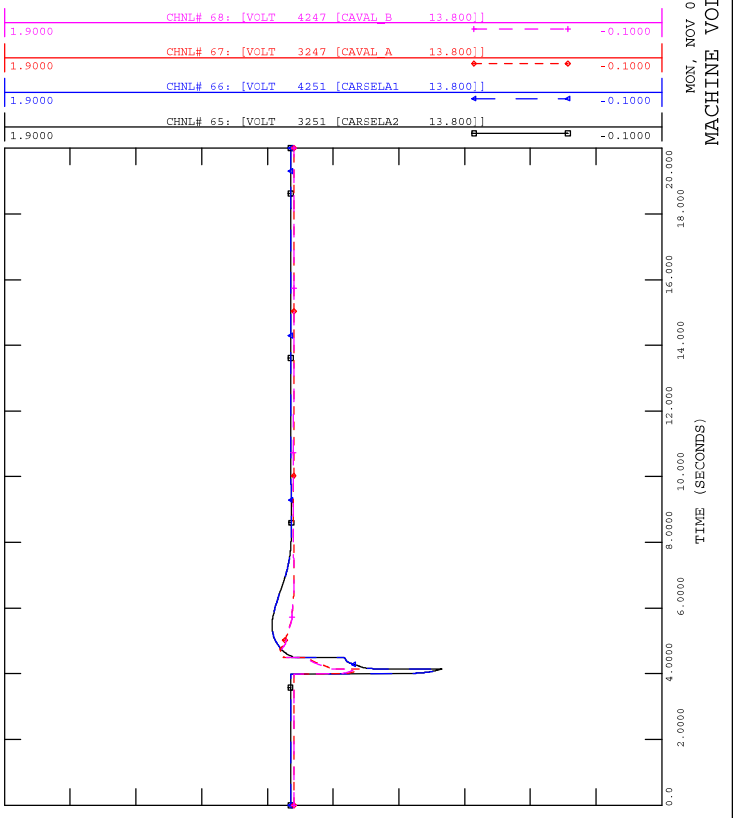


P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (1)

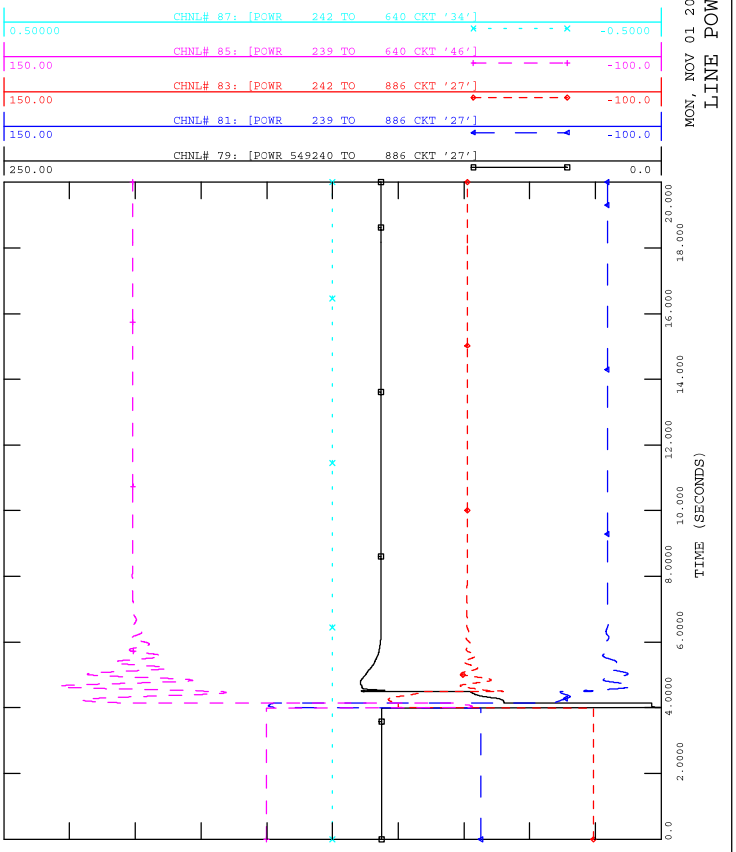


P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04

LINE POWER (1)

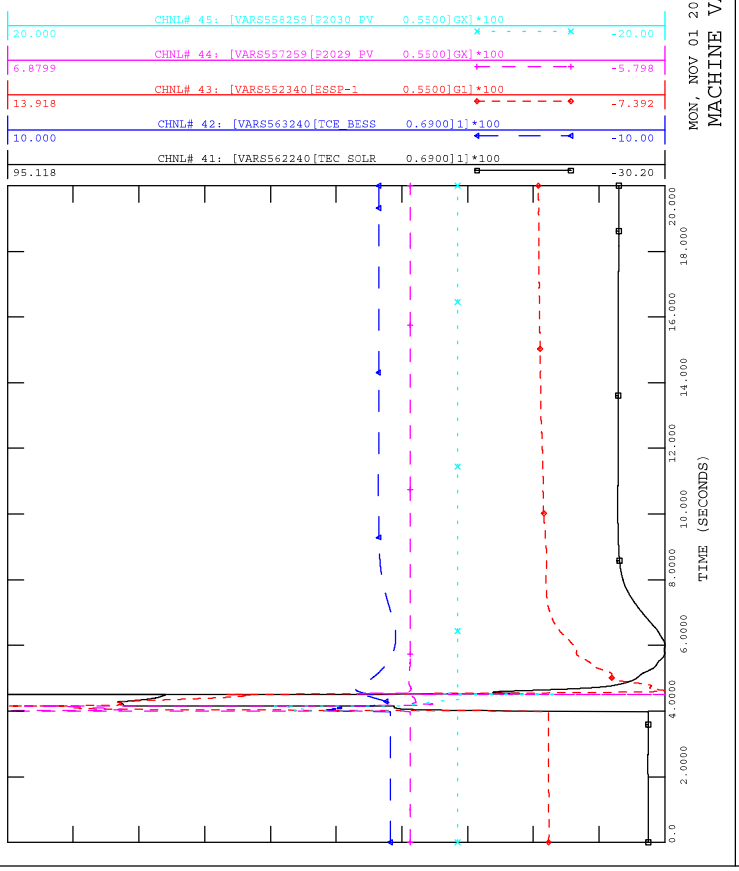


P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04

MACHINE VAR (2)

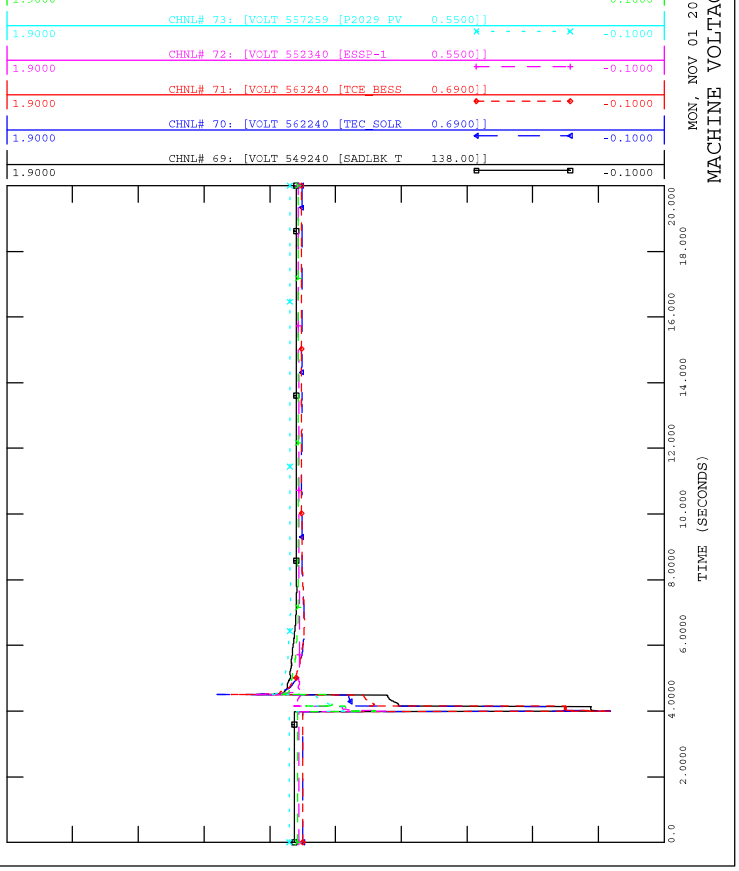


P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out

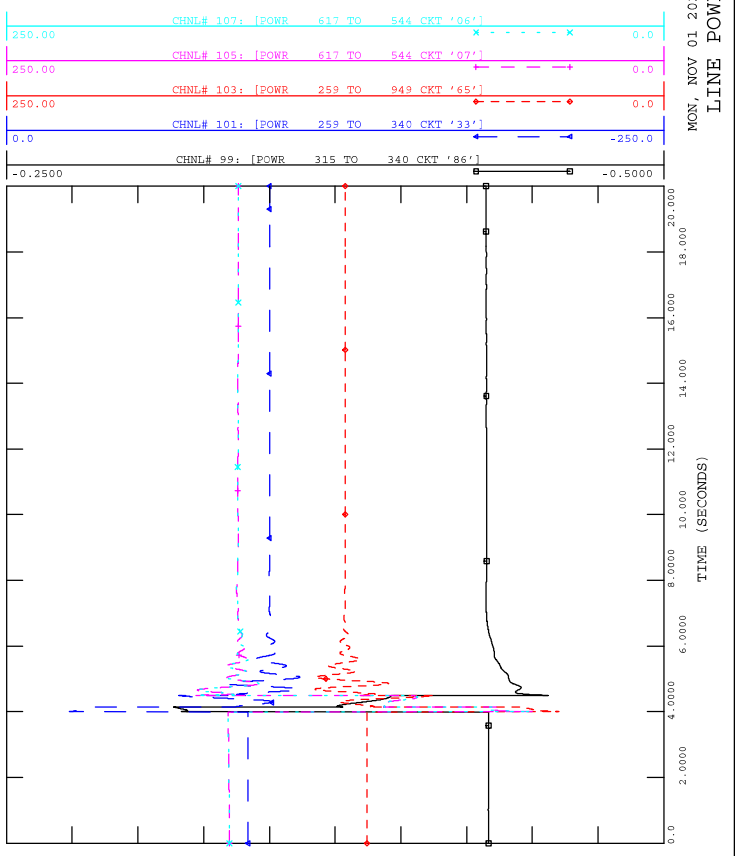
MON, NOV 01 2021 21:04

MACHINE VOLTAGE (2)



P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

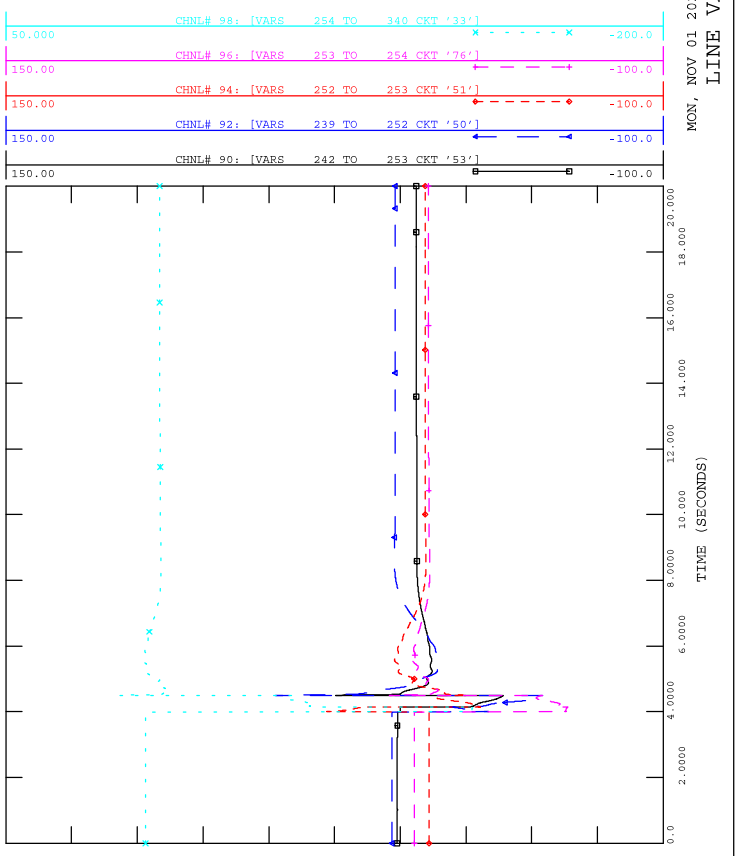
FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE POWER (3)

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

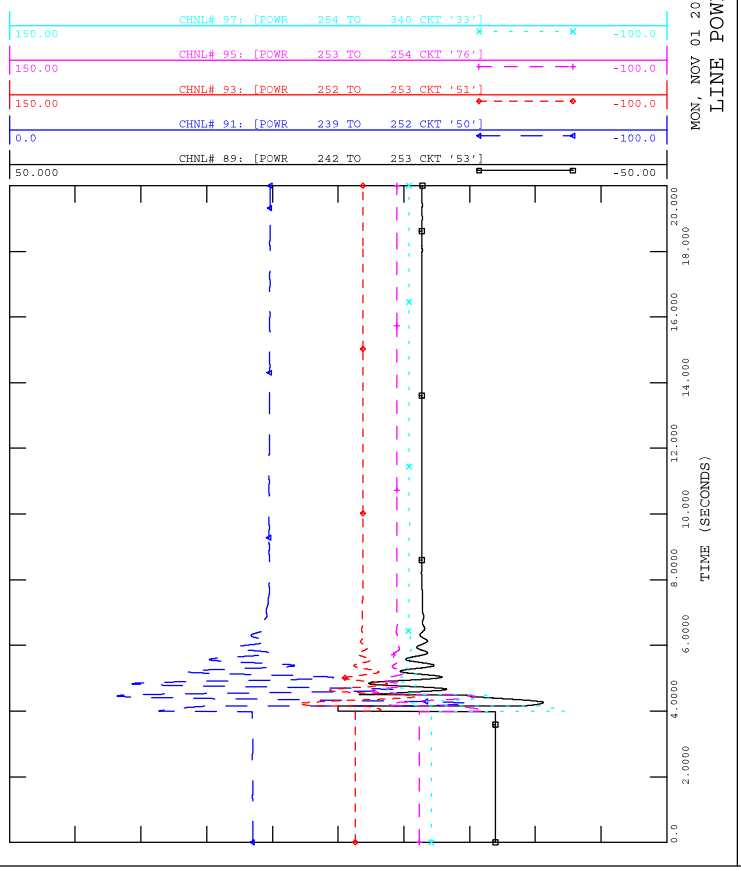
FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE VAR (2)

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

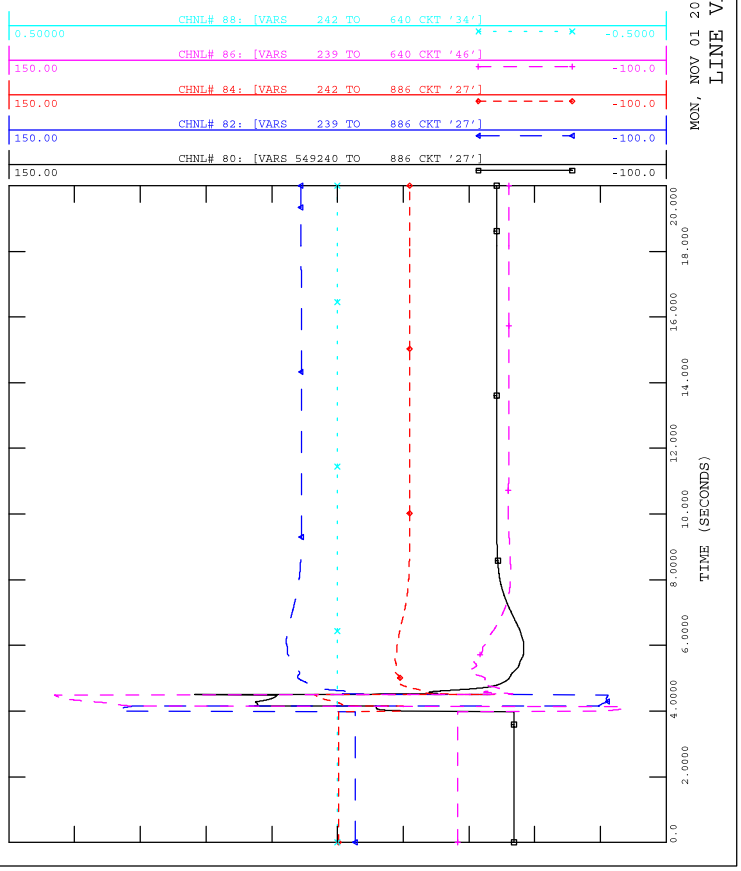
FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE POWER (2)

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

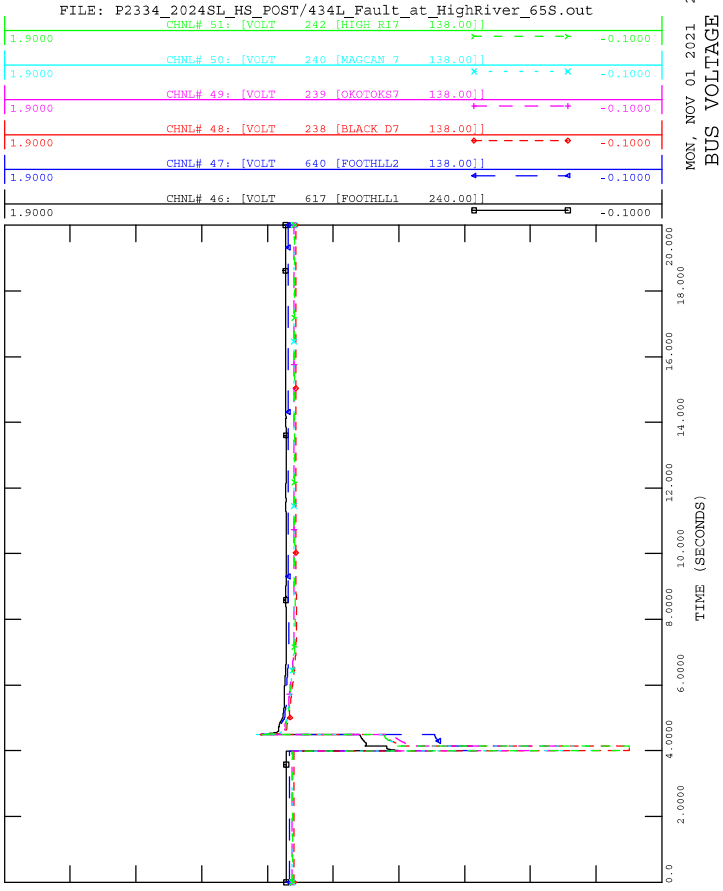
FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE VAR (1)

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

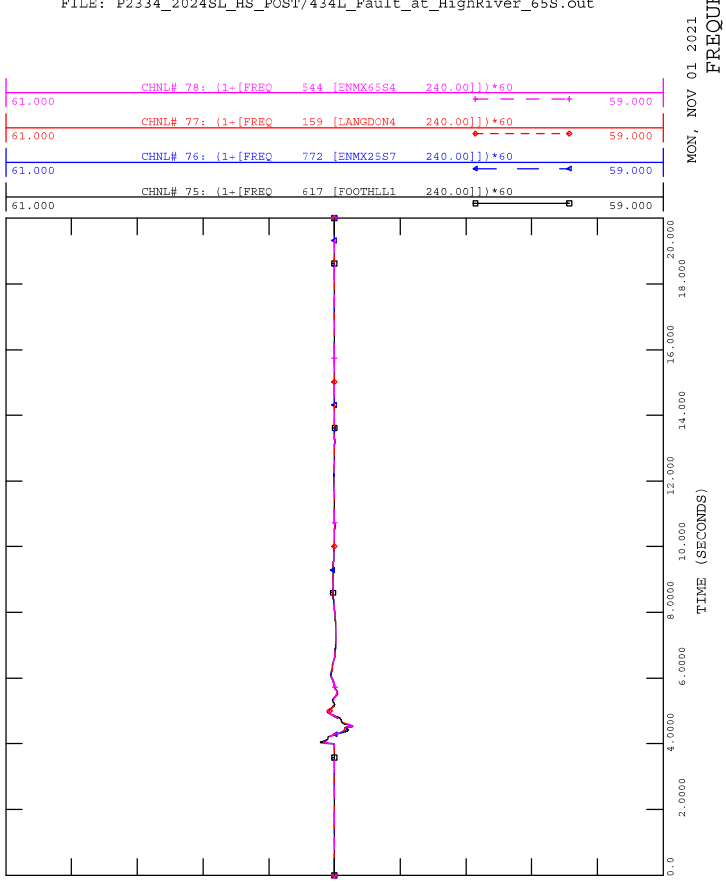
FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

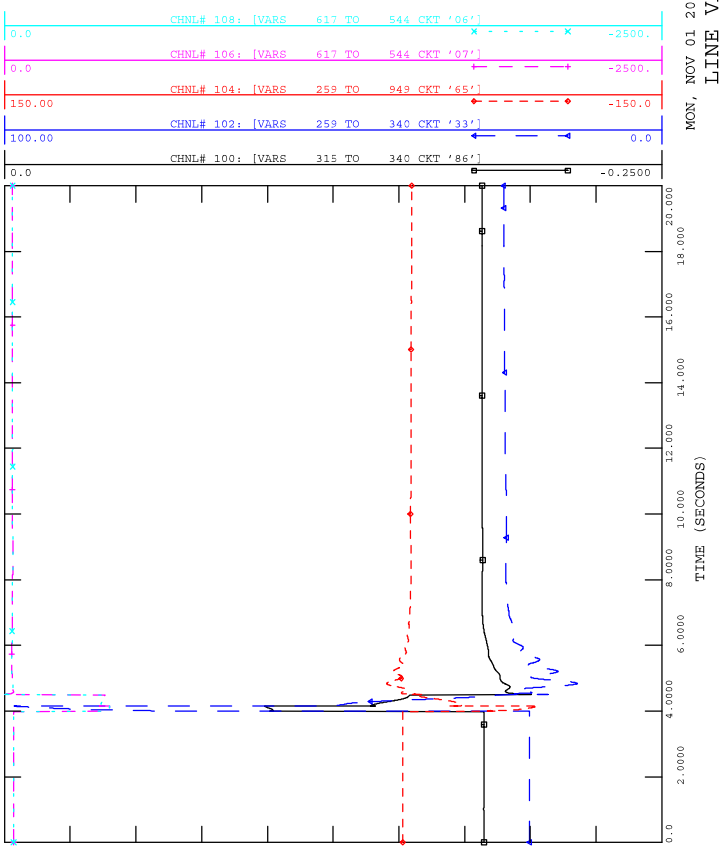
FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
FREQUENCY

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

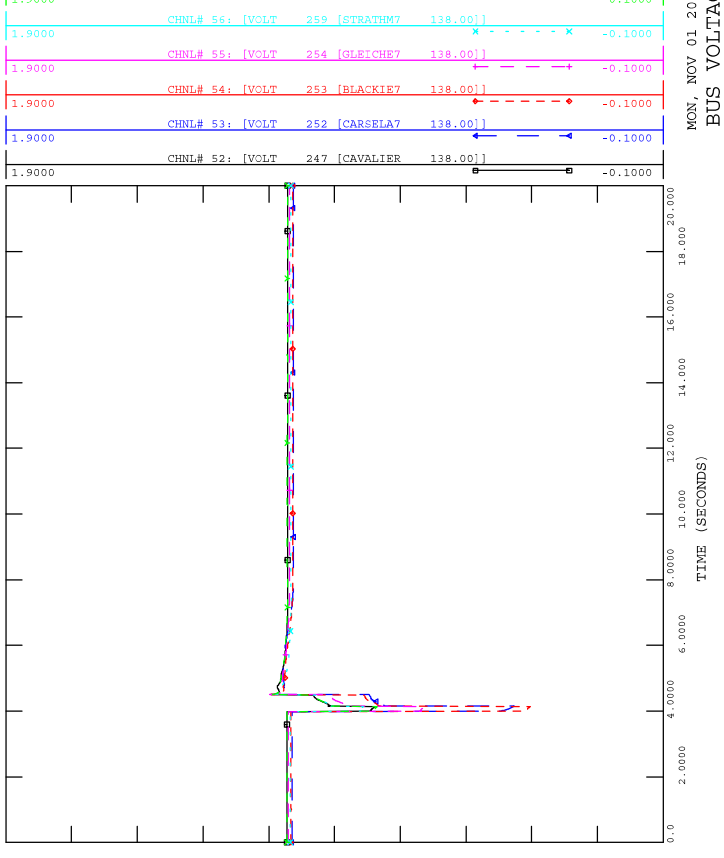
FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE VAR (3)

P2334_2024SL_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

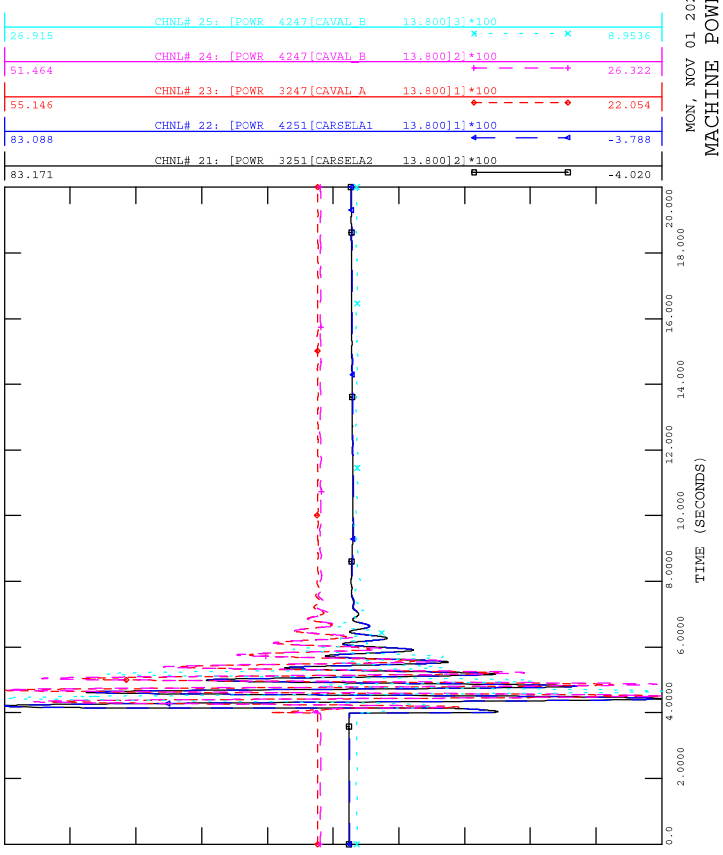
FILE: P2334_2024SL_HS_POST/434L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

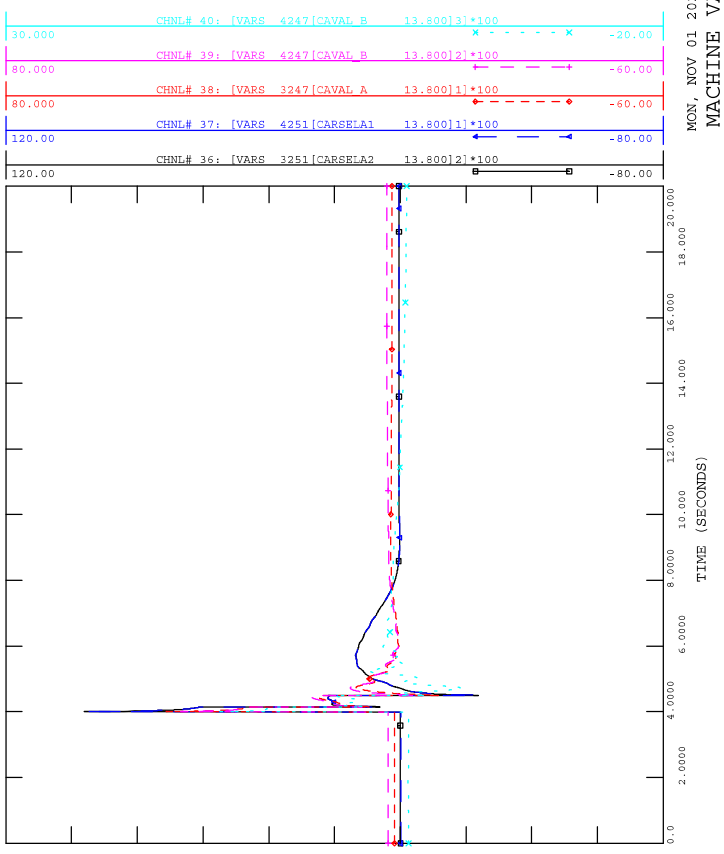
FILE: P2334_2024SL_HS_POST/646L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
MACHINE POWER (1)

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

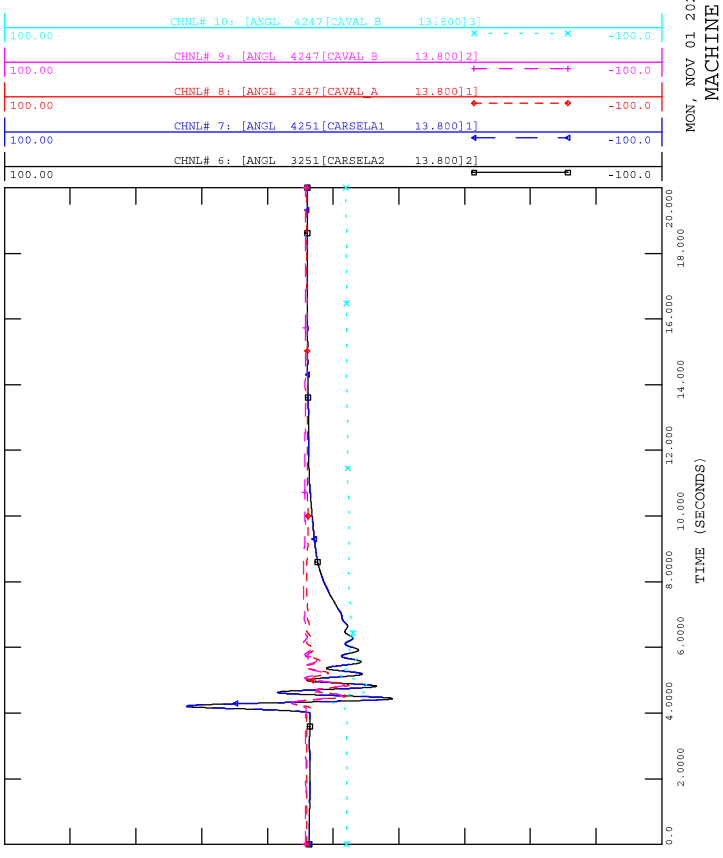
FILE: P2334_2024SL_HS_POST/646L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
MACHINE VAR (1)

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

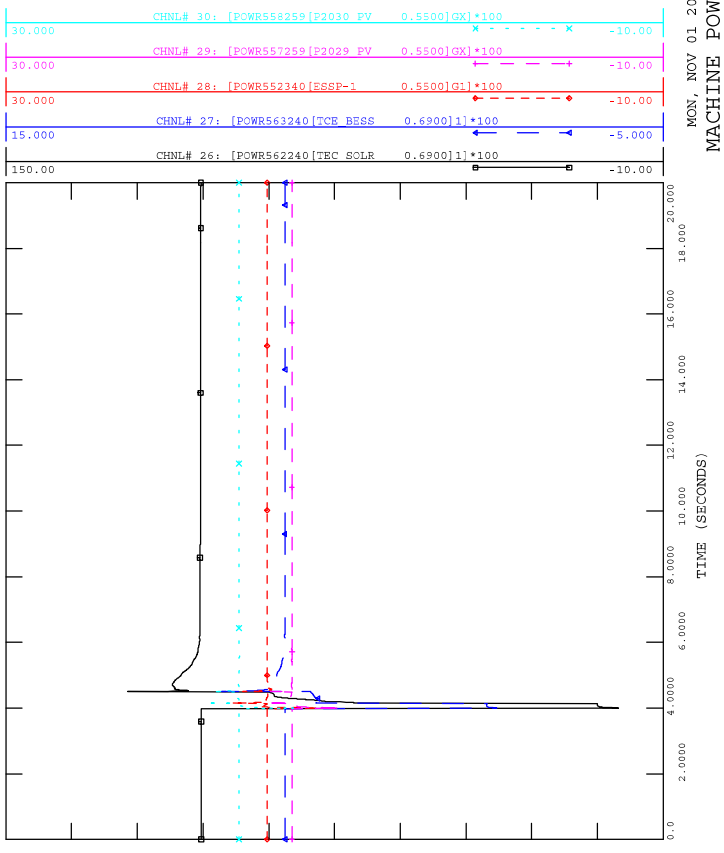
FILE: P2334_2024SL_HS_POST/646L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
MACHINE ANGEL

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Okotoks_678S.out



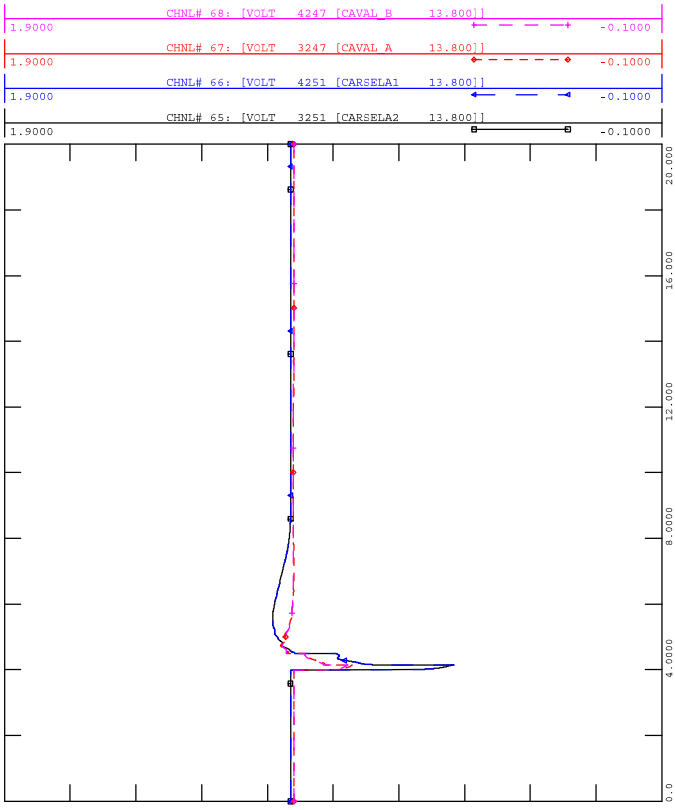
MON, NOV 01 2021 21:04
MACHINE POWER (2)

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (1)



P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Okotoks_678S.out

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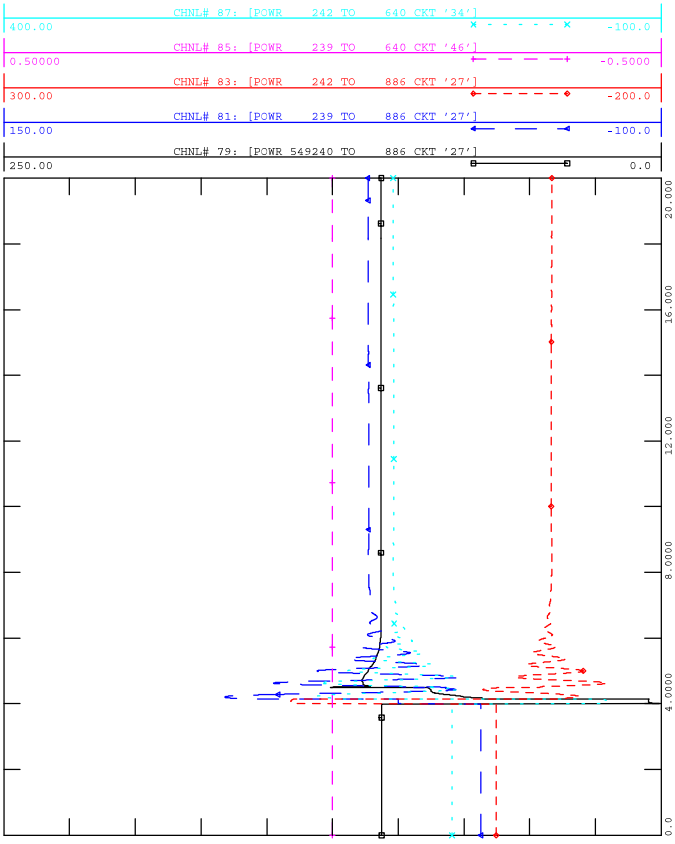
LINE POWER (1)



P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

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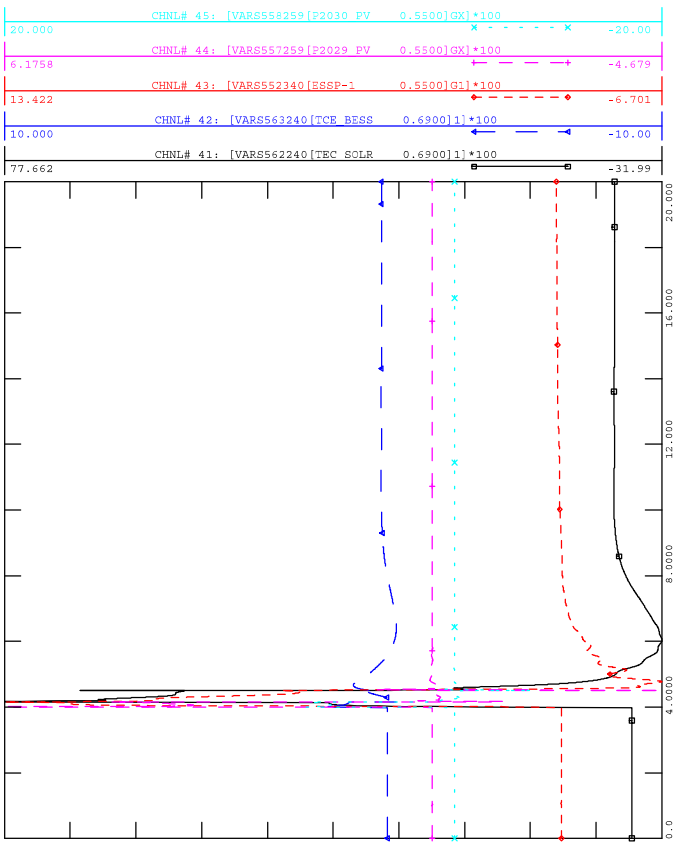
MON, NOV 01 2021 21:04

MACHINE VAR (2)



P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

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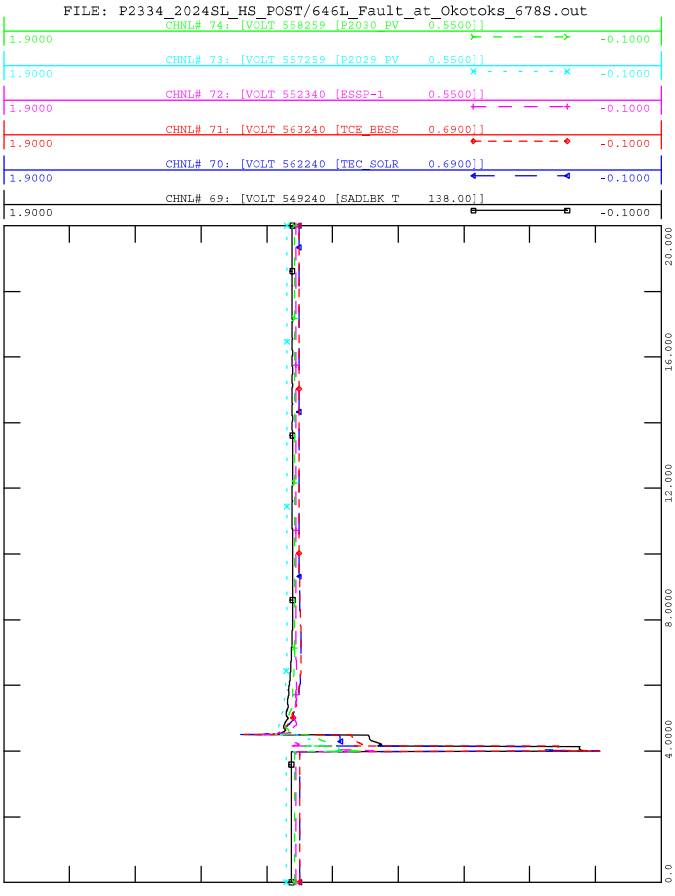
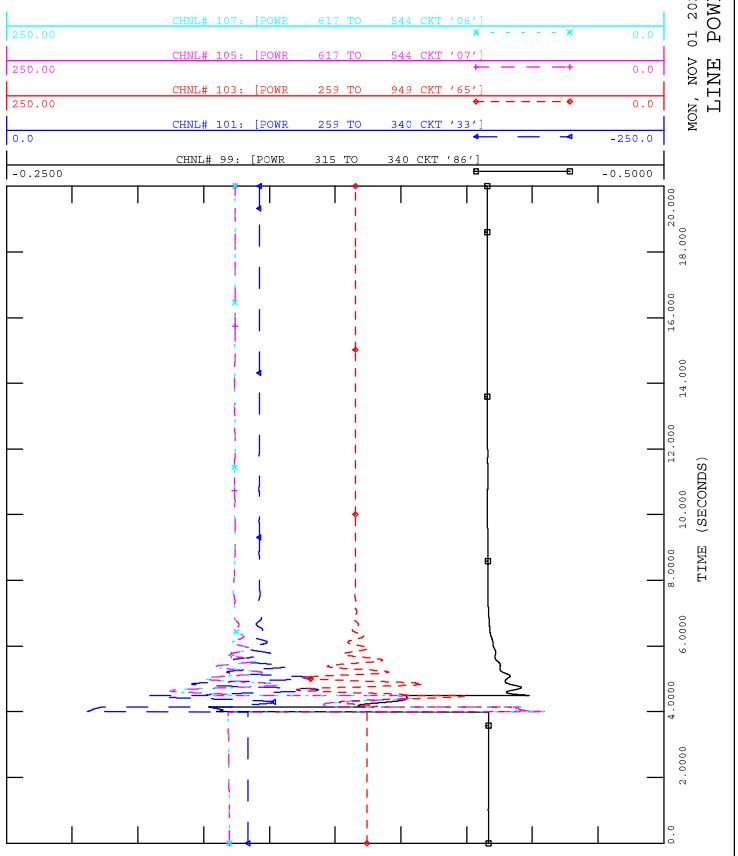
MON, NOV 01 2021 21:04

MACHINE VOLTAGE (2)



P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

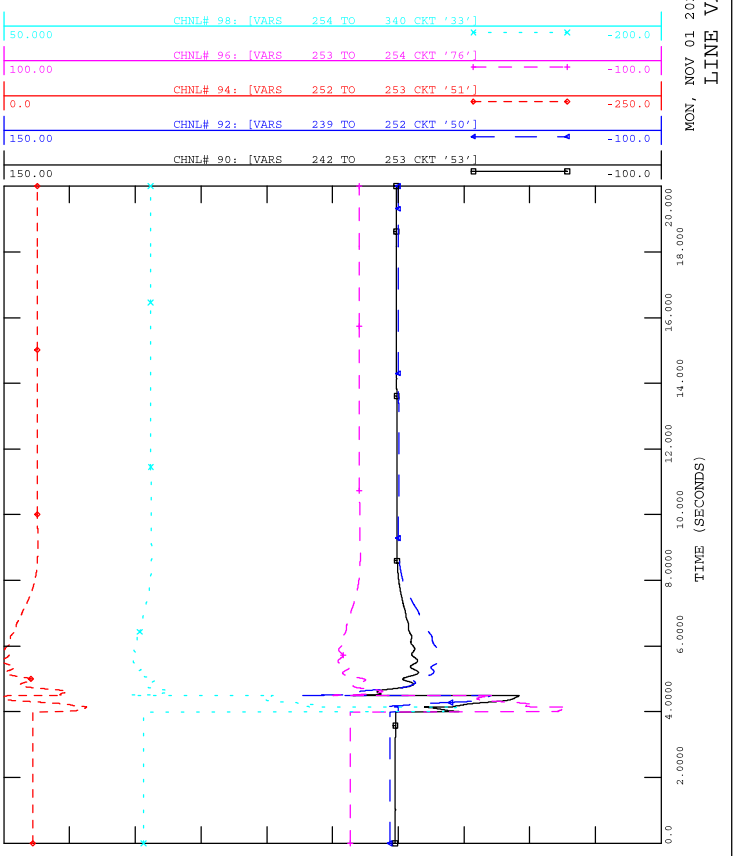
FILE: P2334_2024SL_HS_POST/646L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
LINE POWER (3)

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

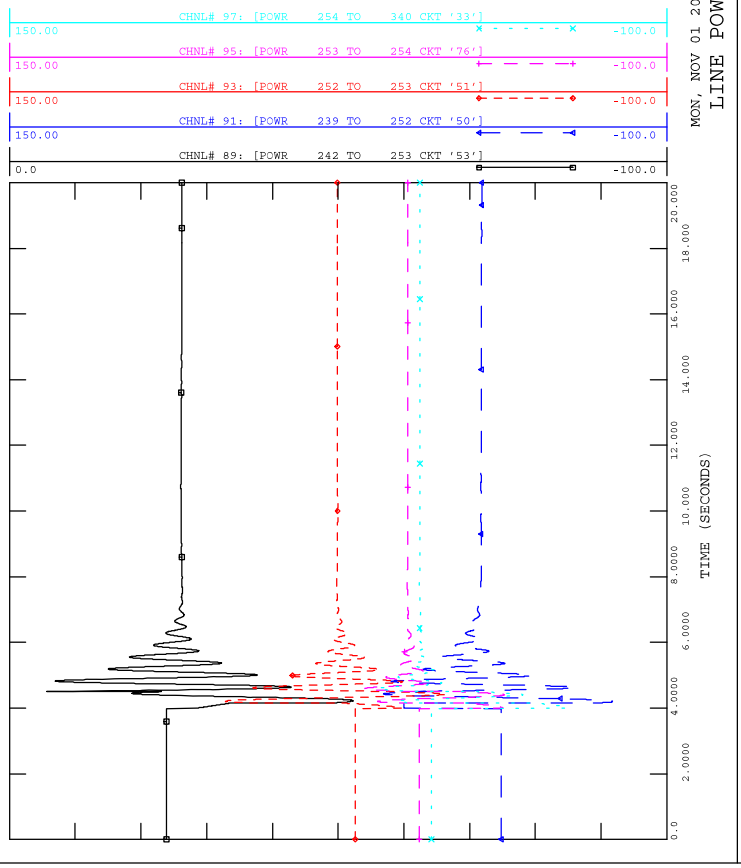
FILE: P2334_2024SL_HS_POST/646L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
LINE VAR (2)

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

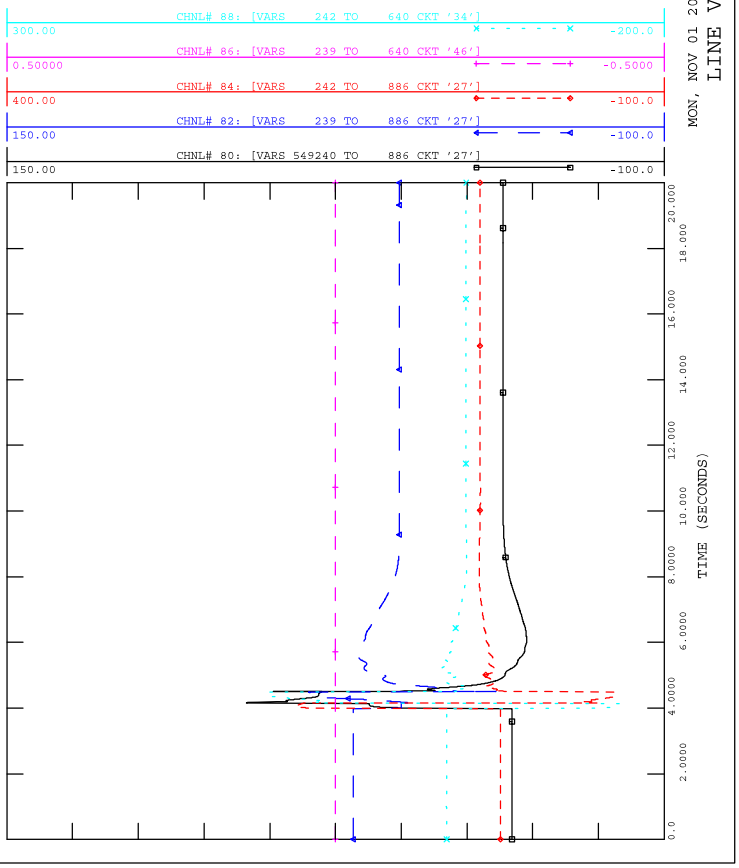
FILE: P2334_2024SL_HS_POST/646L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
LINE POWER (2)

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Okotoks_678S.out



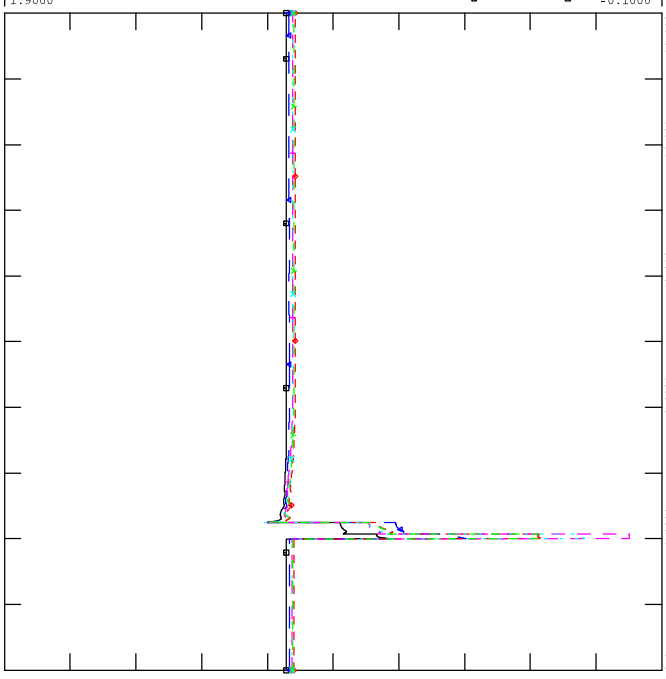
MON, NOV 01 2021 21:04
LINE VAR (1)

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

BUS VOLTAGE (1)



P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Okotoks_678S.out

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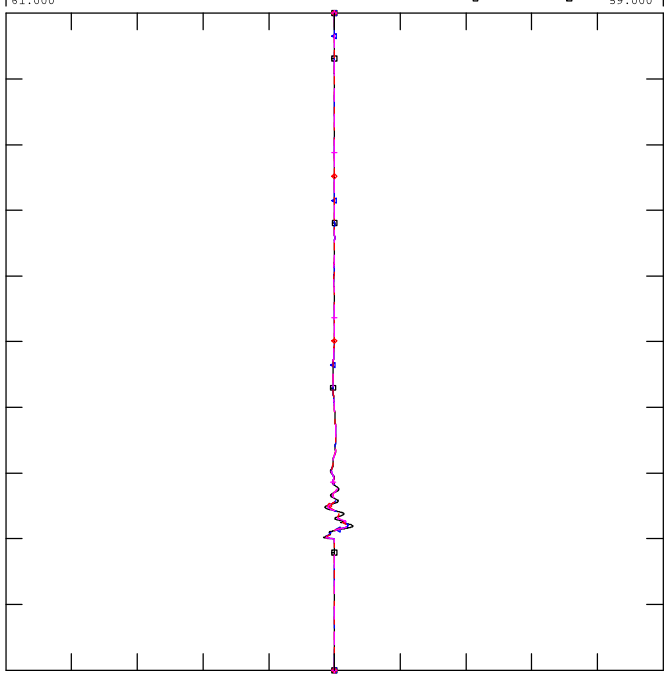
FREQUENCY



P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Okotoks_678S.out

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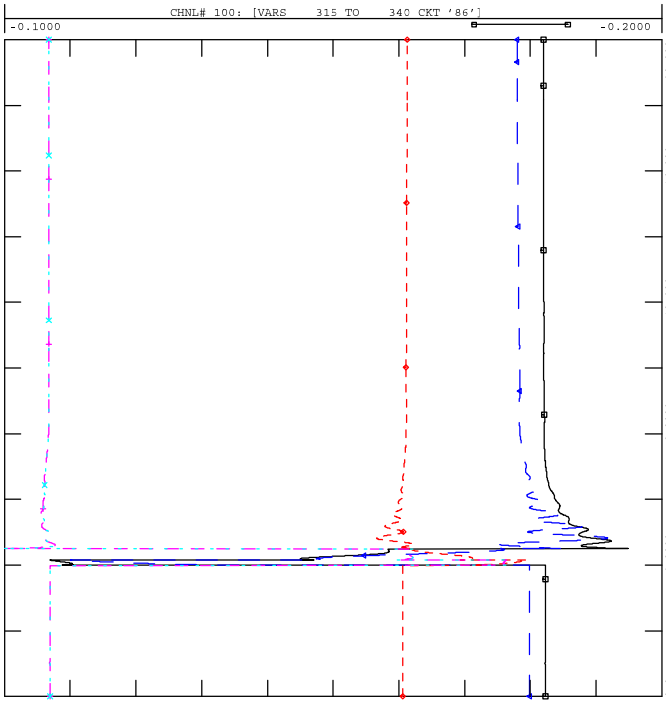
LINE VAR (3)



P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Okotoks_678S.out

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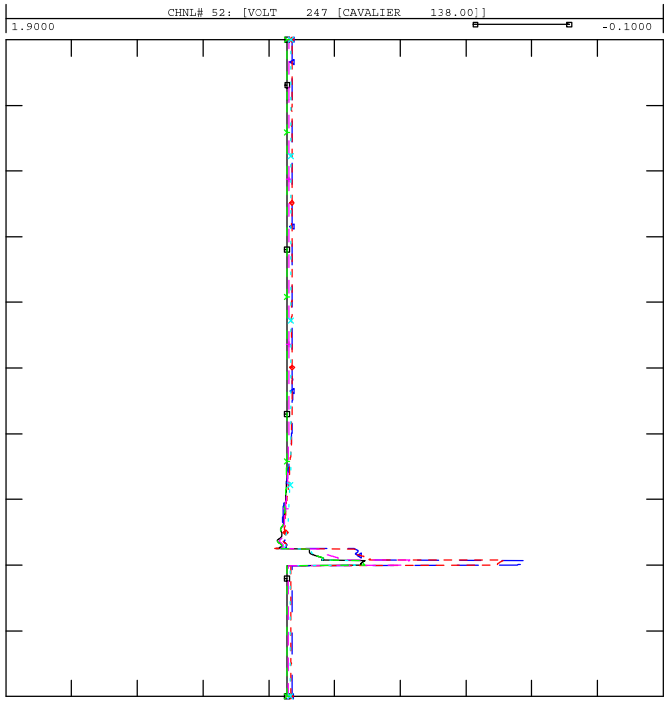
BUS VOLTAGE (2)



P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out

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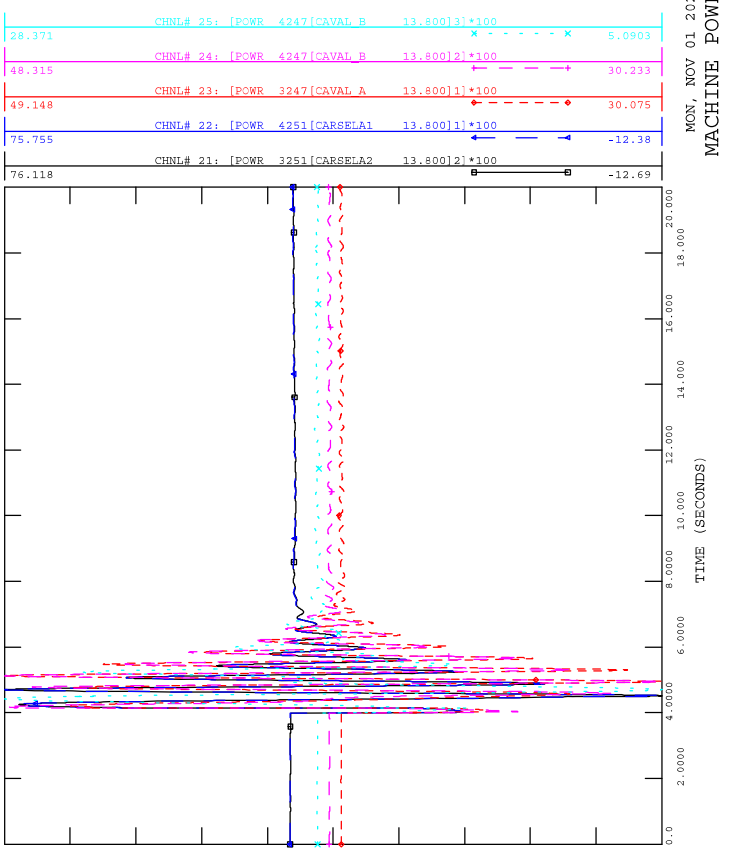
MACHINE POWER (1)

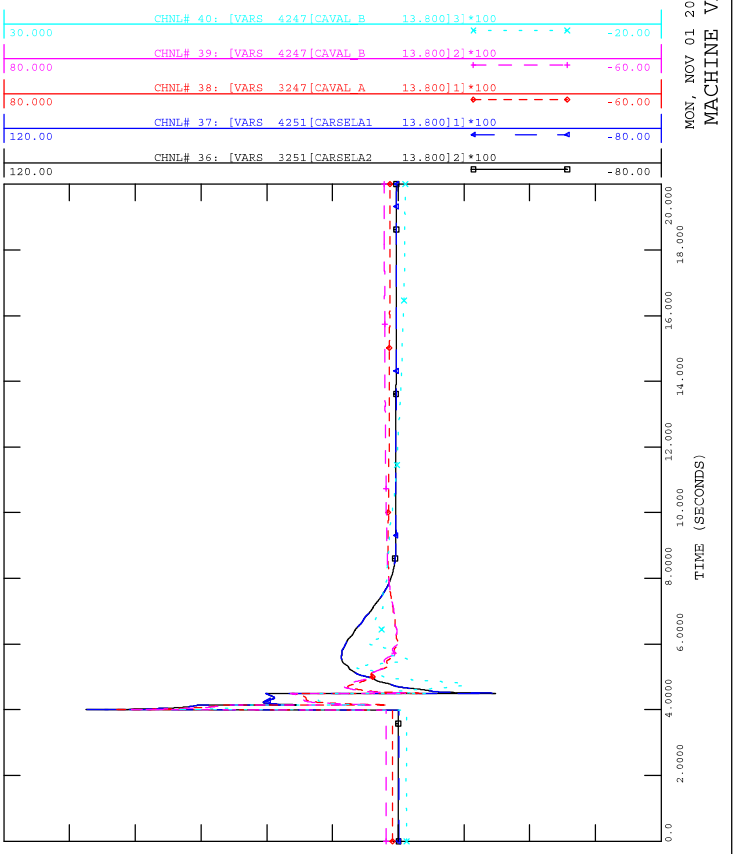


P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

MACHINE VAR (1)



P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out

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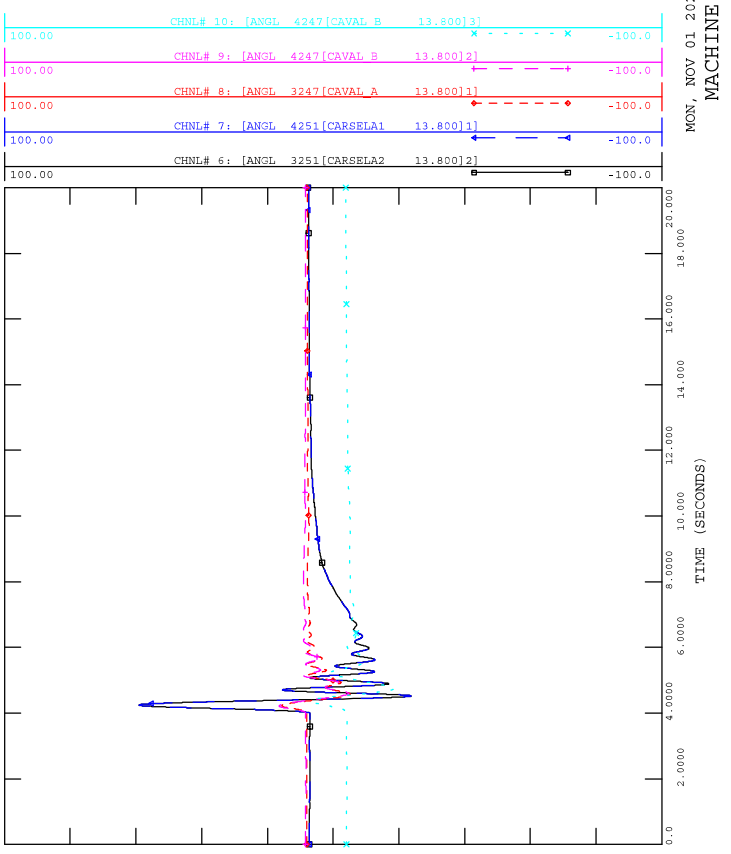
MACHINE ANGEL



P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out

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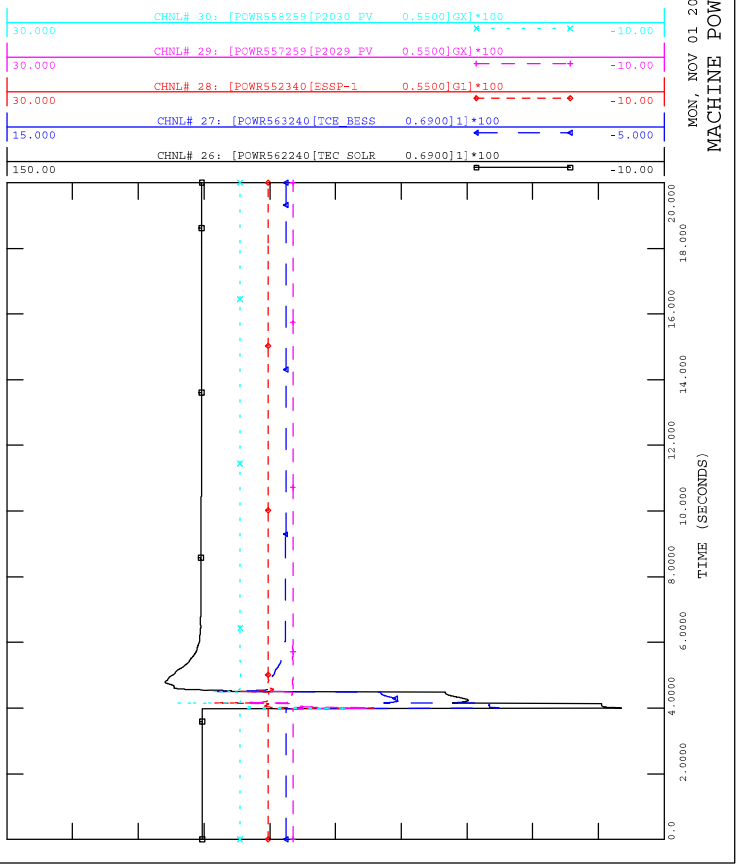
MACHINE POWER (2)



P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out

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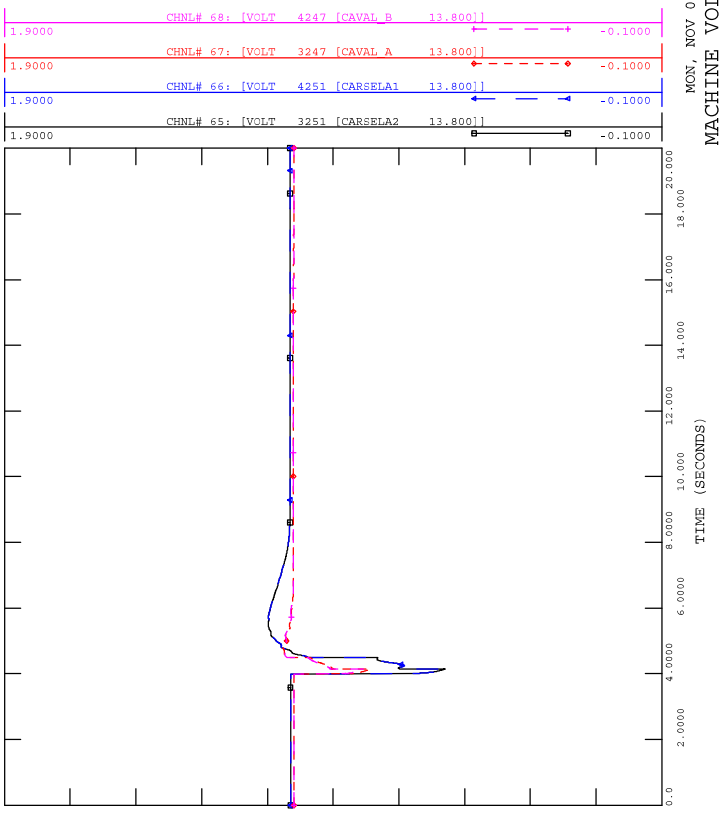
MACHINE VOLTAGE (1)

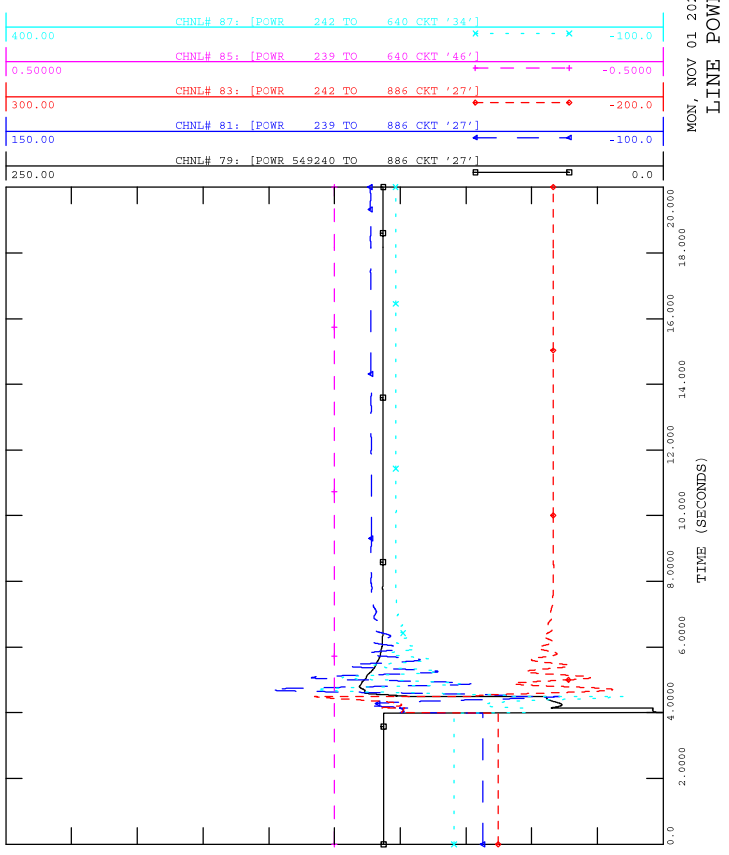


P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

LINE POWER (1)

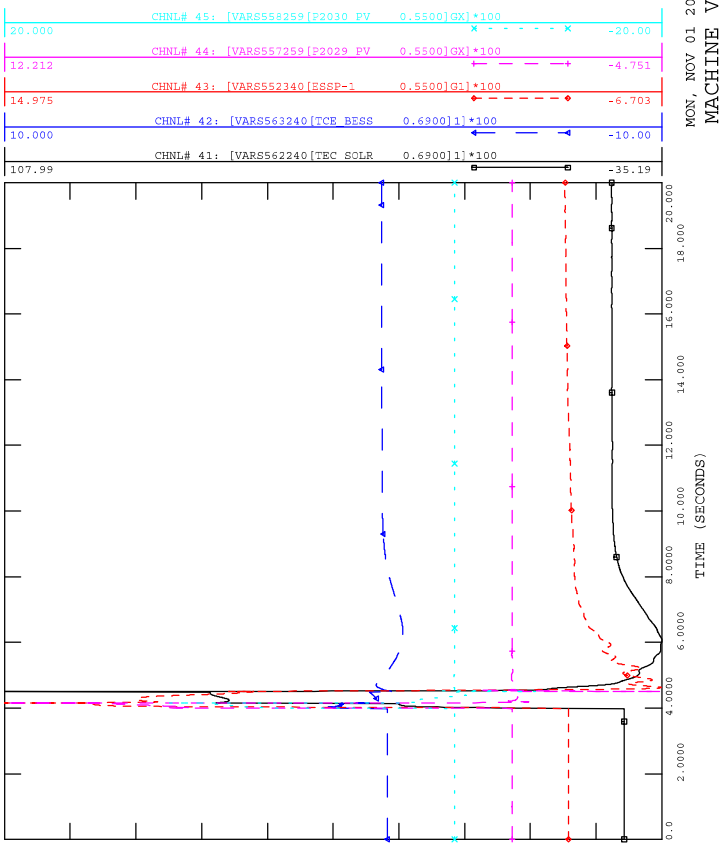


P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

MACHINE VAR (2)

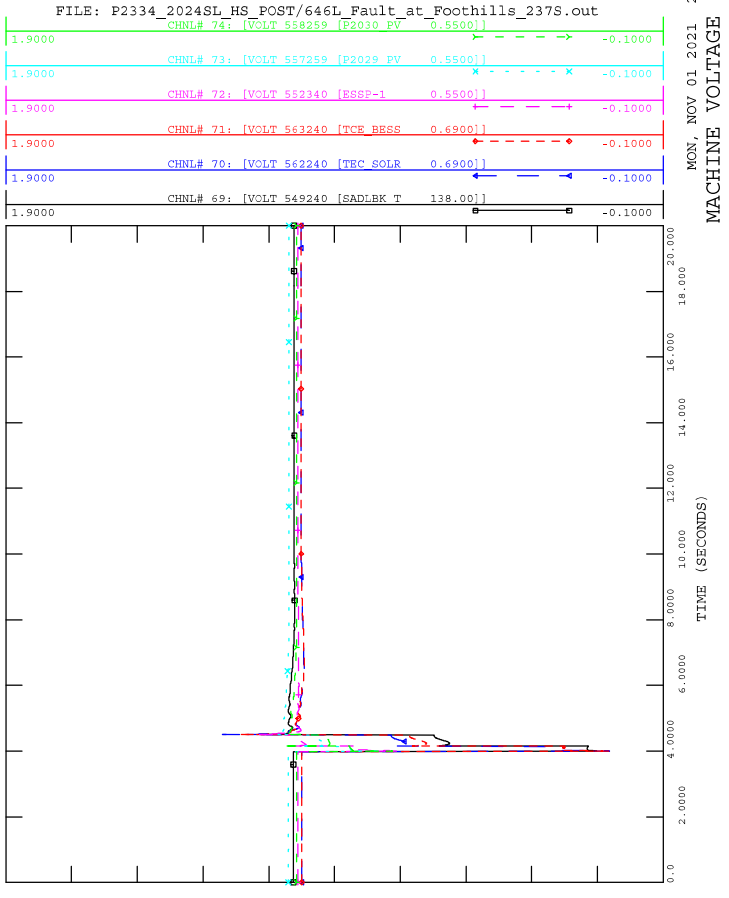


P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out

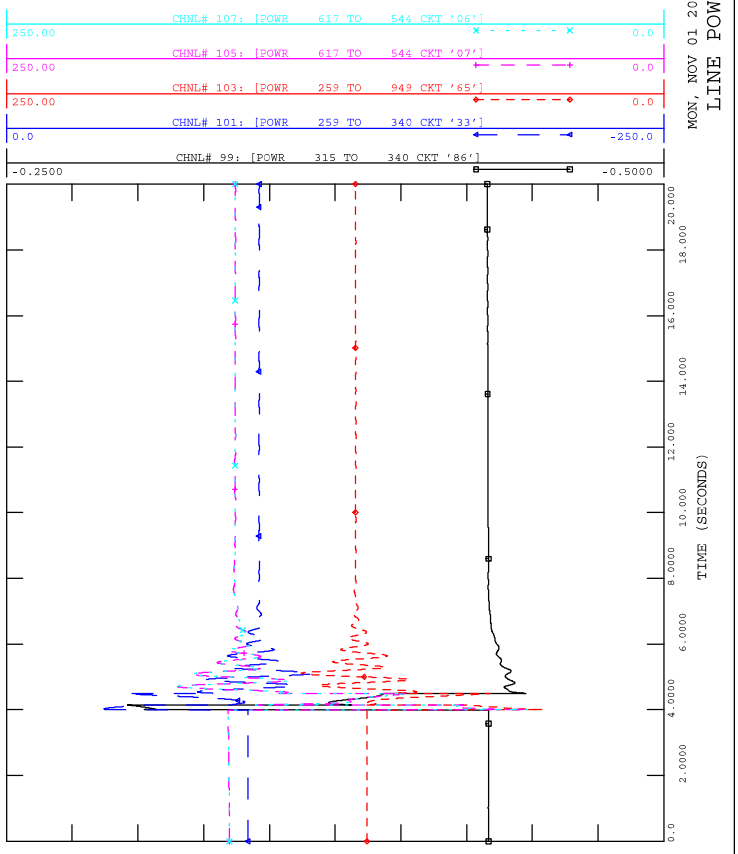
MON, NOV 01 2021 21:04

MACHINE VOLTAGE (2)



P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

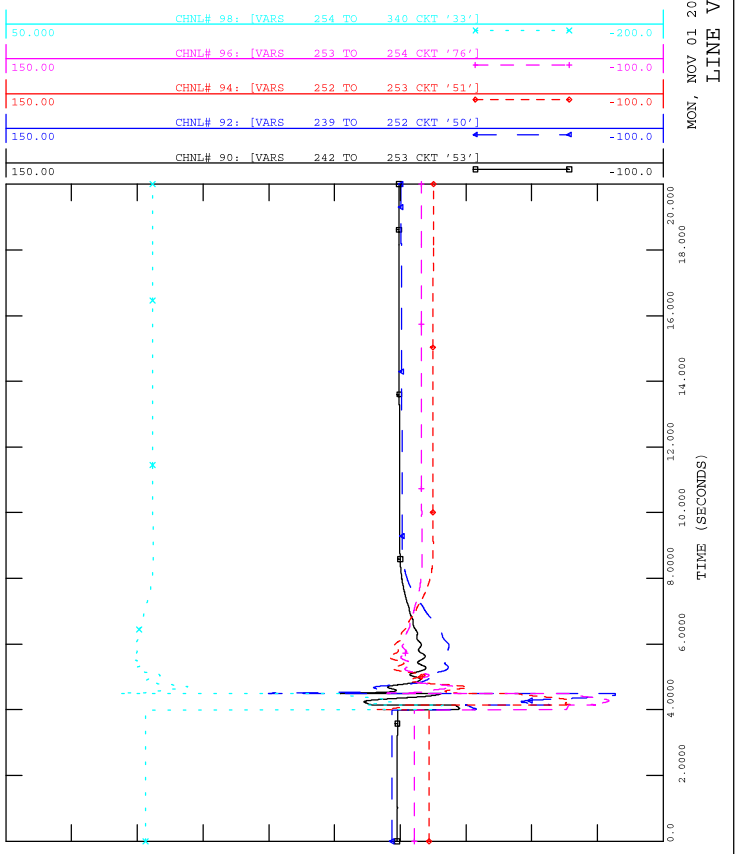
FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE POWER (3)

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

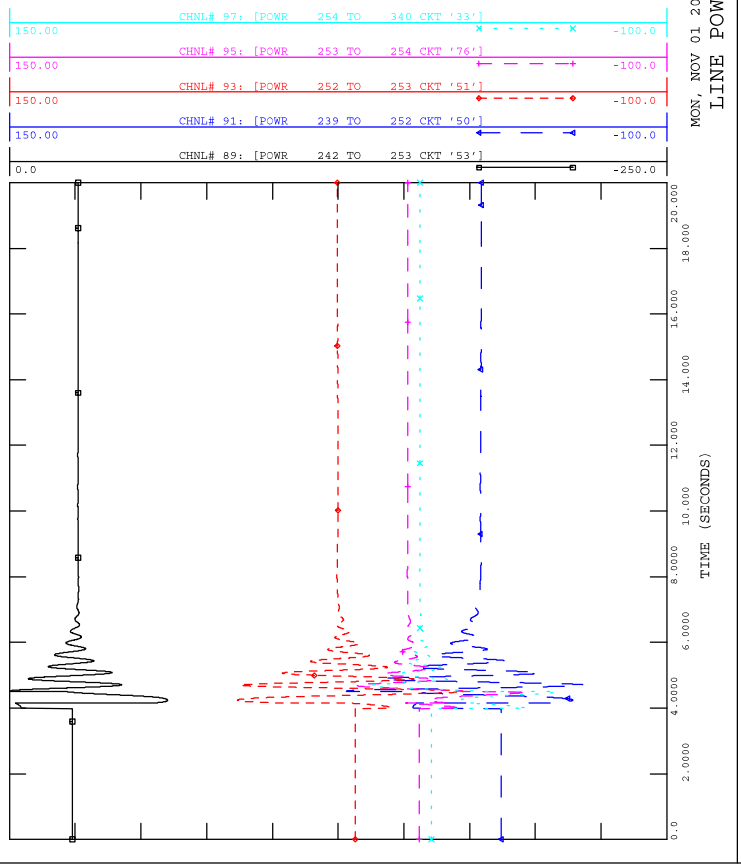
FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE VAR (2)

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

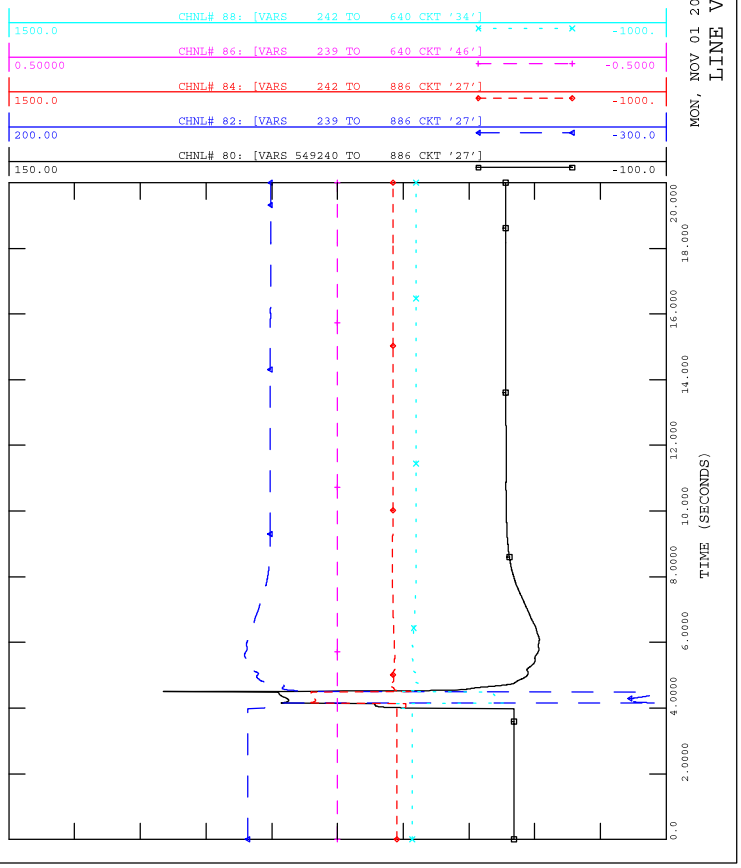
FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE POWER (2)

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

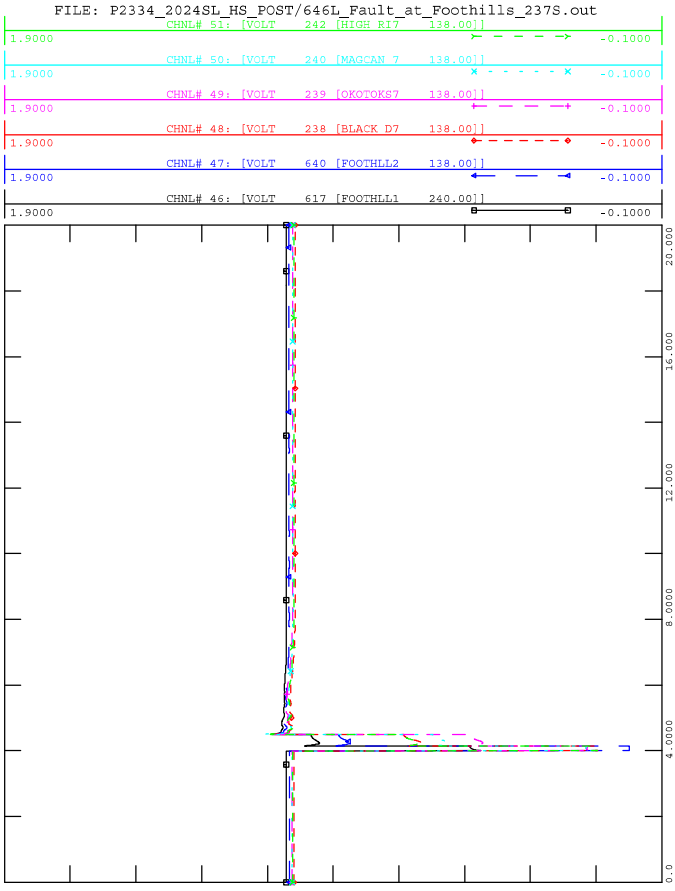
FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE VAR (1)

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

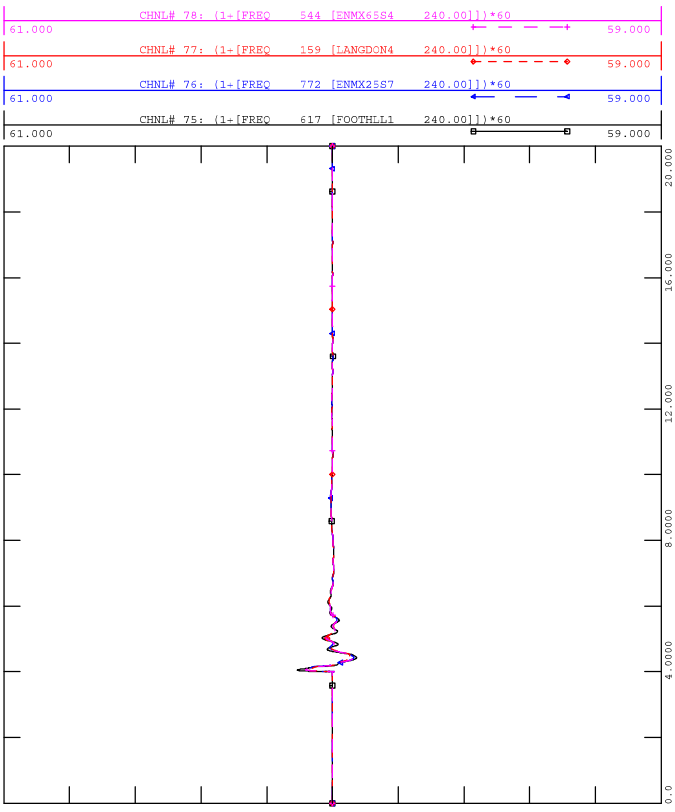
FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

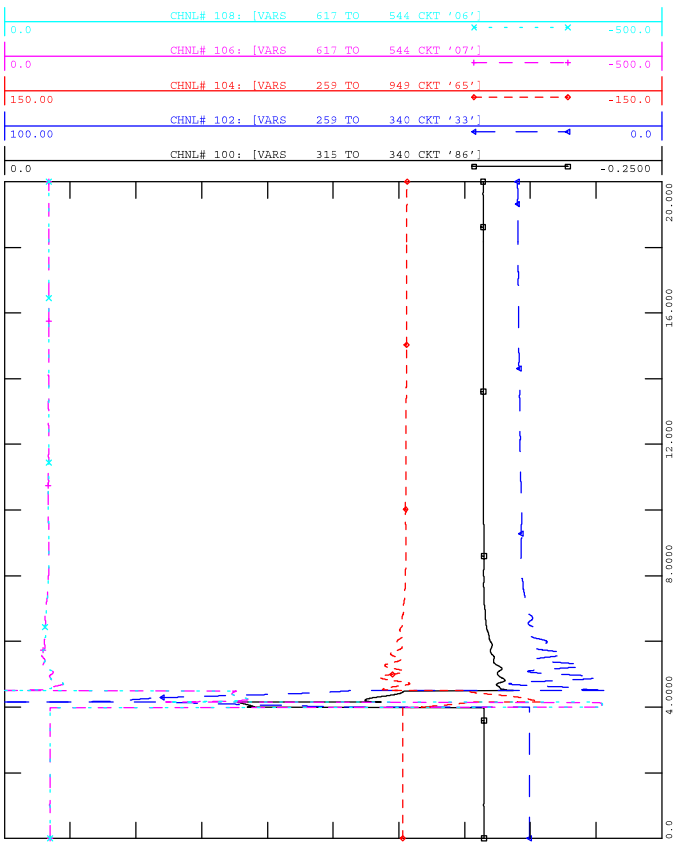
FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
FREQUENCY

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

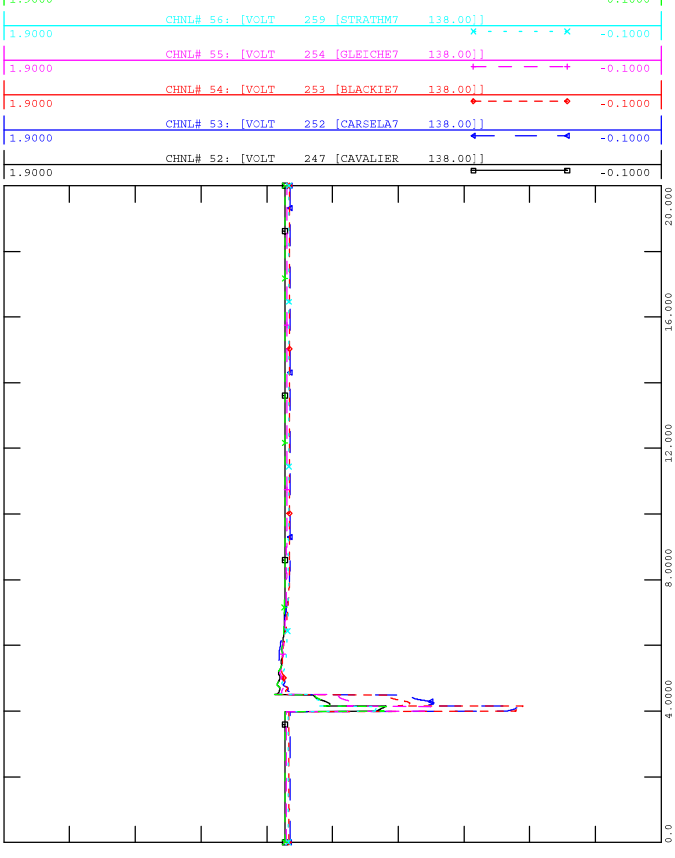
FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE VAR (3)

P2334_2024SL_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

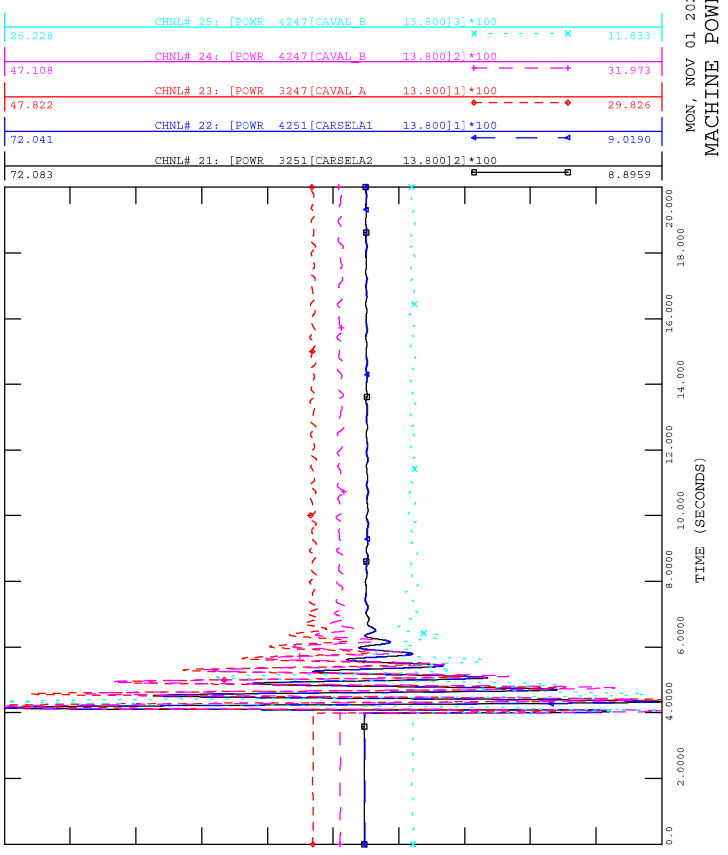
FILE: P2334_2024SL_HS_POST/646L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

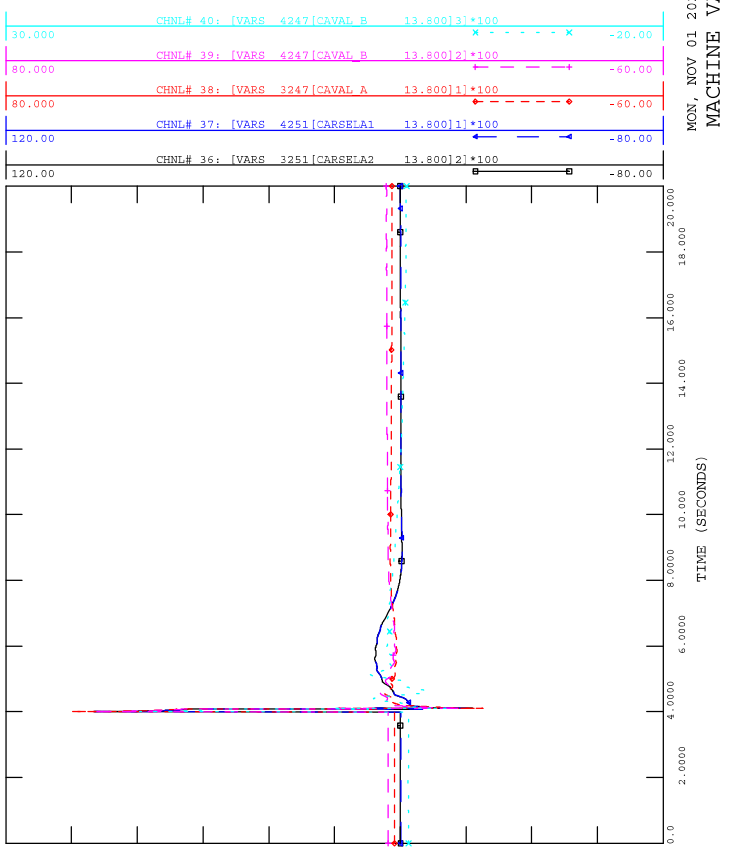
P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out



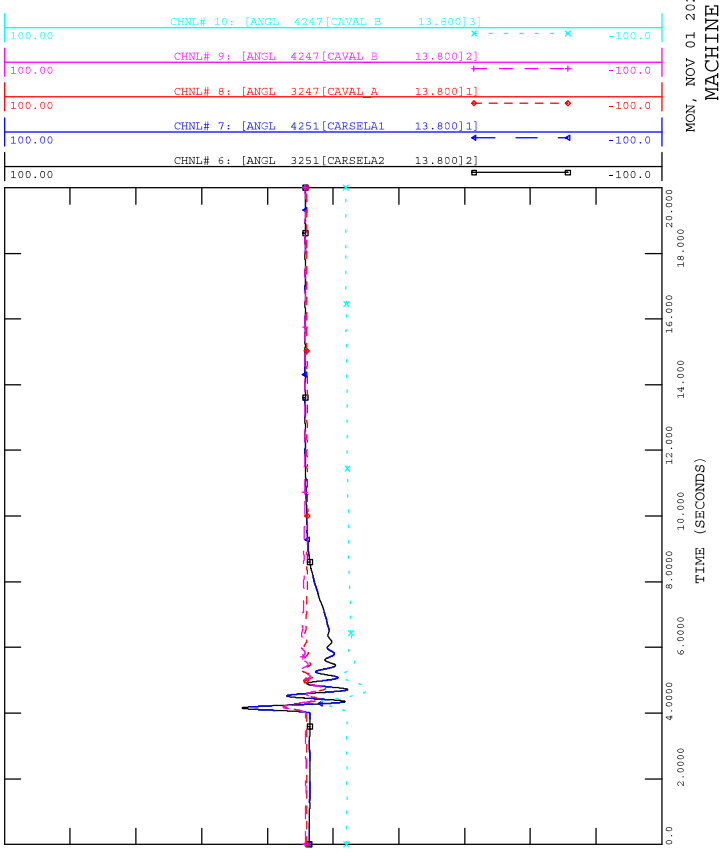
P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out



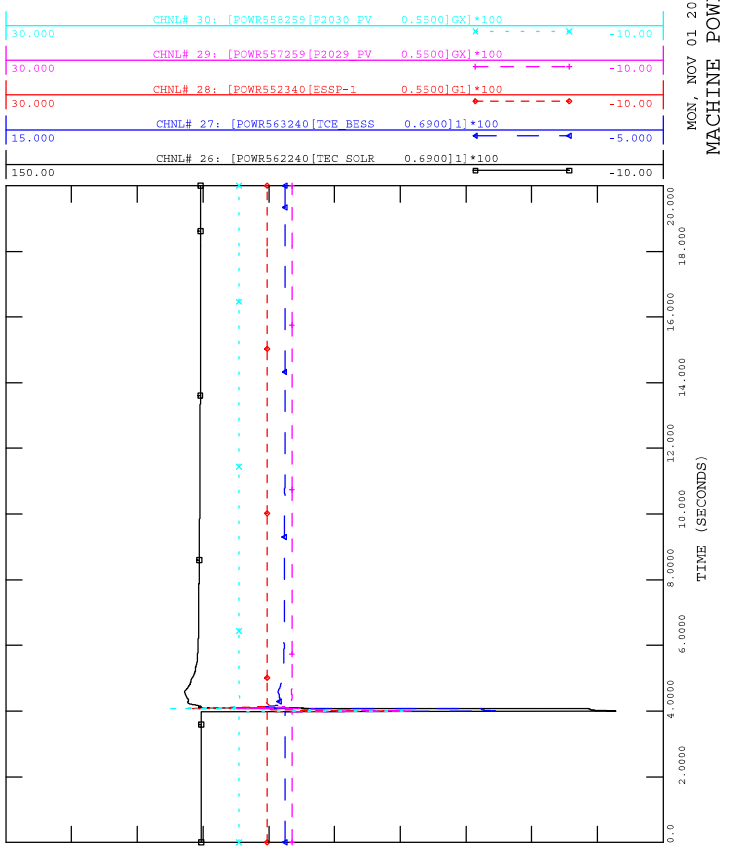
P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out



P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out

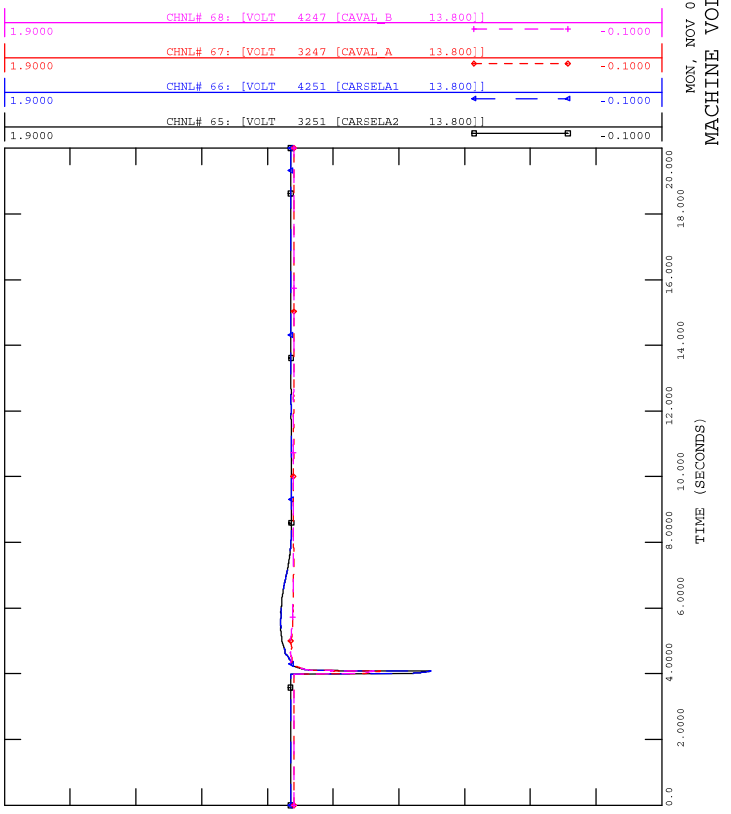


P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (1)

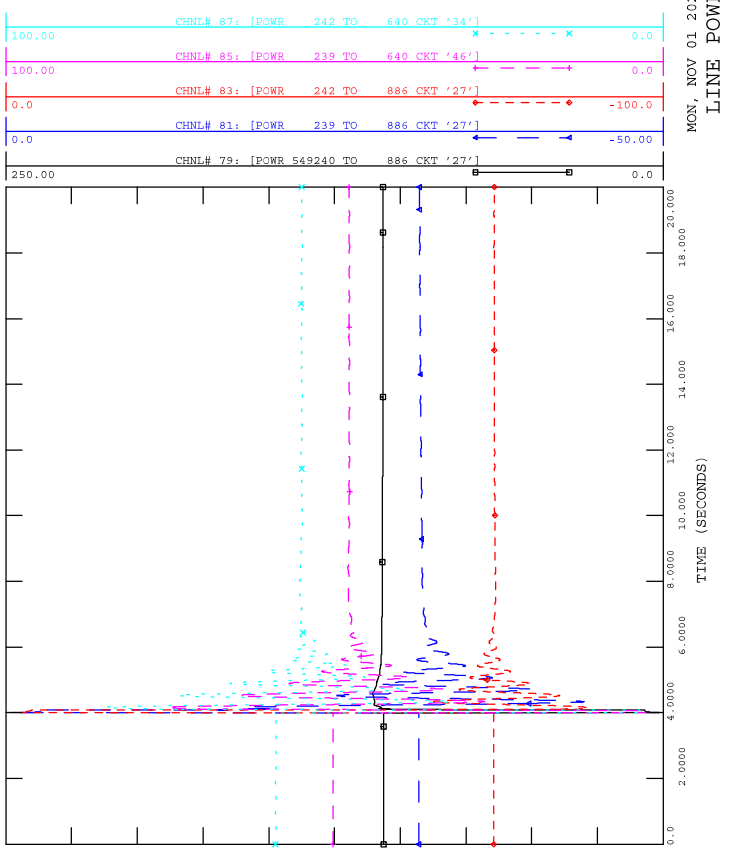


P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

LINE POWER (1)

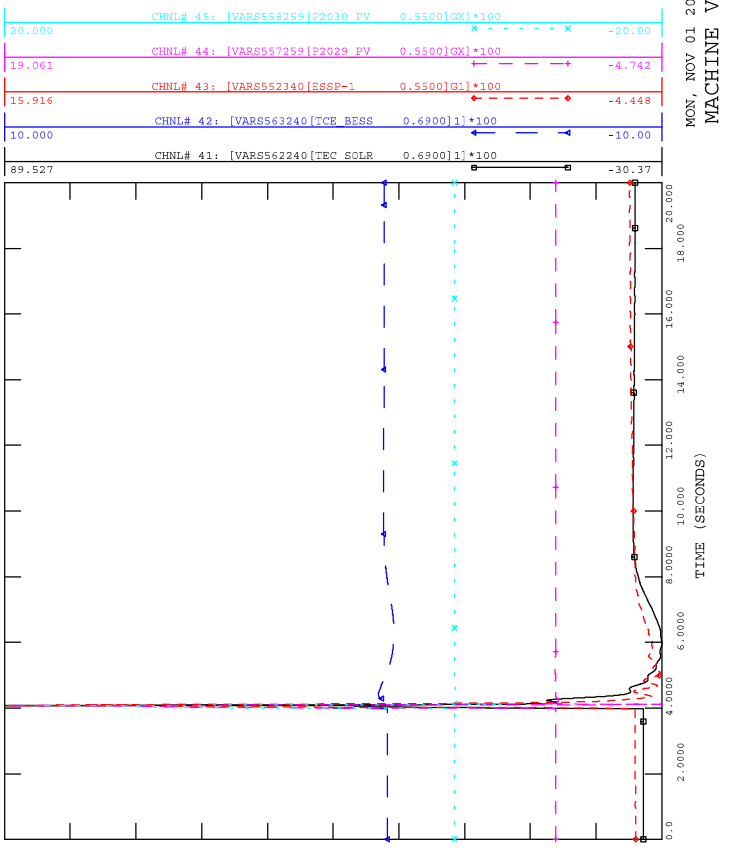


P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

MACHINE VAR (2)

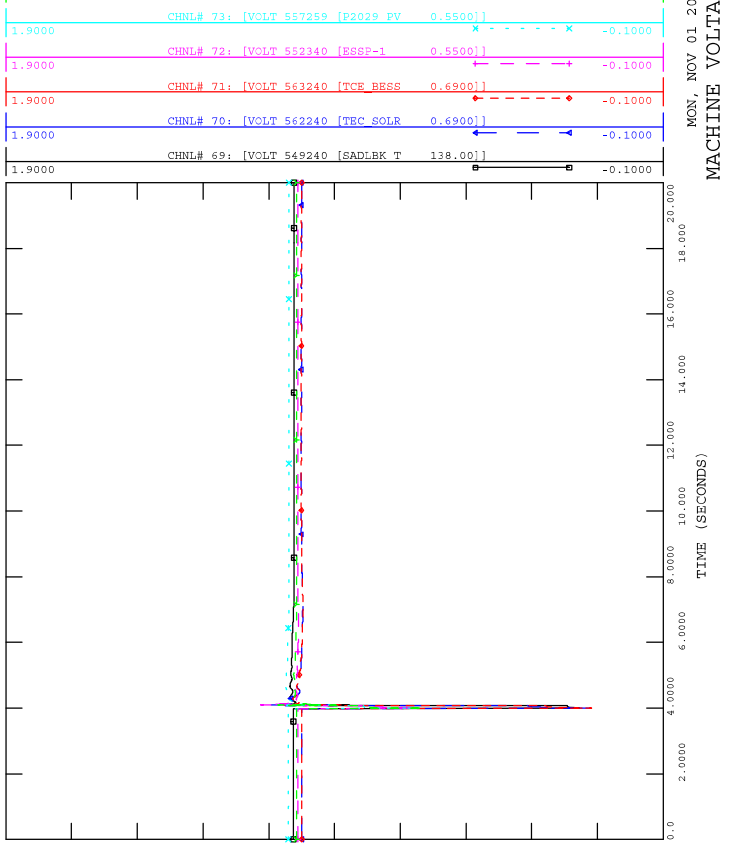


P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

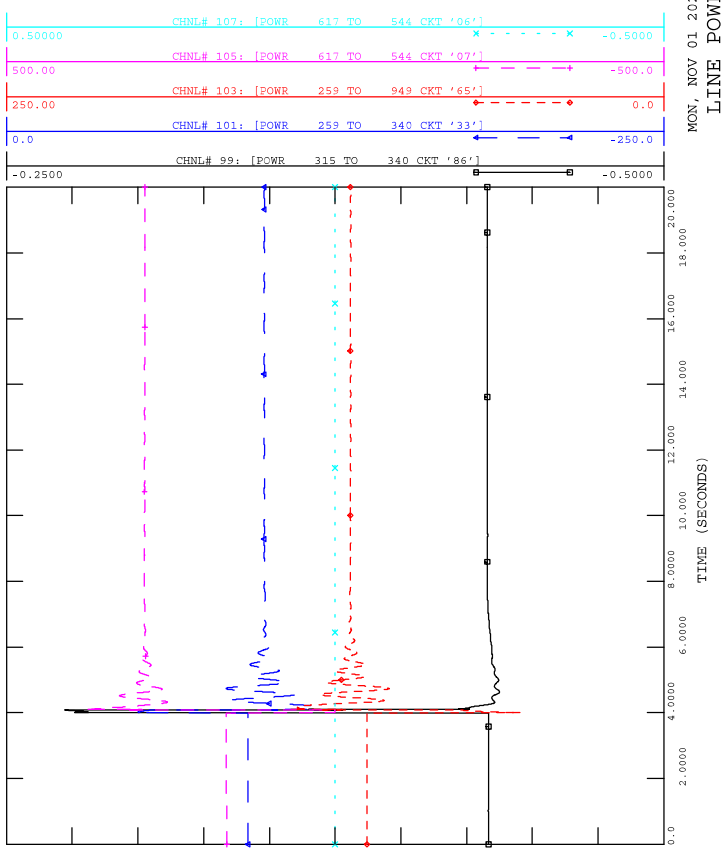
MACHINE VOLTAGE (2)



P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out

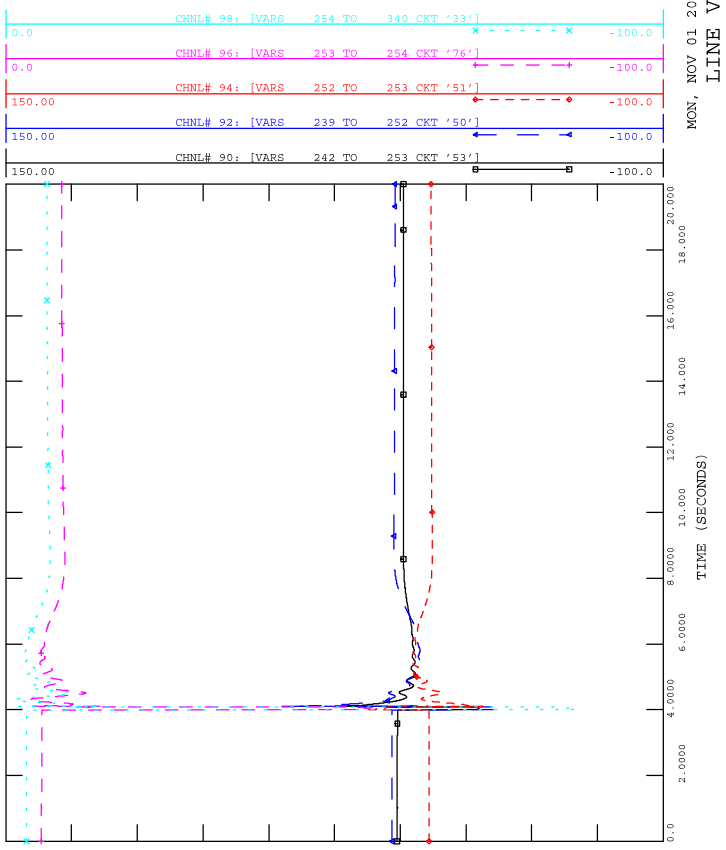
MON, NOV 01 2021 21:04
LINE POWER (3)



P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out

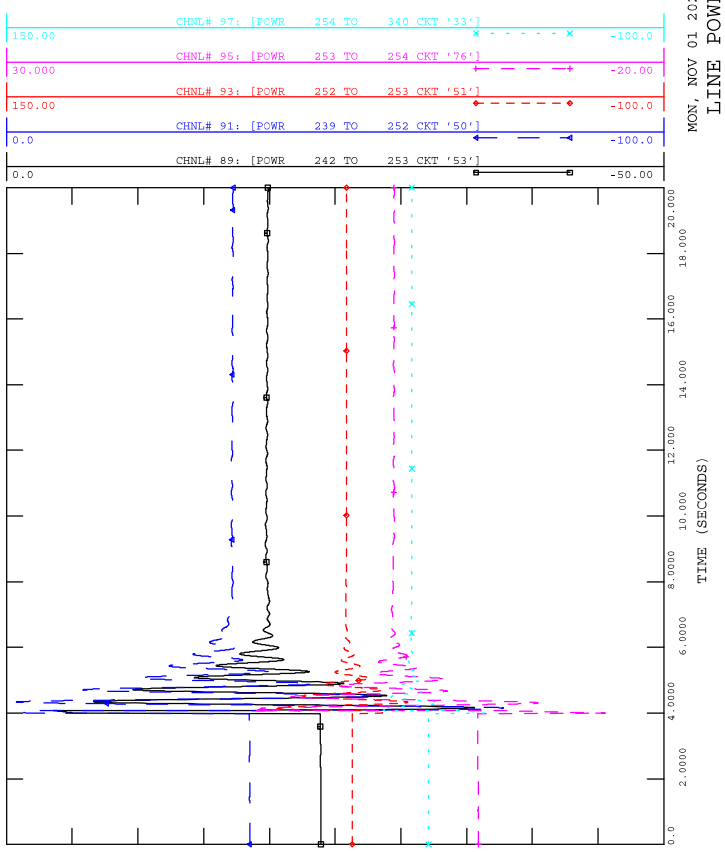
MON, NOV 01 2021 21:04
LINE VAR (2)



P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out

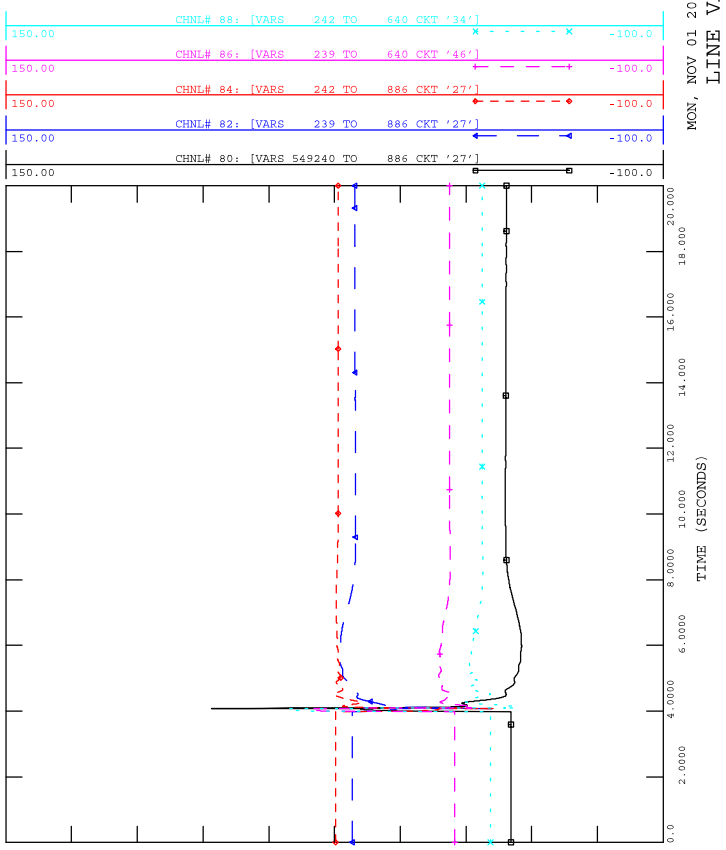
MON, NOV 01 2021 21:04
LINE POWER (2)



P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

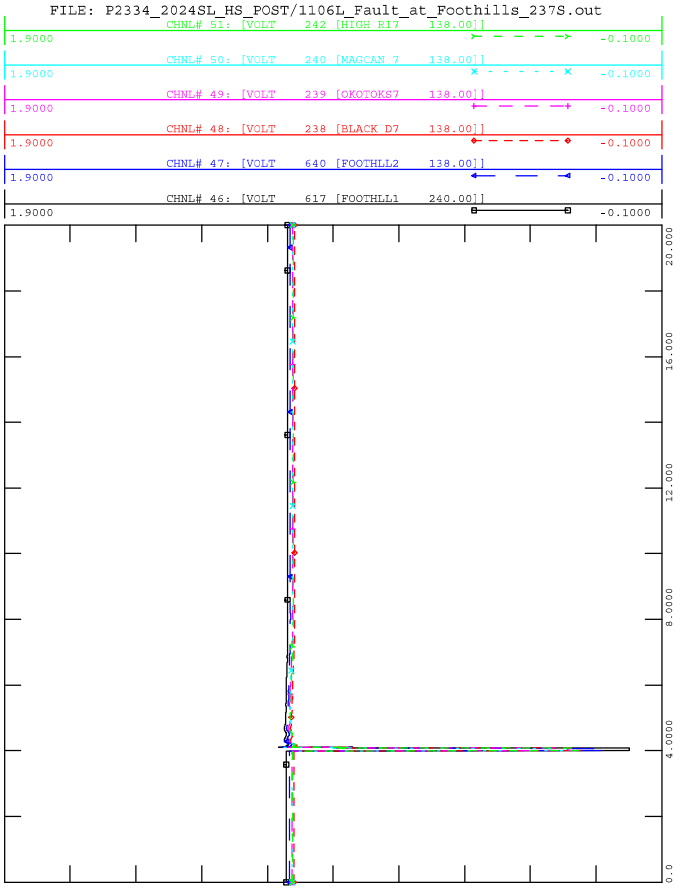
FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04
LINE VAR (1)



P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

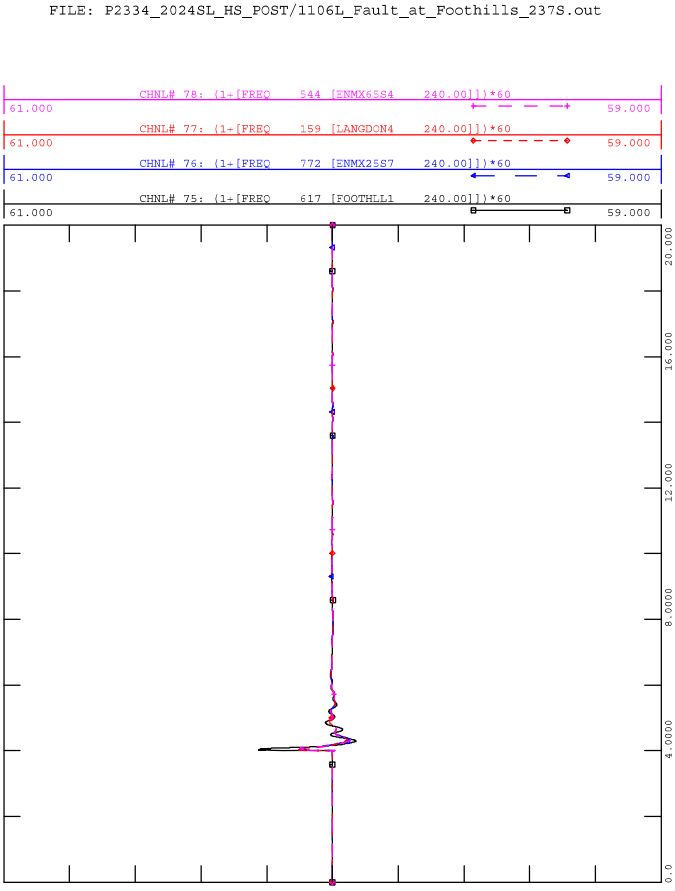
FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

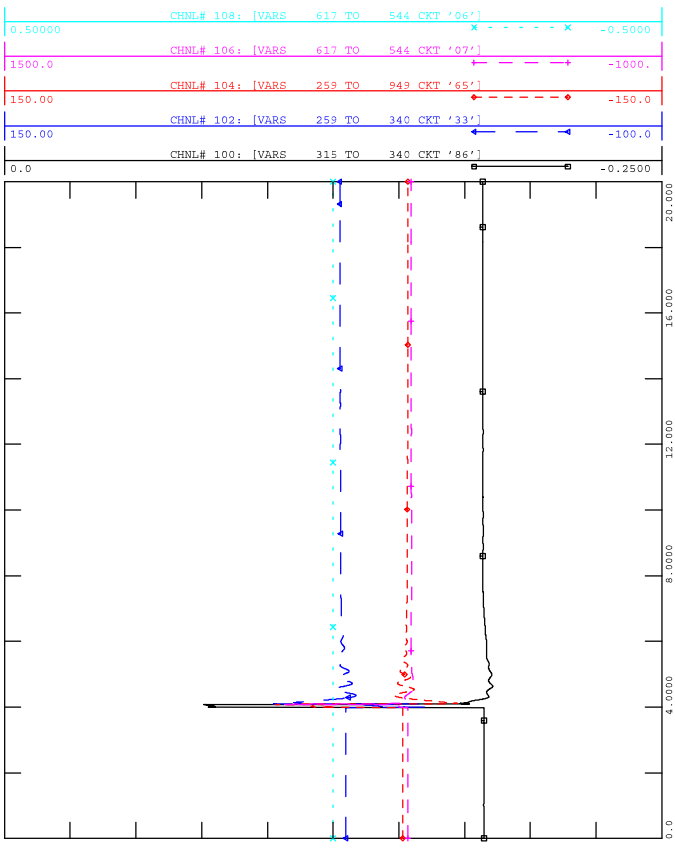
FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
FREQUENCY

P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

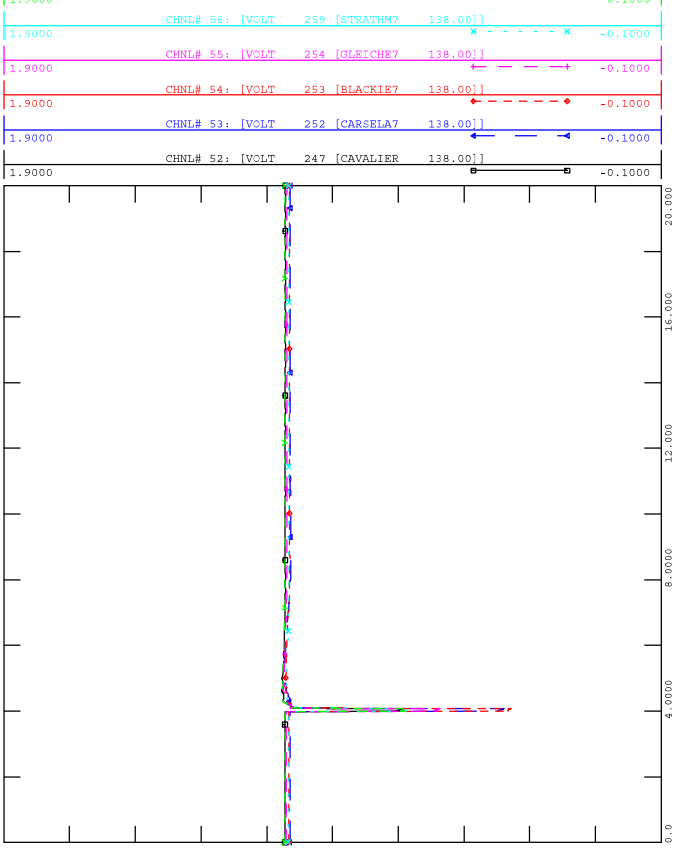
FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE VAR (3)

P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_Foothills_237S.out



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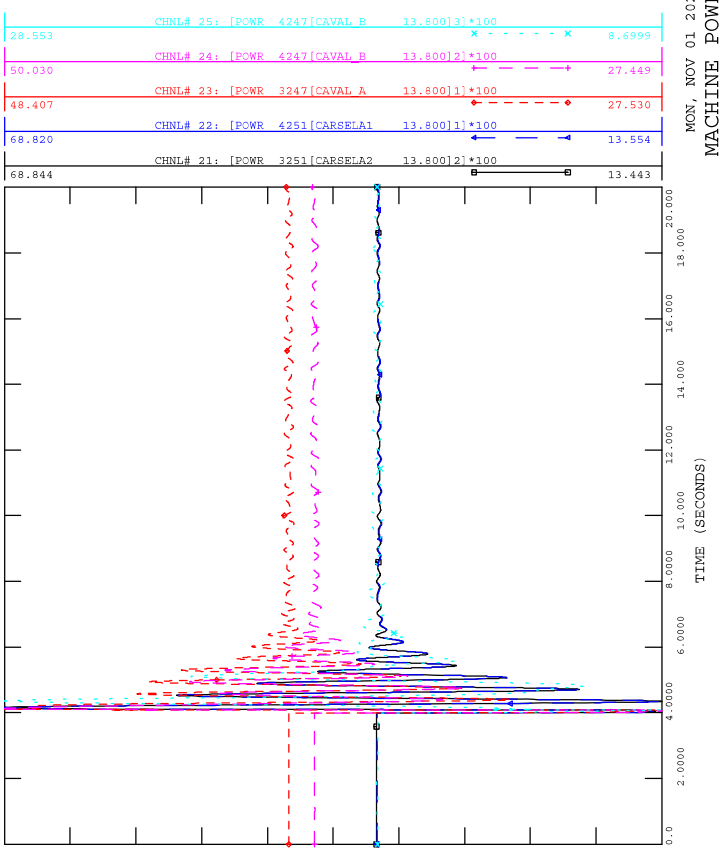
BUS VOLTAGE (2)

P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_ENMAX_SS-65.out



P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

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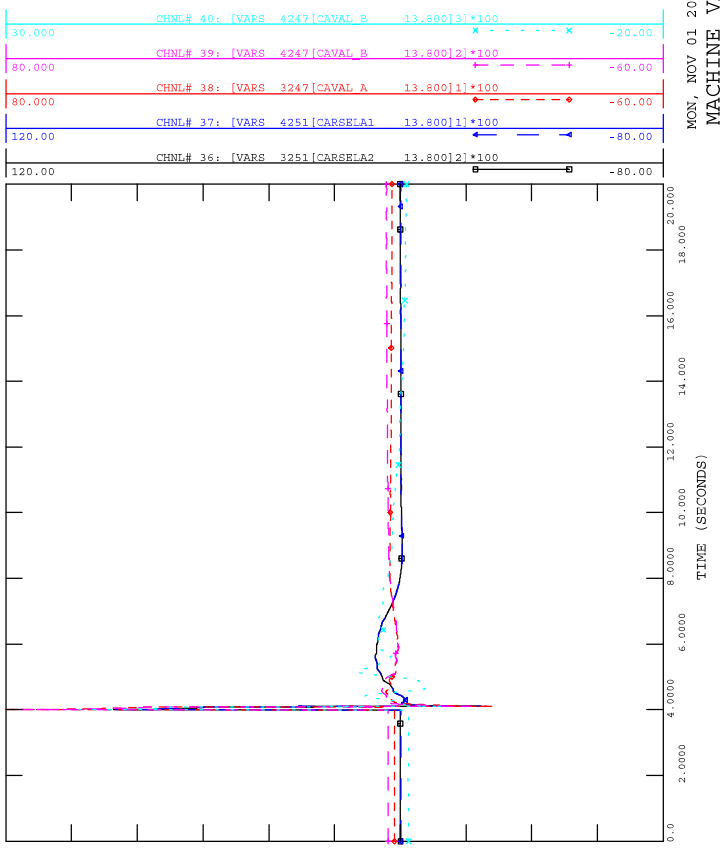

P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

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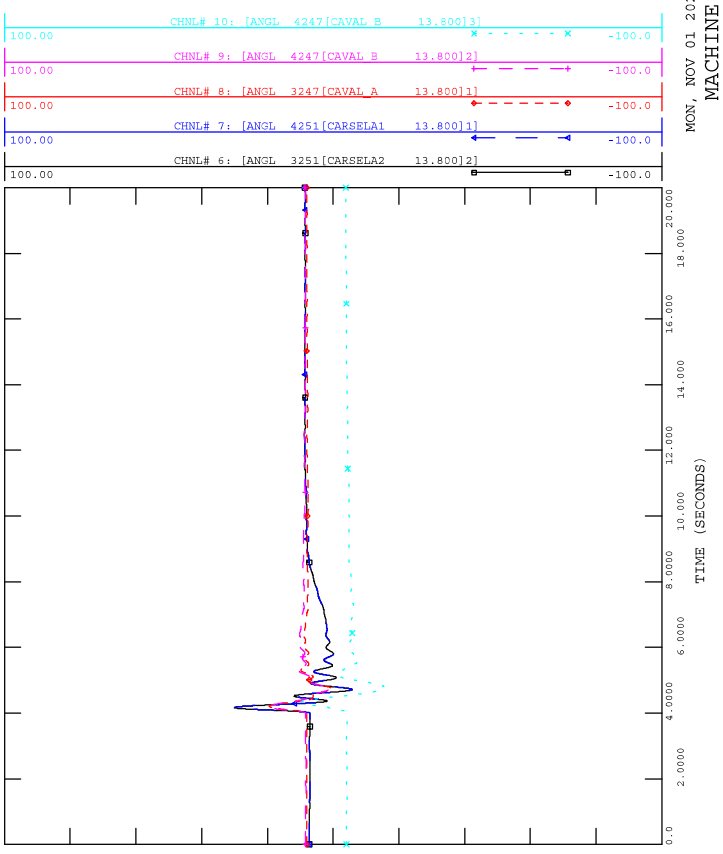

P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

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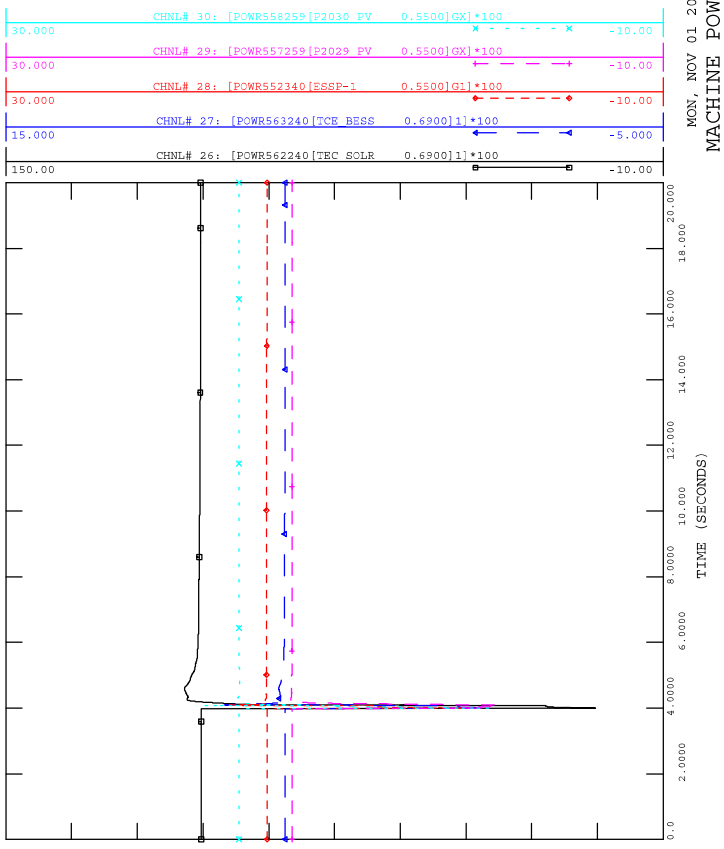

P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_ENMAX_SS-65.out

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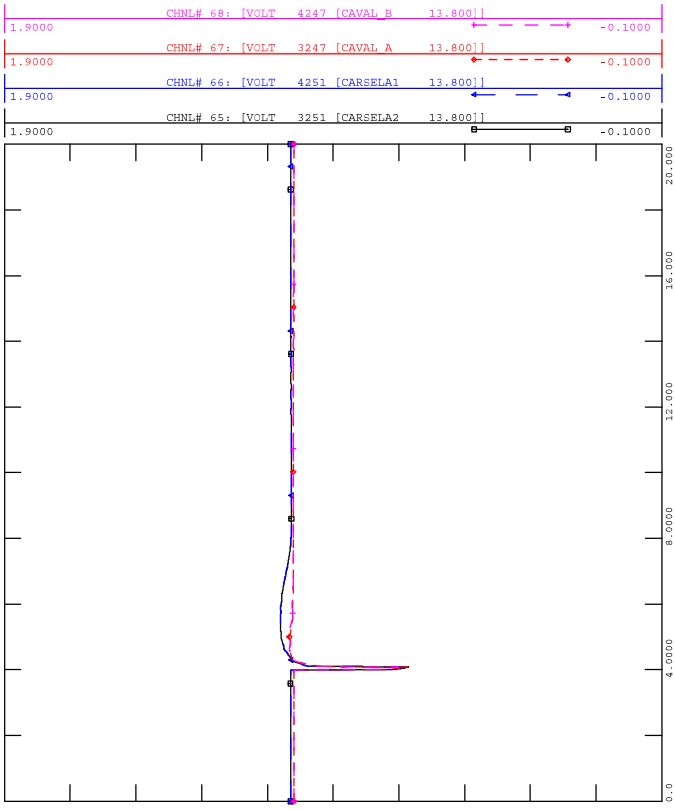
MACHINE VOLTAGE (1)



P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_ENMAX_SS-65.out

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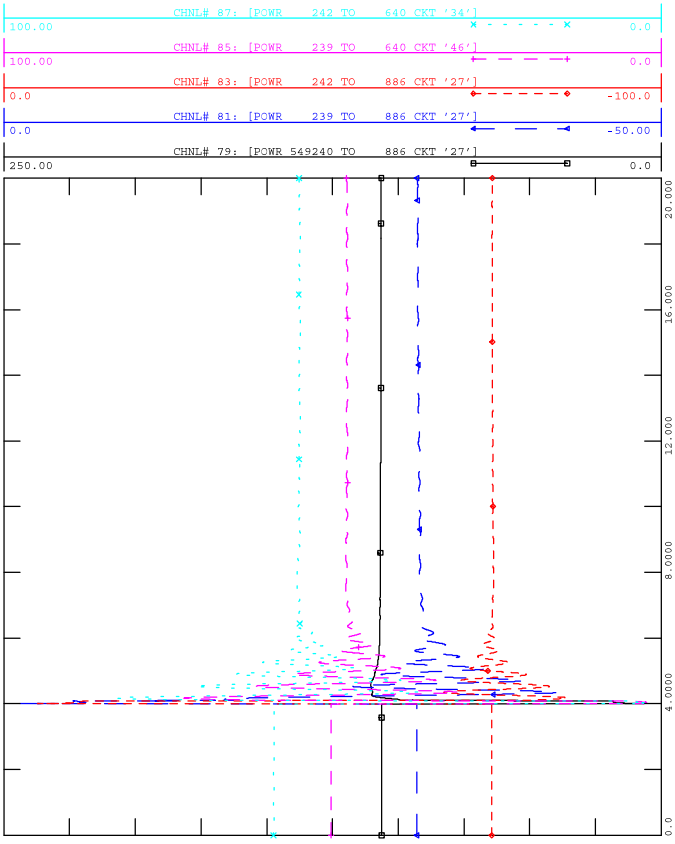
LINE POWER (1)

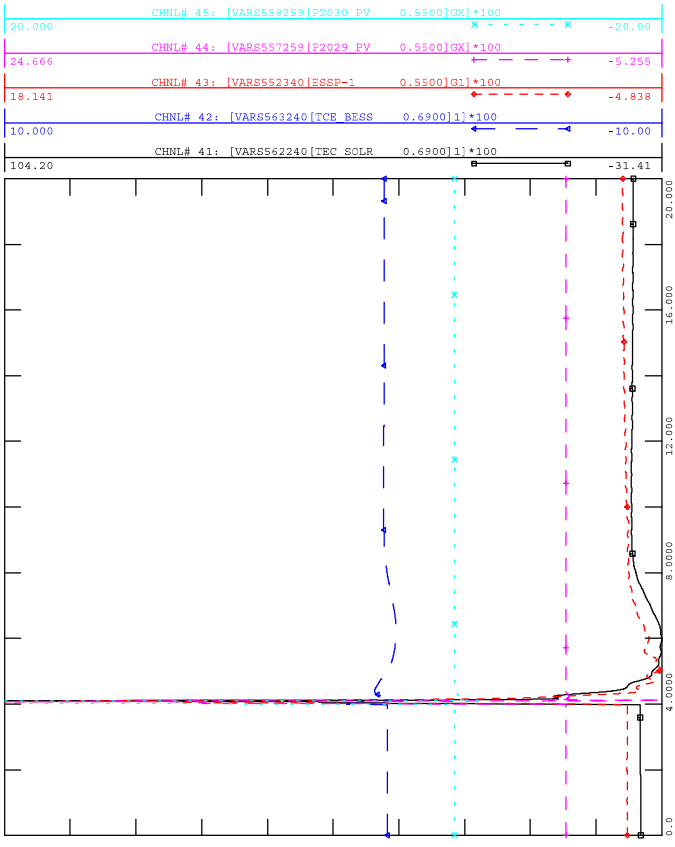


P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_ENMAX_SS-65.out

MON, NOV 01 2021 21:04

MACHINE VAR (2)

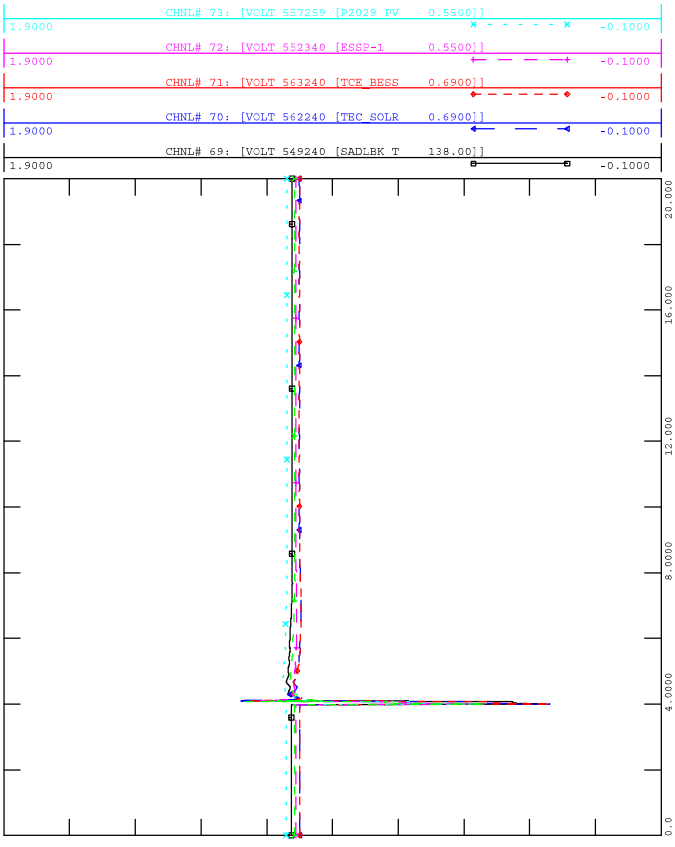


P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_ENMAX_SS-65.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (2)

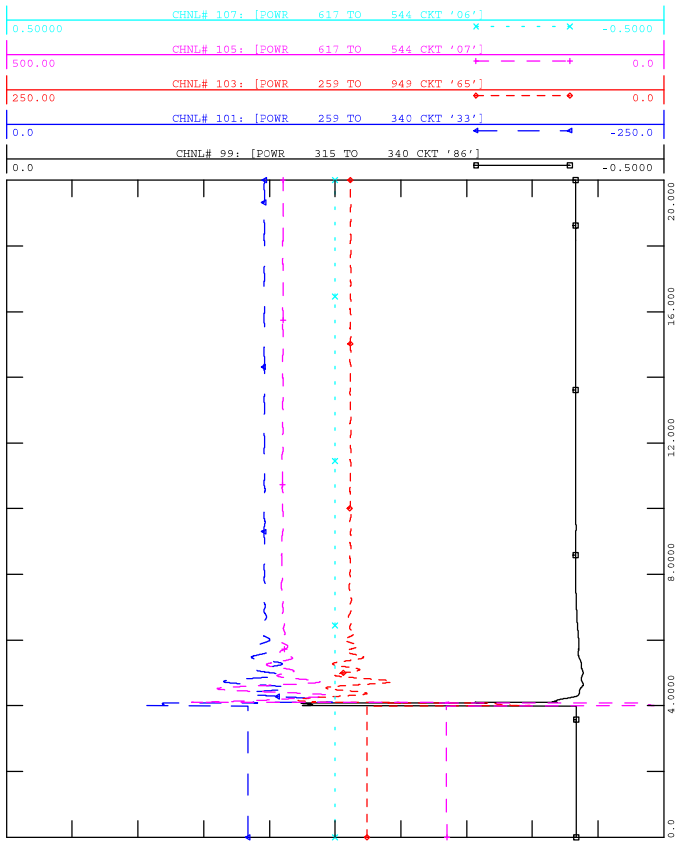


P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_ENMAX_SS-65.out

MON, NOV 01 2021 21:04

LINE POWER (3)

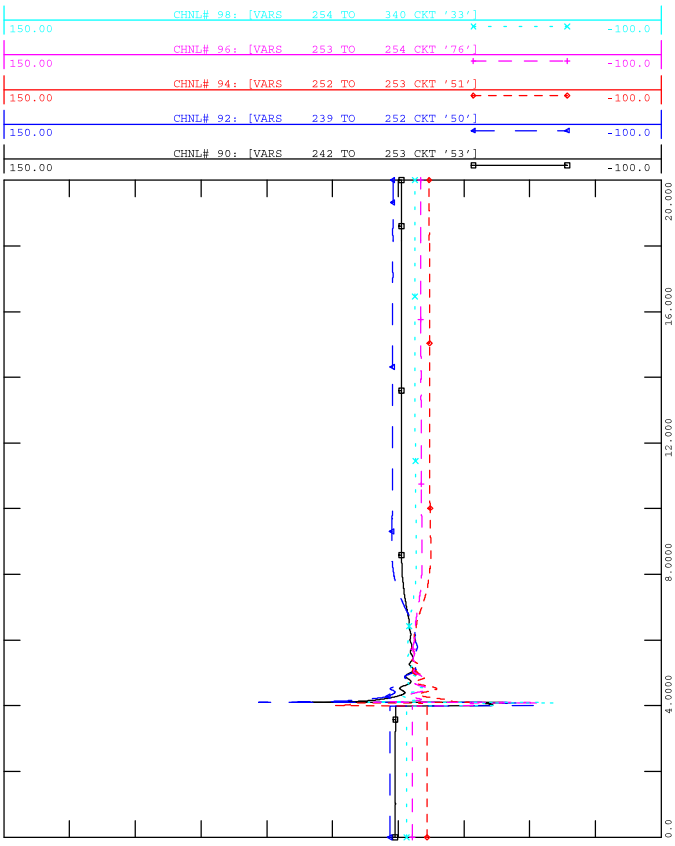


P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_ENMAX_SS-65.out

MON, NOV 01 2021 21:04

LINE VAR (2)

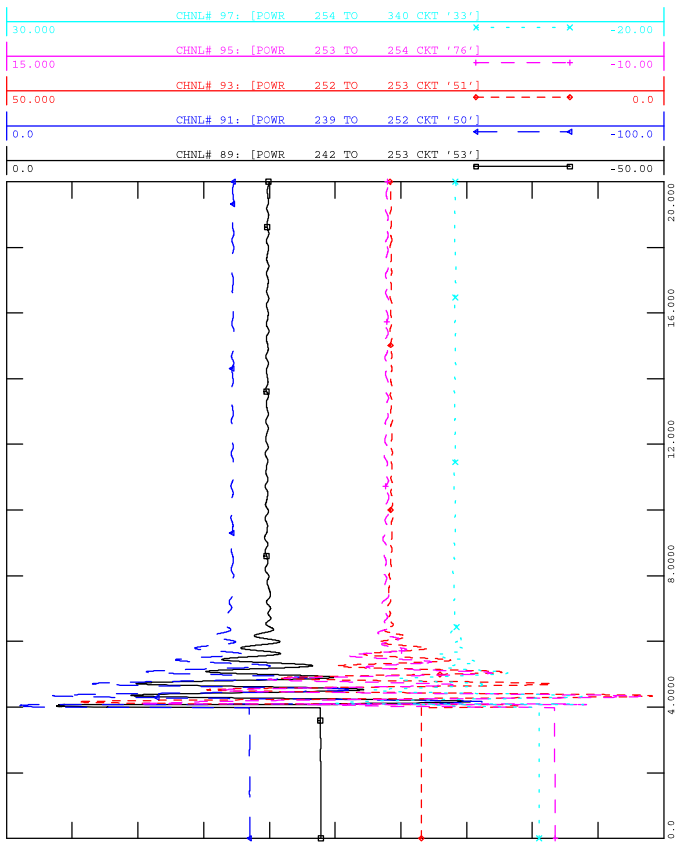


P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_ENMAX_SS-65.out

MON, NOV 01 2021 21:04

LINE POWER (2)

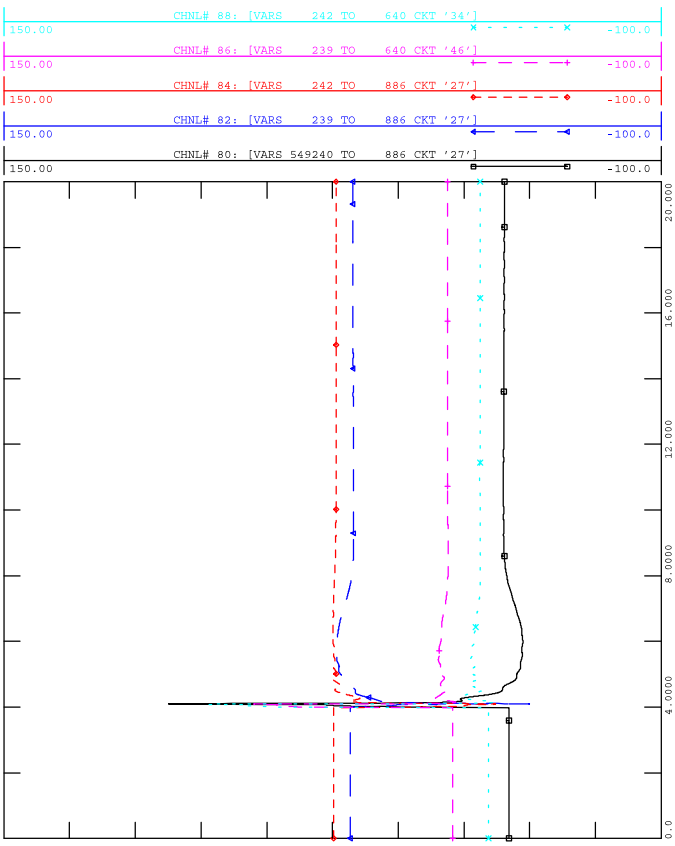


P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_ENMAX_SS-65.out

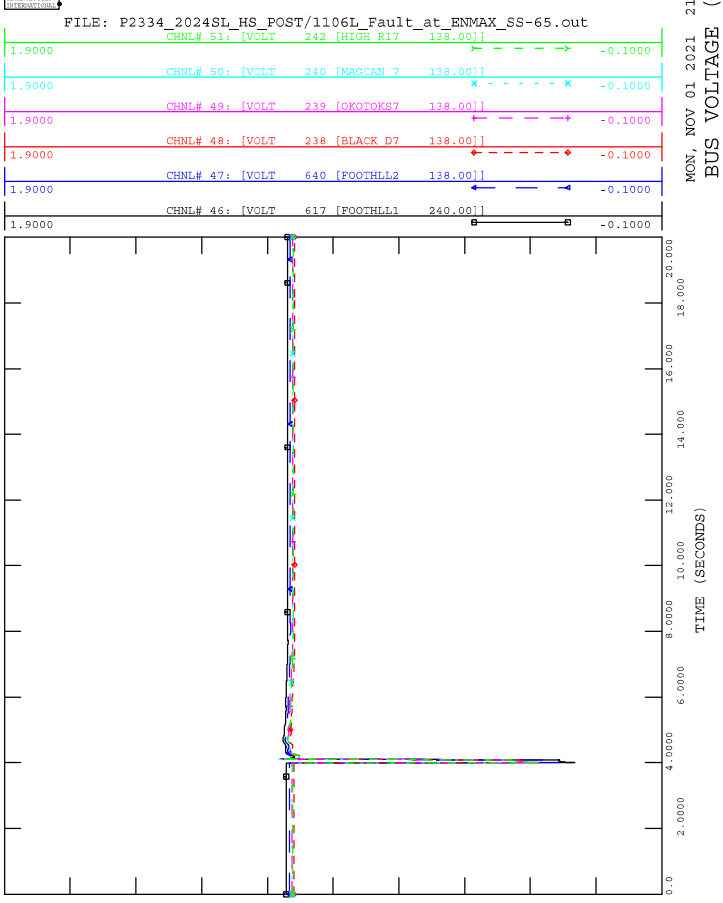
MON, NOV 01 2021 21:04

LINE VAR (1)



P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

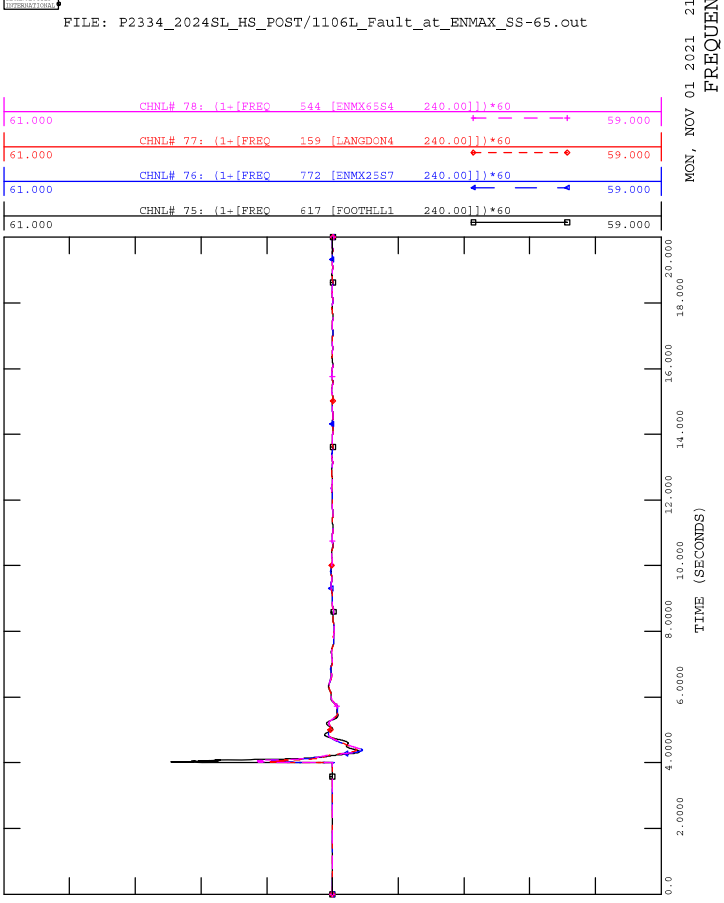
FILE: P2334_2024SL_HS_POST/1106L_Fault_at_ENMAX_SS-65.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

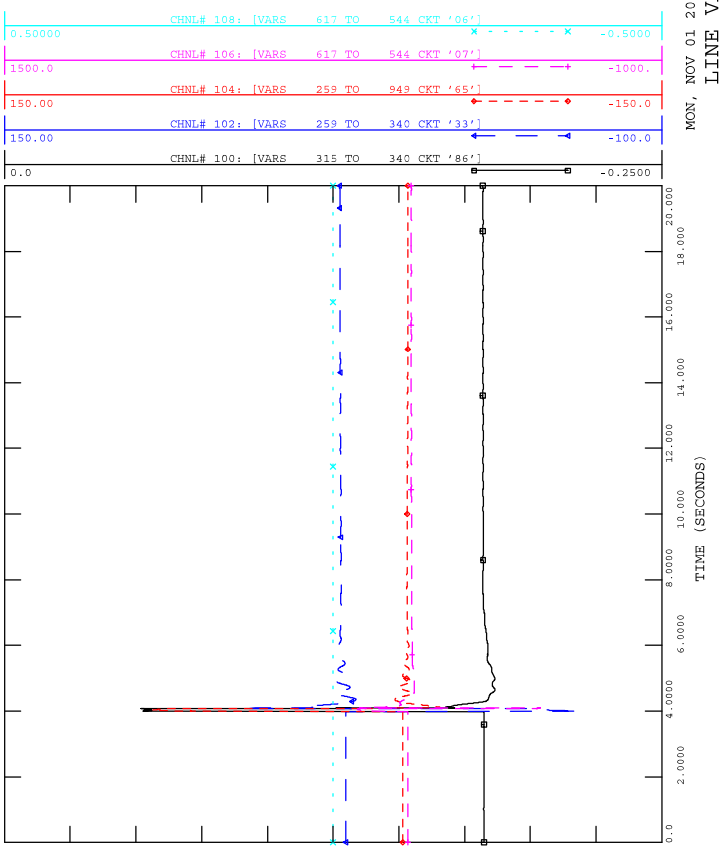
FILE: P2334_2024SL_HS_POST/1106L_Fault_at_ENMAX_SS-65.out



MON, NOV 01 2021 21:04
FREQUENCY

P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

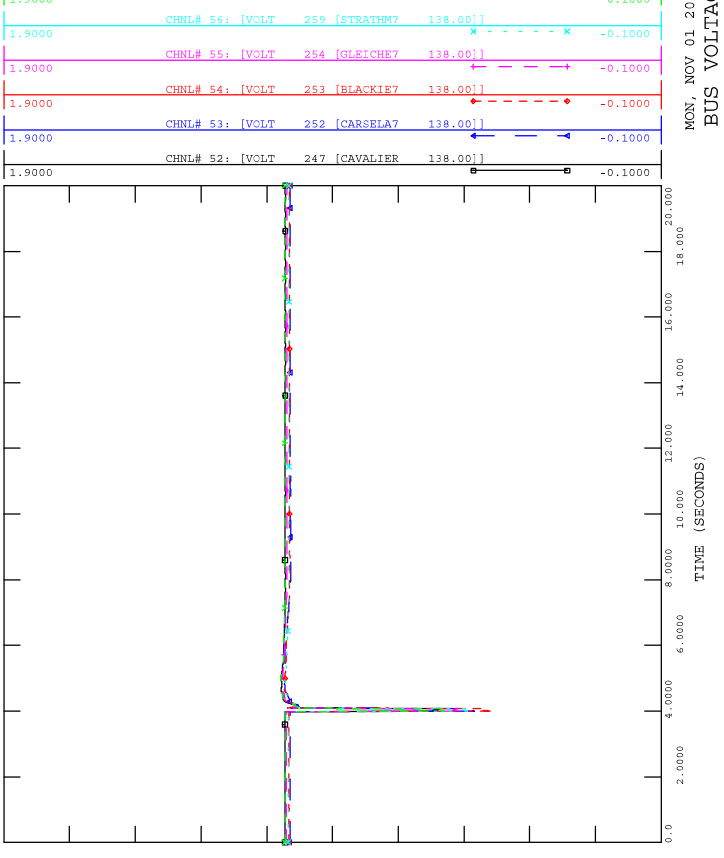
FILE: P2334_2024SL_HS_POST/1106L_Fault_at_ENMAX_SS-65.out



MON, NOV 01 2021 21:04
LINE VAR (3)

P2334_2024SL_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

FILE: P2334_2024SL_HS_POST/1106L_Fault_at_ENMAX_SS-65.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04
MACHINE POWER (1)

CHNL# 25: [POWR 4247[CAVAL B 13.800]3]*100 — 22.533 — 10.194
CHNL# 24: [POWR 4247[CAVAL B 13.800]2]*100 — 42.989 — 31.692
CHNL# 23: [POWR 3247[CAVAL A 13.800]1]*100 — 43.586 — 29.460
CHNL# 22: [POWR 4251[CARSELA1 13.800]1]*100 — 60.518 — 7.5958
CHNL# 21: [POWR 3251[CARSELA2 13.800]2]*100 — 60.666 — 7.4836

TIME (SECONDS)
0.0 2.0000 4.0000 6.0000 8.0000 10.000 12.000 14.000 16.000 18.000 20.000

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04
MACHINE VAR (1)

CHNL# 40: [VARS 4247[CAVAL B 13.800]3]*100 — 30.000 — -20.00
CHNL# 39: [VARS 4247[CAVAL B 13.800]2]*100 — 80.000 — -60.00
CHNL# 38: [VARS 3247[CAVAL A 13.800]1]*100 — 80.000 — -60.00
CHNL# 37: [VARS 4251[CARSELA1 13.800]1]*100 — 120.00 — -80.00
CHNL# 36: [VARS 3251[CARSELA2 13.800]2]*100 — 120.00 — -80.00

TIME (SECONDS)
0.0 2.0000 4.0000 6.0000 8.0000 10.000 12.000 14.000 16.000 18.000 20.000

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04
MACHINE ANGEL

CHNL# 10: [ANGL 4247[CAVAL B 13.800]3] — 100.00 — -100.0
CHNL# 9: [ANGL 4247[CAVAL B 13.800]2] — 100.00 — -100.0
CHNL# 8: [ANGL 3247[CAVAL A 13.800]1] — 100.00 — -100.0
CHNL# 7: [ANGL 4251[CARSELA1 13.800]1] — 100.00 — -100.0
CHNL# 6: [ANGL 3251[CARSELA2 13.800]2] — 100.00 — -100.0

TIME (SECONDS)
0.0 2.0000 4.0000 6.0000 8.0000 10.000 12.000 14.000 16.000 18.000 20.000

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04
MACHINE POWER (2)

CHNL# 30: [POWR558259[P2030_PV 0.5500]GX]*100 — 30.000 — -10.00
CHNL# 29: [POWR557259[P2029_PV 0.5500]GX]*100 — 30.000 — -10.00
CHNL# 28: [POWR552340[ESSP-1 0.5500]G1]*100 — 30.000 — -10.00
CHNL# 27: [POWR563240[TCE_BESS 0.6900]1]*100 — 15.000 — -5.000
CHNL# 26: [POWR562240[TEC_SOLR 0.6900]1]*100 — 150.00 — -10.00

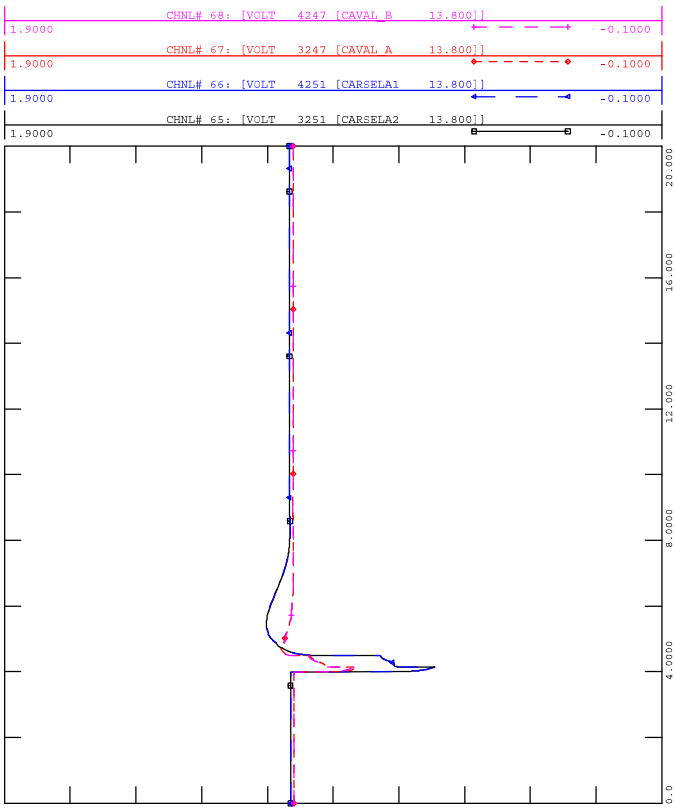
TIME (SECONDS)
0.0 2.0000 4.0000 6.0000 8.0000 10.000 12.000 14.000 16.000 18.000 20.000

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (1)

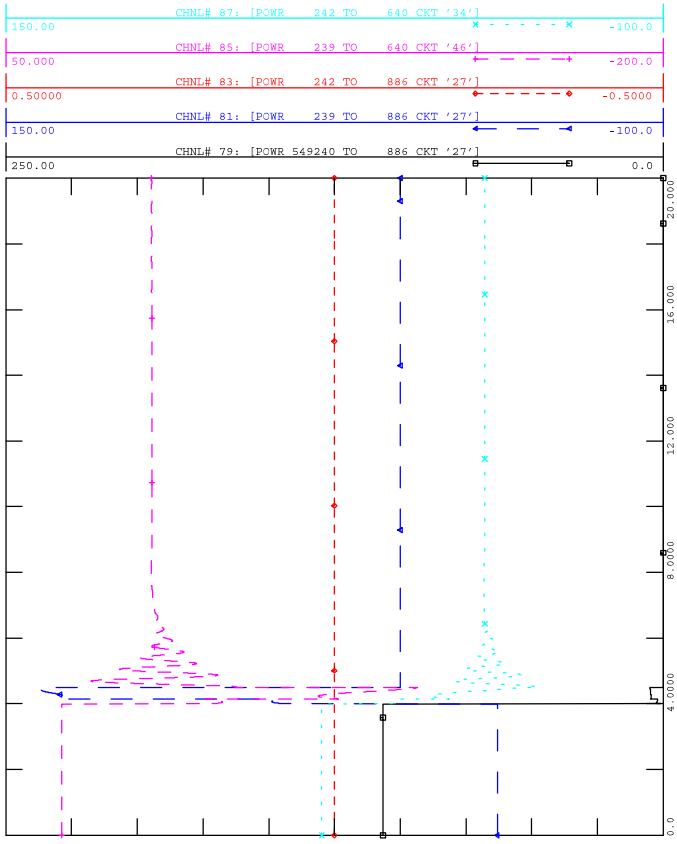


P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04

LINE POWER (1)

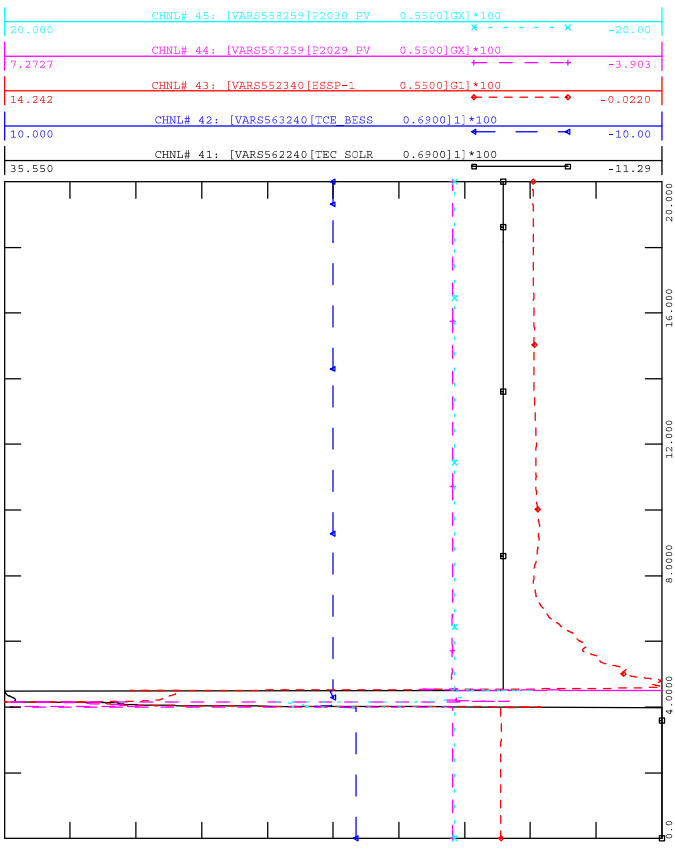


P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04

MACHINE VAR (2)

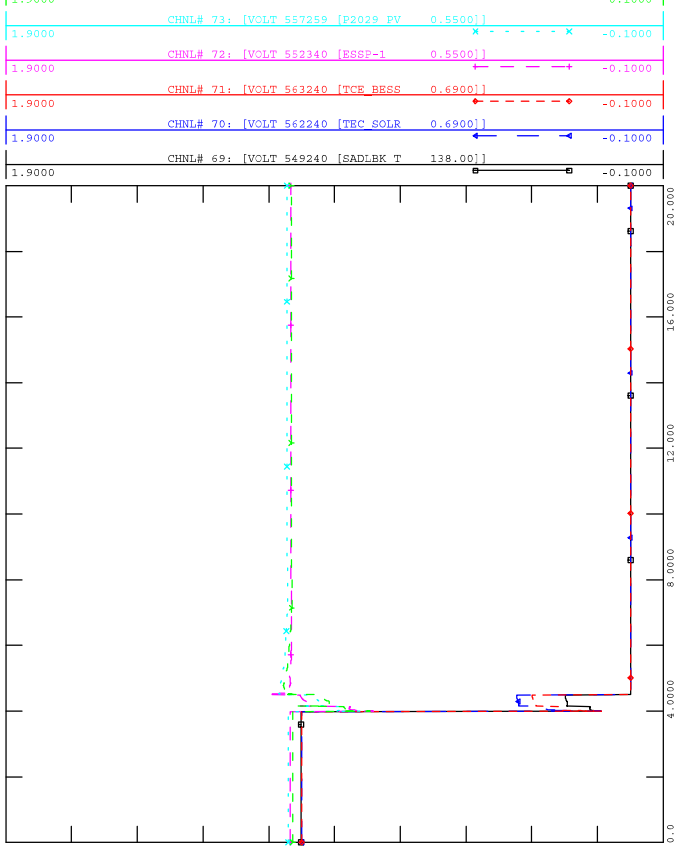


P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04

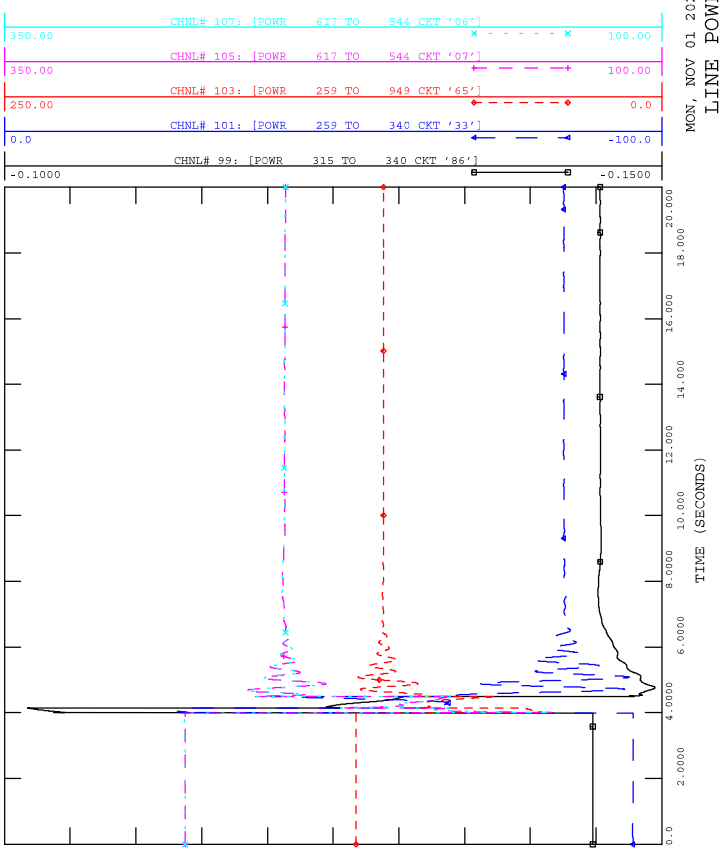
MACHINE VOLTAGE (2)



P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out

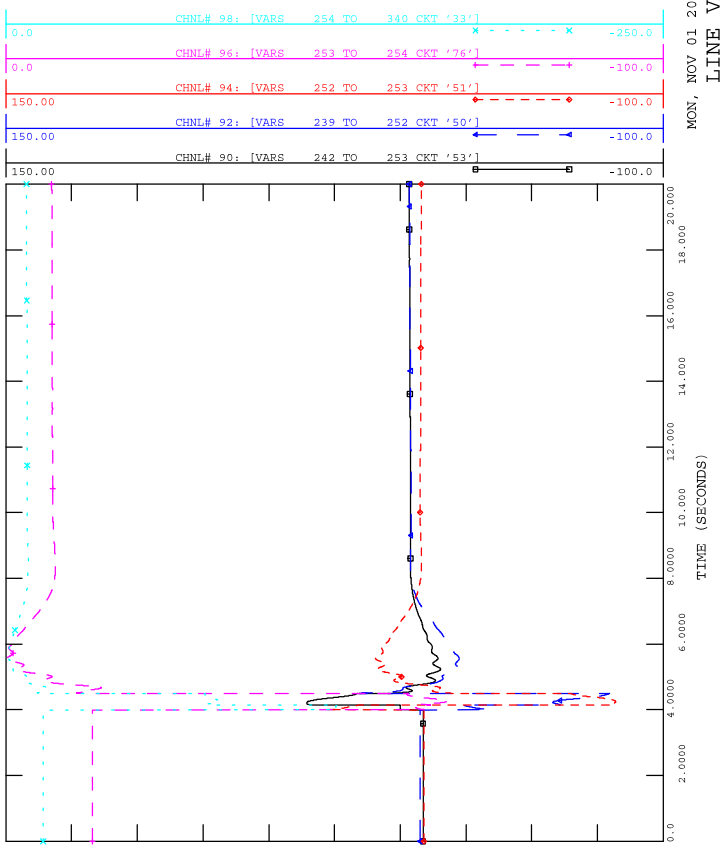
MON, NOV 01 2021 21:04
LINE POWER (3)



P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out

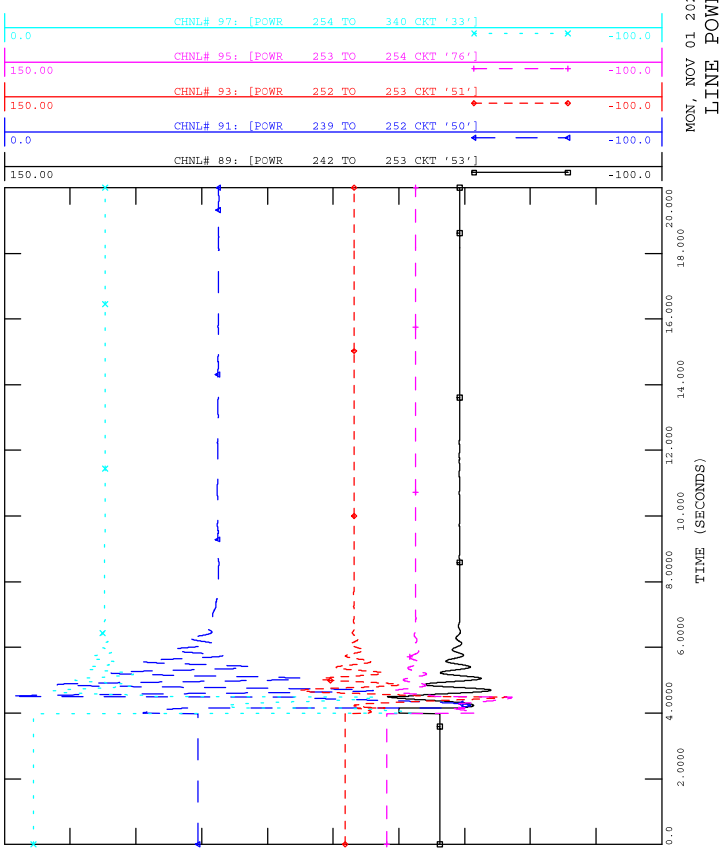
MON, NOV 01 2021 21:04
LINE VAR (2)



P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out

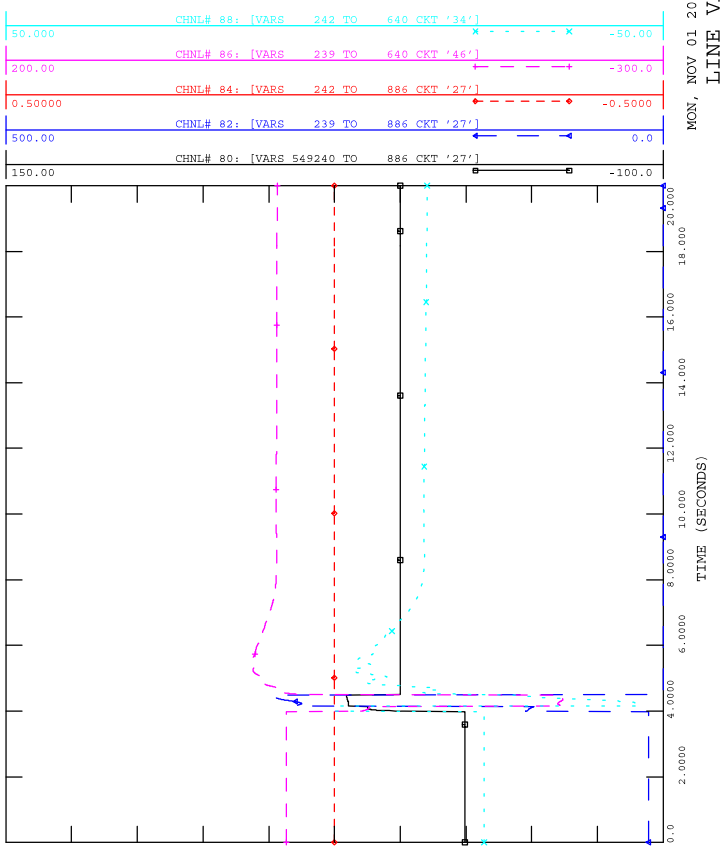
MON, NOV 01 2021 21:04
LINE POWER (2)



P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

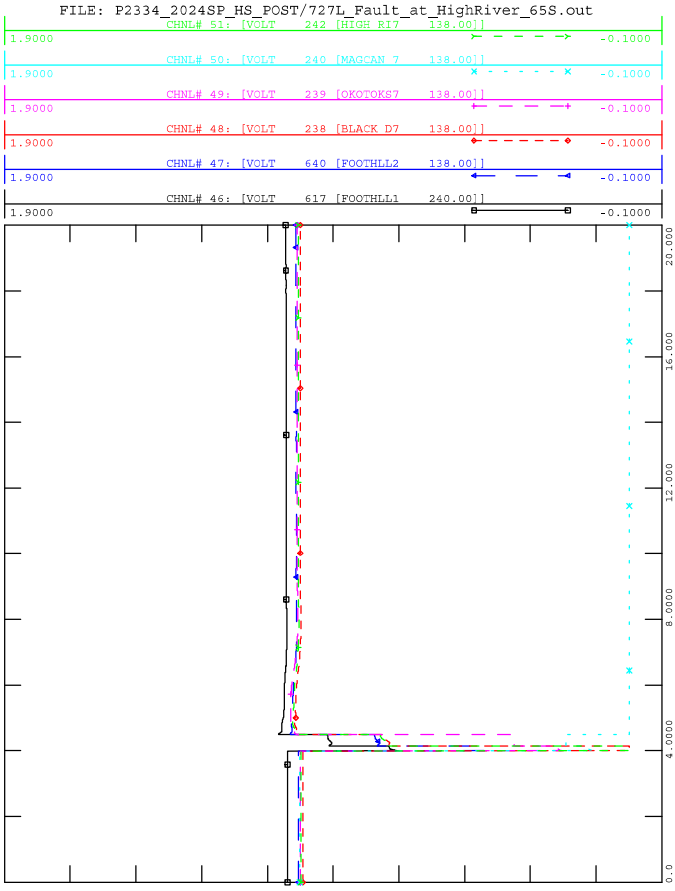
FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04
LINE VAR (1)



P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

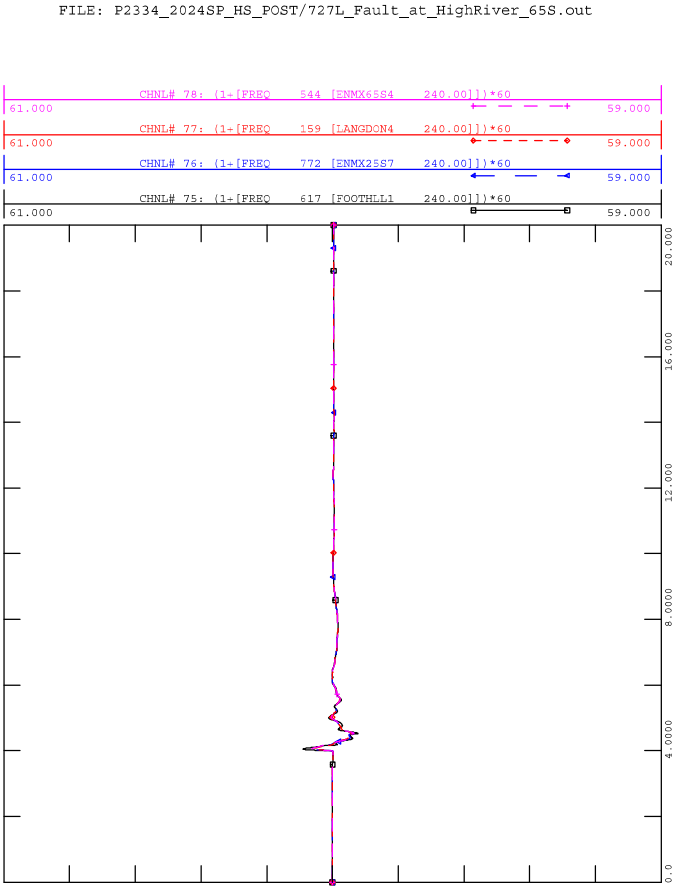
FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

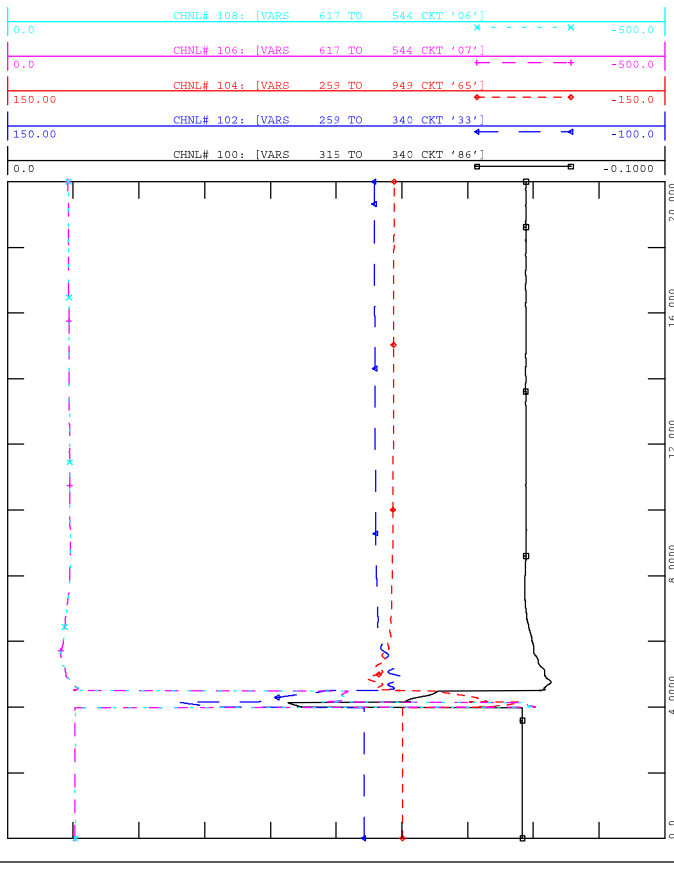
FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
FREQUENCY

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

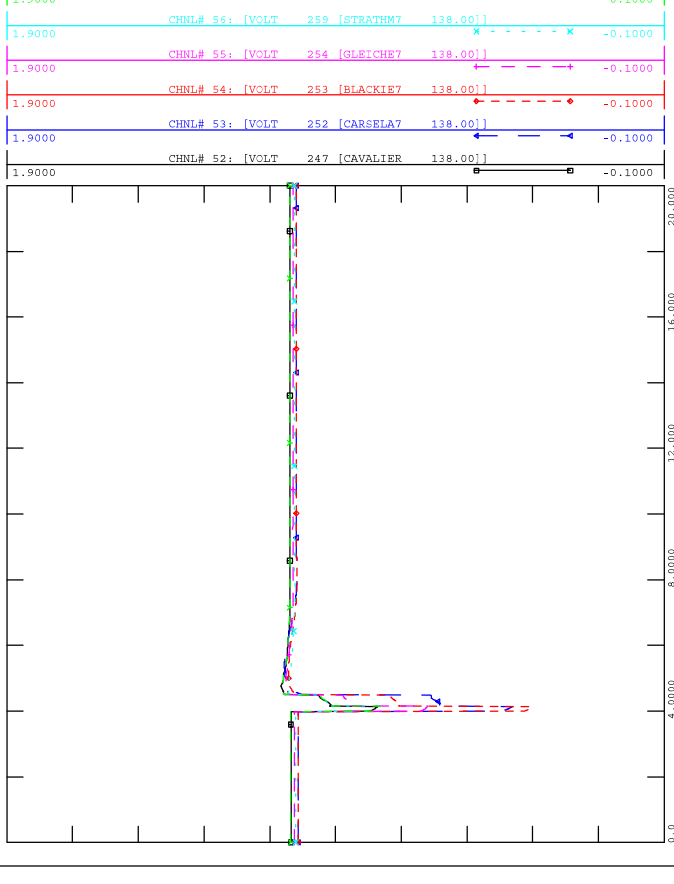
FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE VAR (3)

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_HighRiver_65S.out



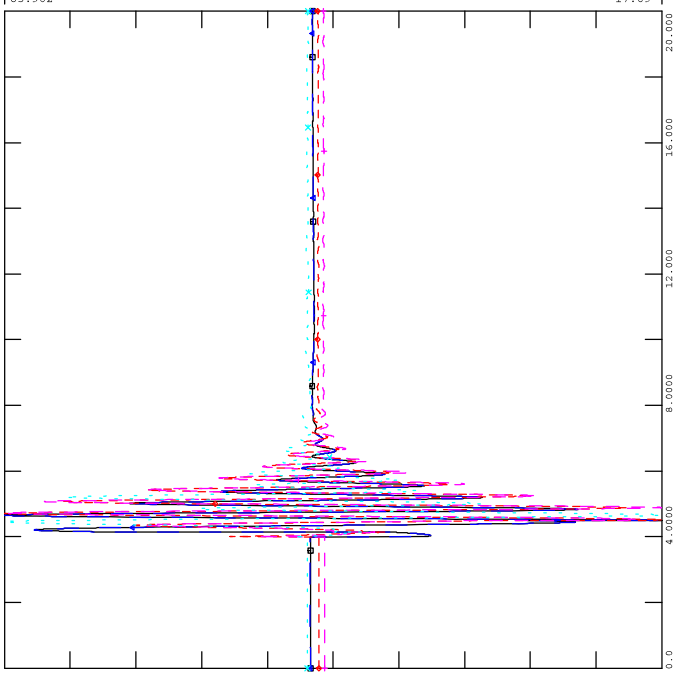
MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04
MACHINE POWER (1)

CHNL# 25: [POWR 4247[CAVAL B 13.800]3]*100 — 24.521 / 7.4143
CHNL# 24: [POWR 4247[CAVAL B 13.800]2]*100 — 50.670 / 24.546
CHNL# 23: [POWR 3247[CAVAL A 13.800]1]*100 — 53.005 / 21.517
CHNL# 22: [POWR 4251[CARSELA1 13.800]1]*100 — 85.606 / -16.74
CHNL# 21: [POWR 3251[CARSELA2 13.800]2]*100 — 85.962 / -17.09

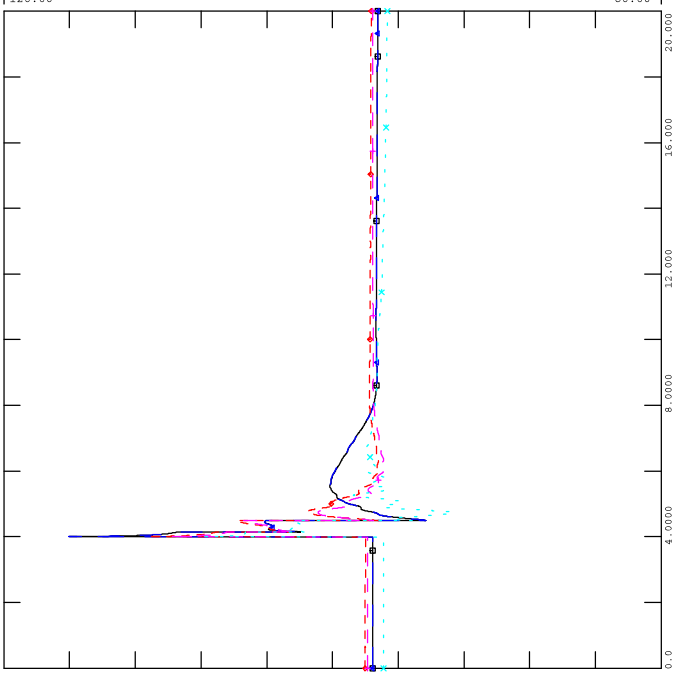


P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04
MACHINE VAR (1)

CHNL# 40: [VARS 4247[CAVAL B 13.800]3]*100 — 30.000 / -20.00
CHNL# 39: [VARS 4247[CAVAL B 13.800]2]*100 — 80.000 / -60.00
CHNL# 38: [VARS 3247[CAVAL A 13.800]1]*100 — 80.000 / -60.00
CHNL# 37: [VARS 4251[CARSELA1 13.800]1]*100 — 120.00 / -80.00
CHNL# 36: [VARS 3251[CARSELA2 13.800]2]*100 — 120.00 / -80.00

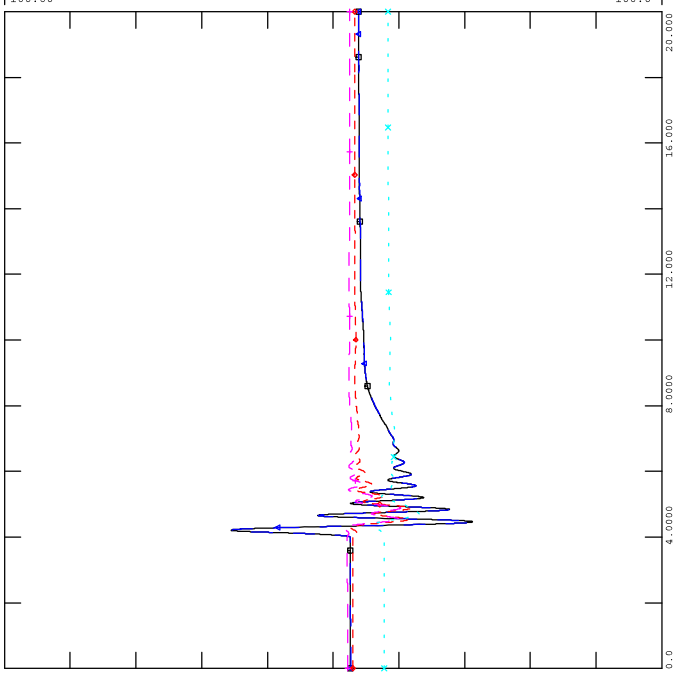


P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04
MACHINE ANGEL

CHNL# 10: [ANGL 4247[CAVAL B 13.800]3] — 100.00 / -100.0
CHNL# 9: [ANGL 4247[CAVAL B 13.800]2] — 100.00 / -100.0
CHNL# 8: [ANGL 3247[CAVAL A 13.800]1] — 100.00 / -100.0
CHNL# 7: [ANGL 4251[CARSELA1 13.800]1] — 100.00 / -100.0
CHNL# 6: [ANGL 3251[CARSELA2 13.800]2] — 100.00 / -100.0

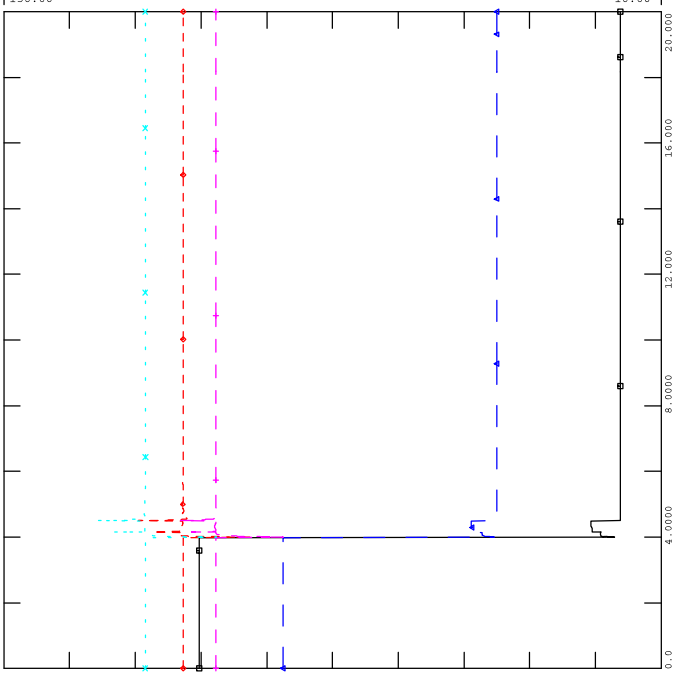


P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out

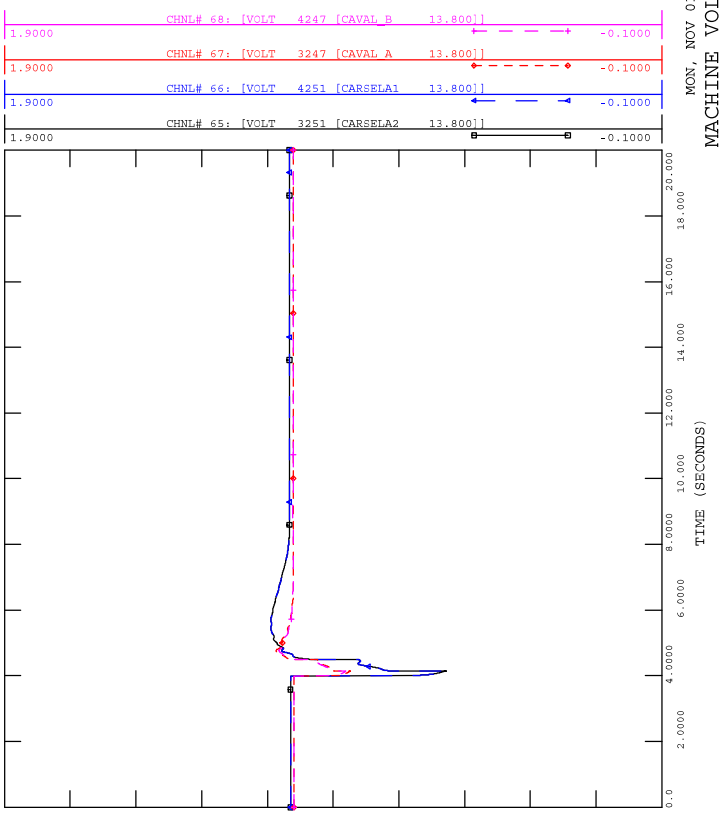
MON, NOV 01 2021 21:04
MACHINE POWER (2)

CHNL# 30: [POWR558259[P2030_PV 0.5500]GX]*100 — 30.000 / -10.00
CHNL# 29: [POWR557259[P2029_PV 0.5500]GX]*100 — 30.000 / -10.00
CHNL# 28: [POWR552340[ESSP-1 0.5500]G1]*100 — 30.000 / -10.00
CHNL# 27: [POWR563240[TCE_BESS 0.6900]1]*100 — 15.000 / -5.000
CHNL# 26: [POWR562240[TEC_SOLR 0.6900]1]*100 — 150.00 / -10.00



P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

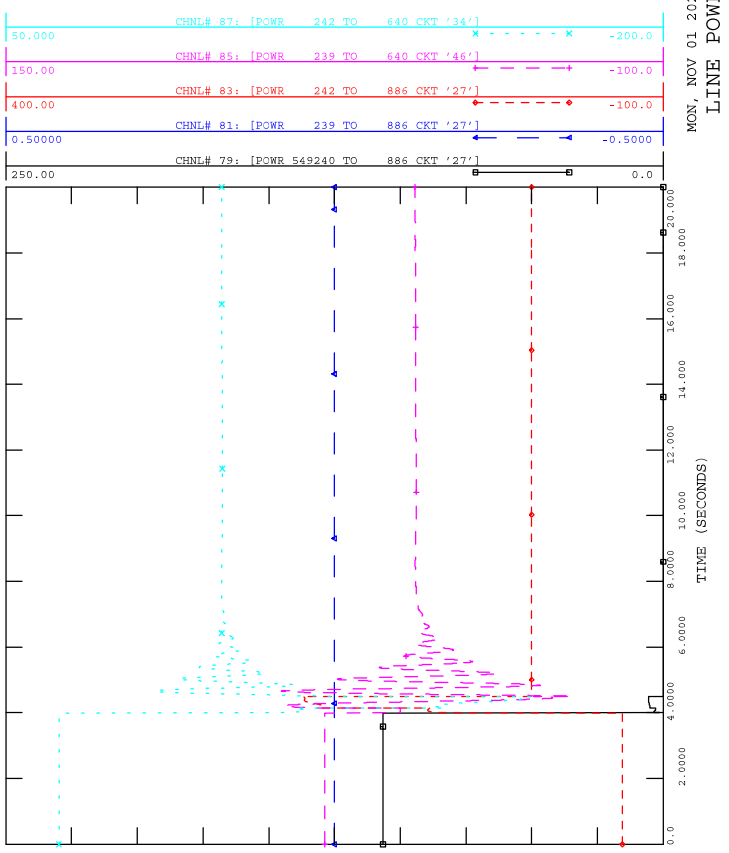
FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
MACHINE VOLTAGE (1)

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

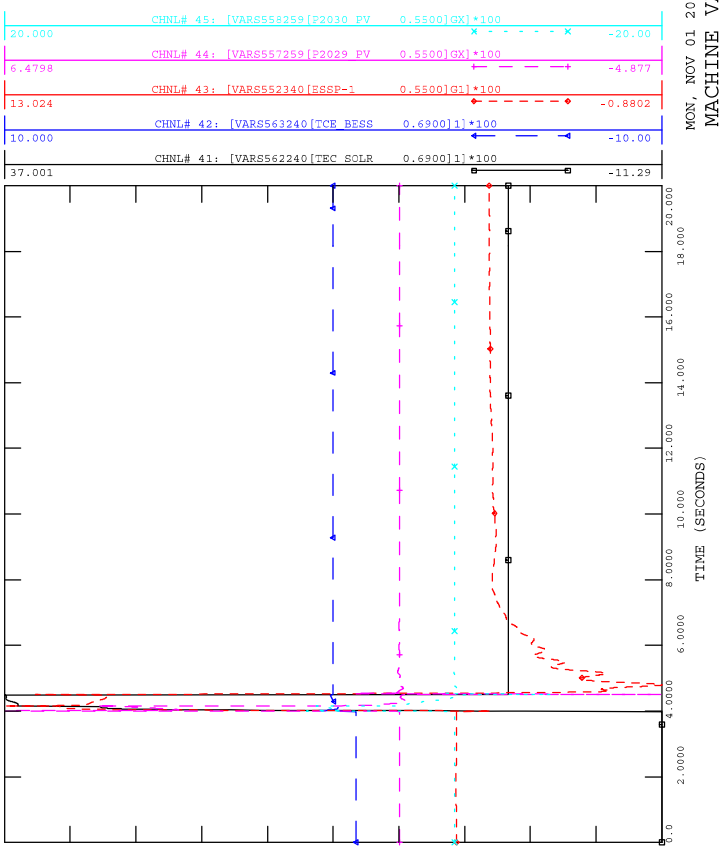
FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
LINE POWER (1)

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

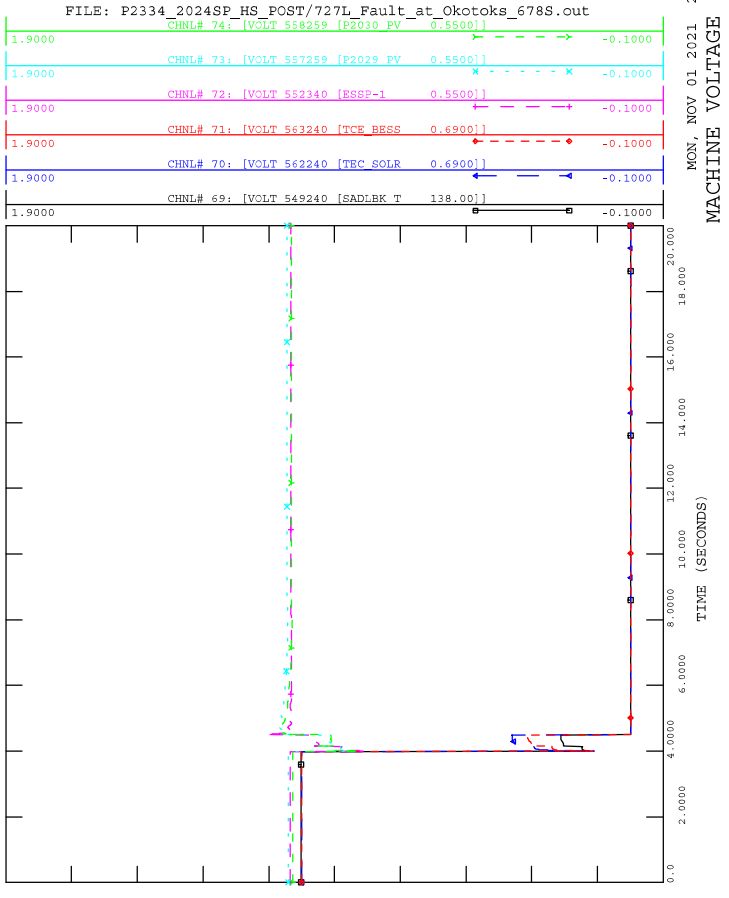
FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
MACHINE VAR (2)

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out

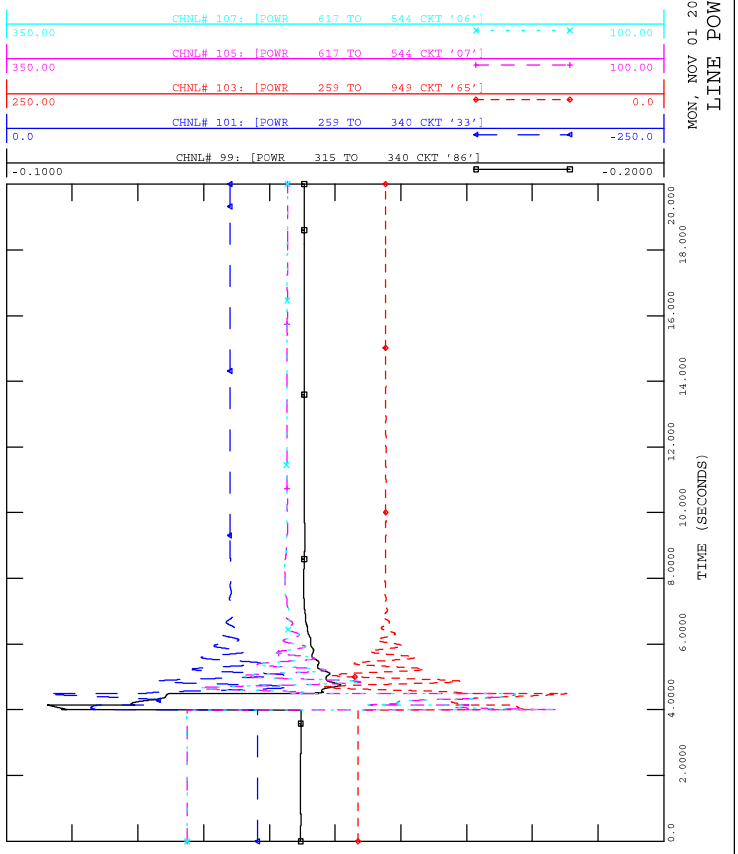


MON, NOV 01 2021 21:04
MACHINE VOLTAGE (2)

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out

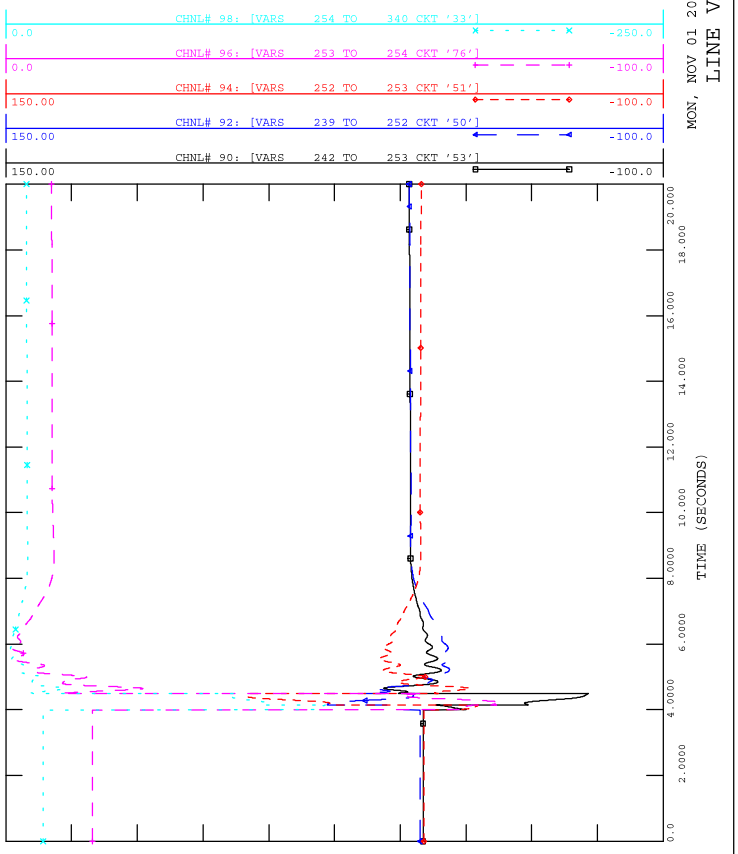
MON, NOV 01 2021 21:04
LINE POWER (3)



P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out

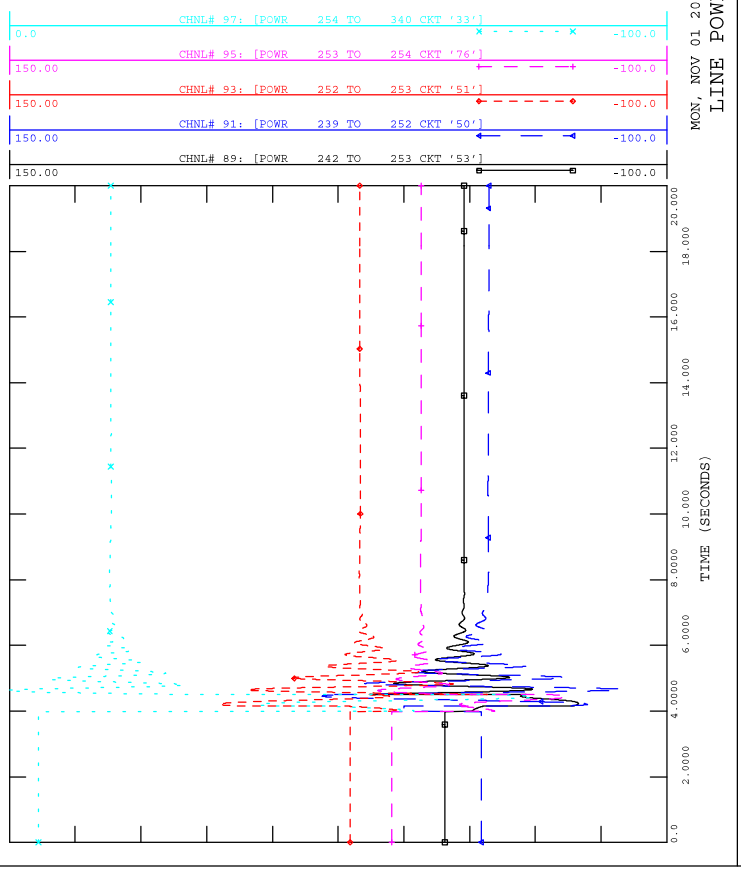
MON, NOV 01 2021 21:04
LINE VAR (2)



P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out

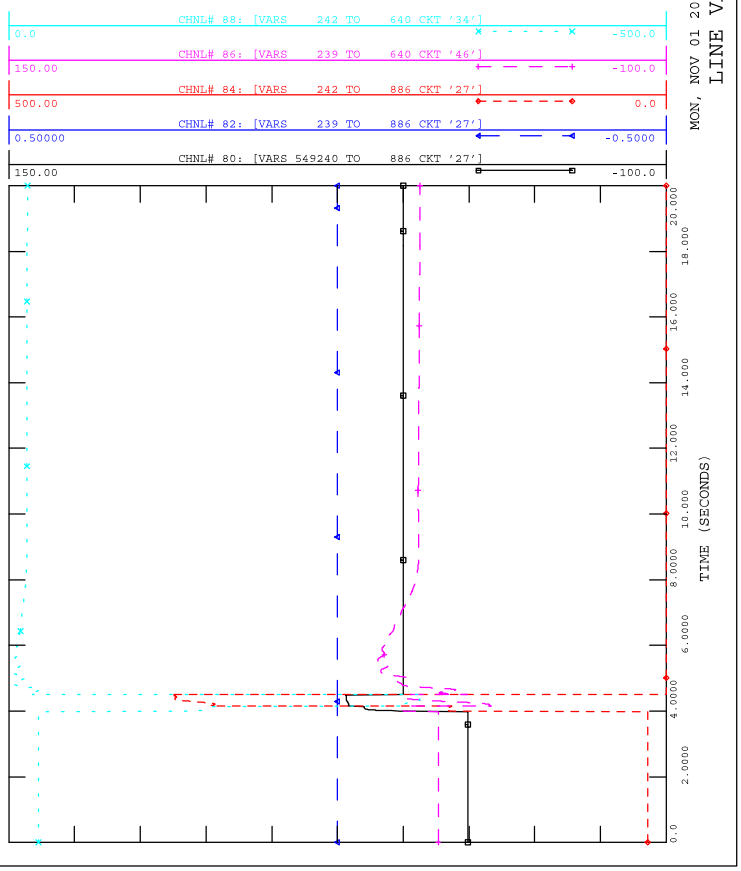
MON, NOV 01 2021 21:04
LINE POWER (2)



P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

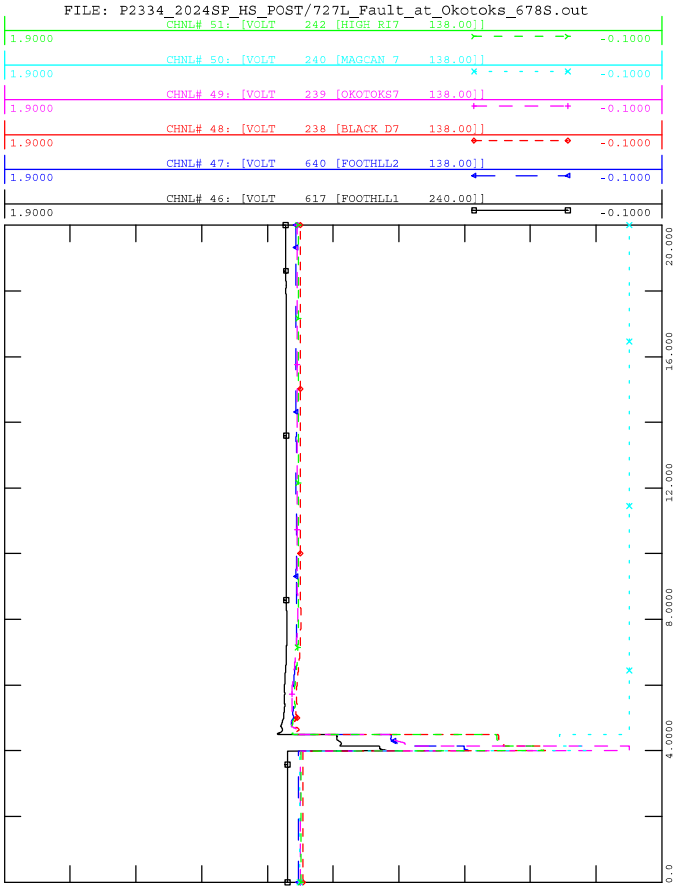
FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04
LINE VAR (1)



P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

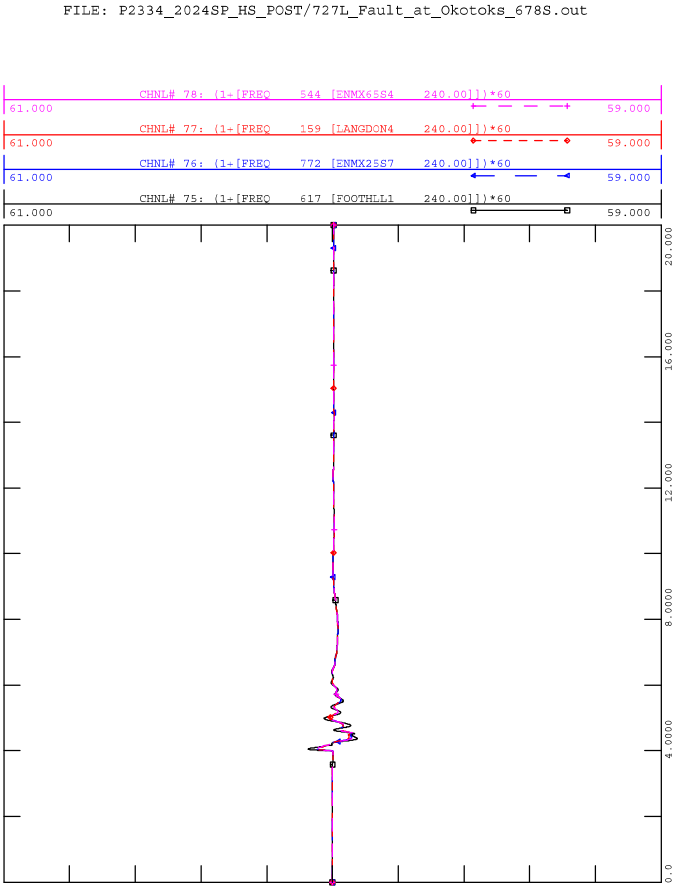
FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

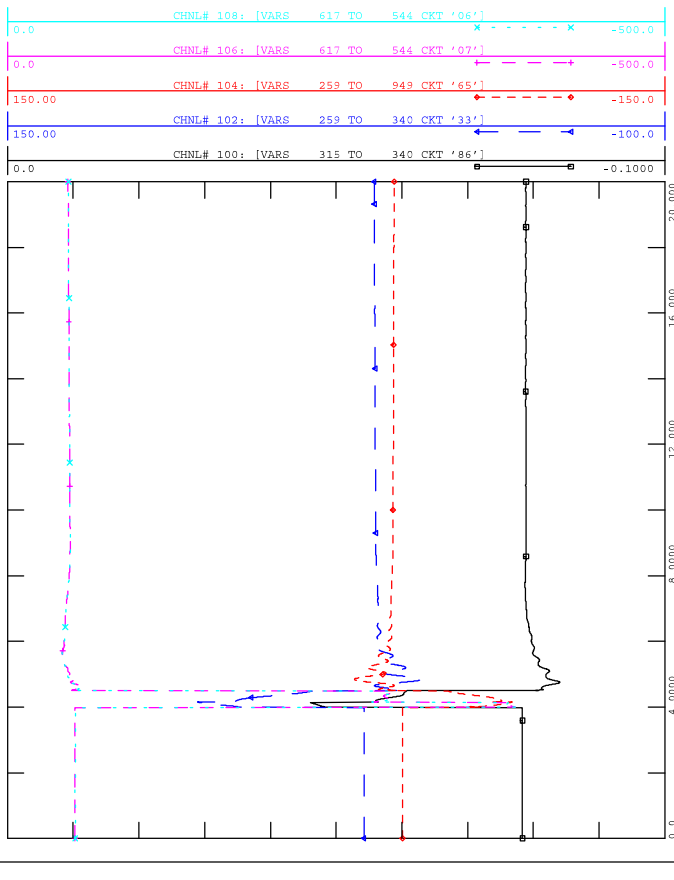
FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
FREQUENCY

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

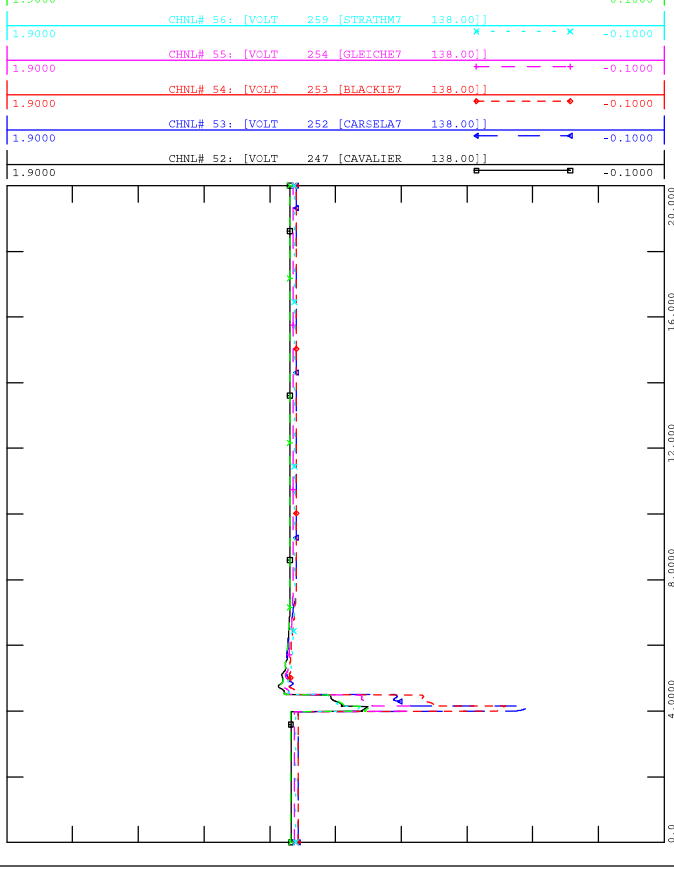
FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
LINE VAR (3)

P2334_2024SP_HS_POST
CATB -727L_FAULT_AT_OKOTOKS_678S

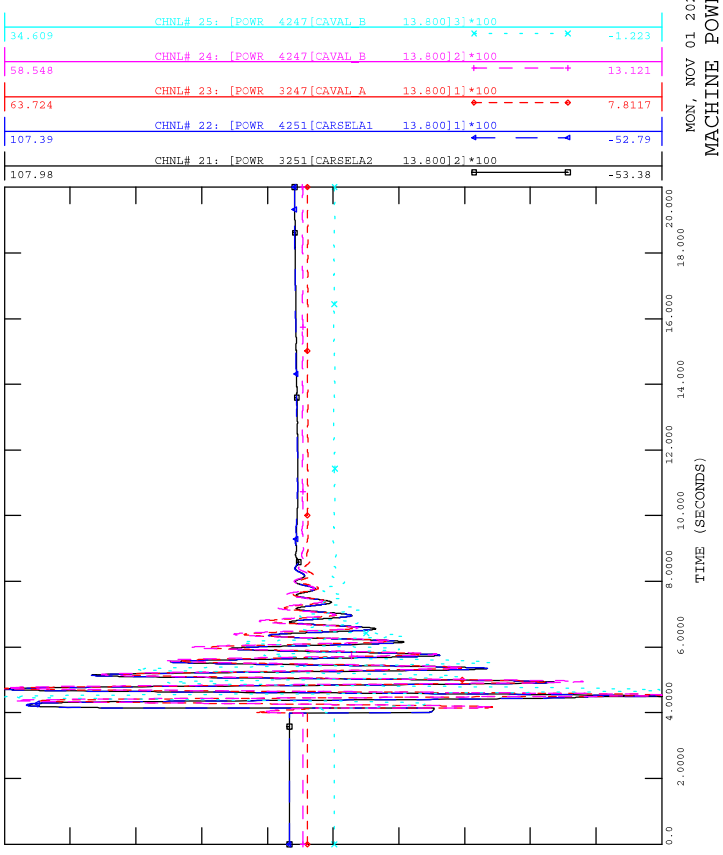
FILE: P2334_2024SP_HS_POST/727L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

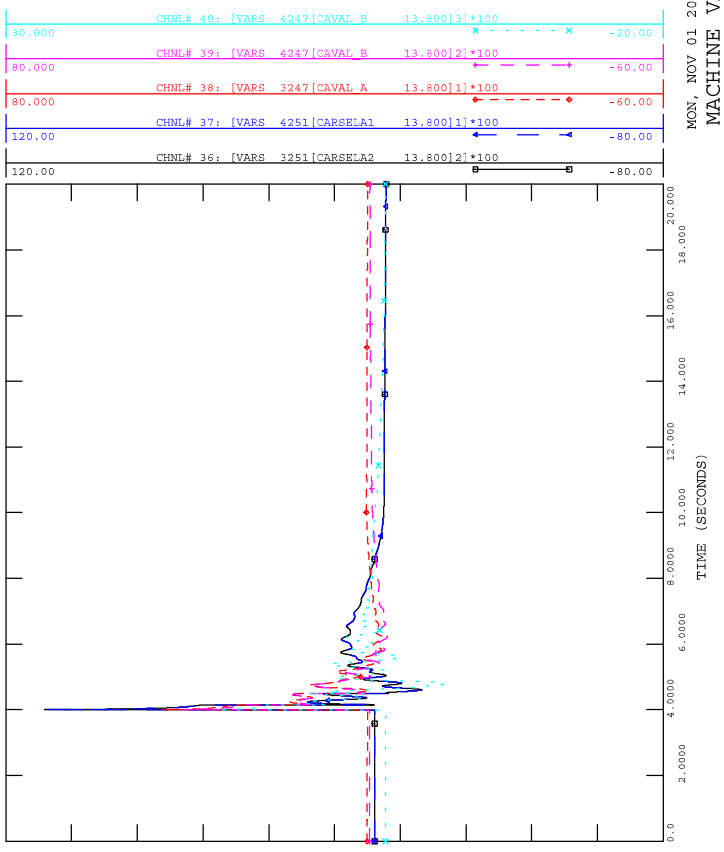
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out



MON, NOV 01 2021 21:04
MACHINE POWER (1)

P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

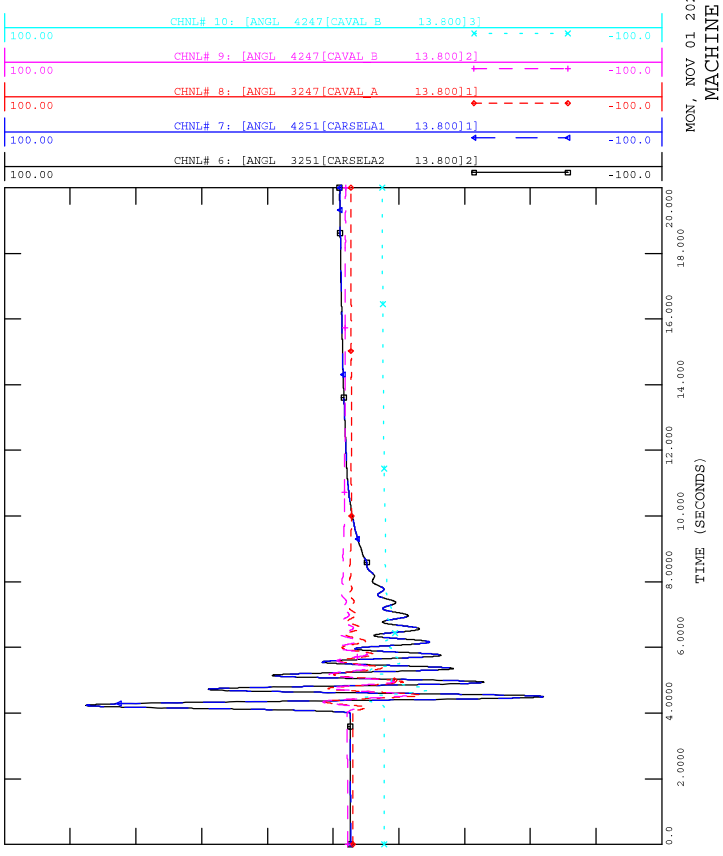
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out



MON, NOV 01 2021 21:04
MACHINE VAR (1)

P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

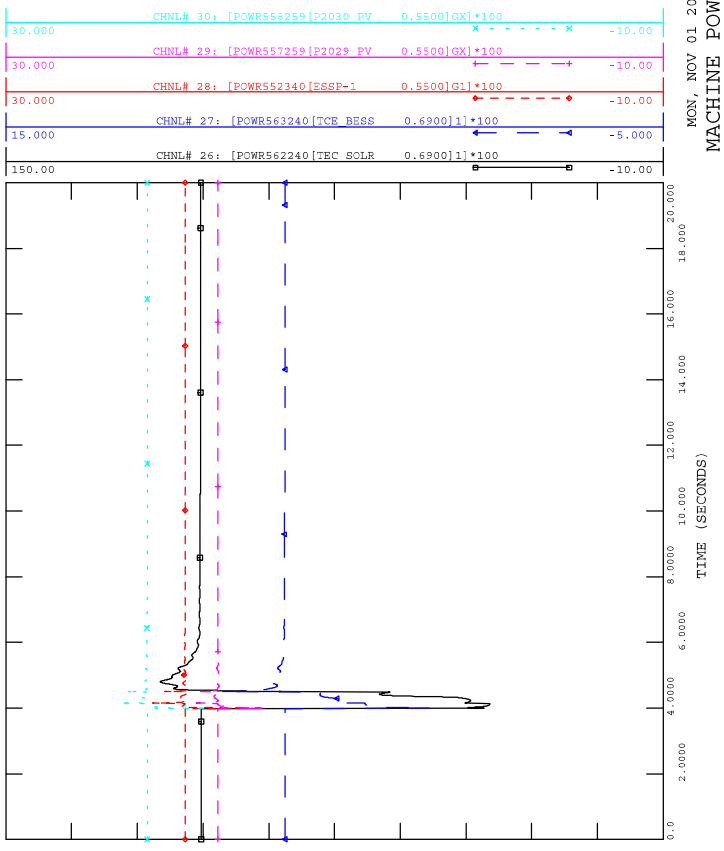
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out



MON, NOV 01 2021 21:04
MACHINE ANGEL

P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out

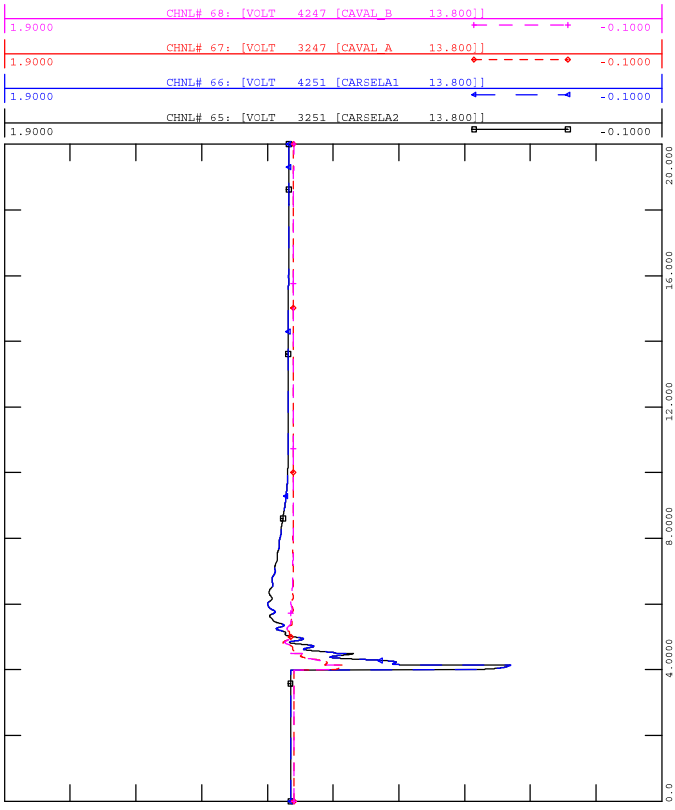


MON, NOV 01 2021 21:04
MACHINE POWER (2)

P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out

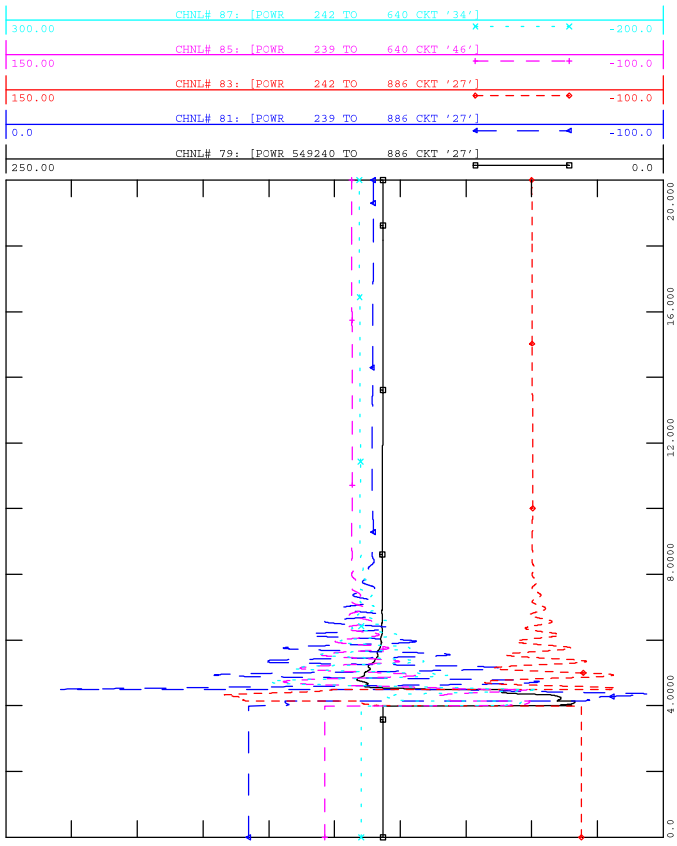
MON, NOV 01 2021 21:04
MACHINE VOLTAGE (1)



P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out

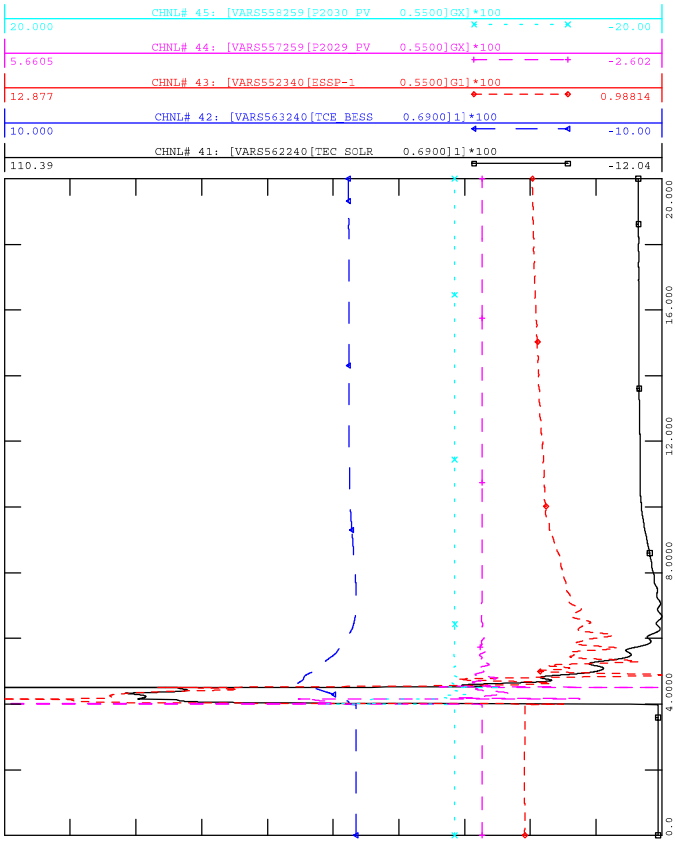
MON, NOV 01 2021 21:04
LINE POWER (1)



P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out

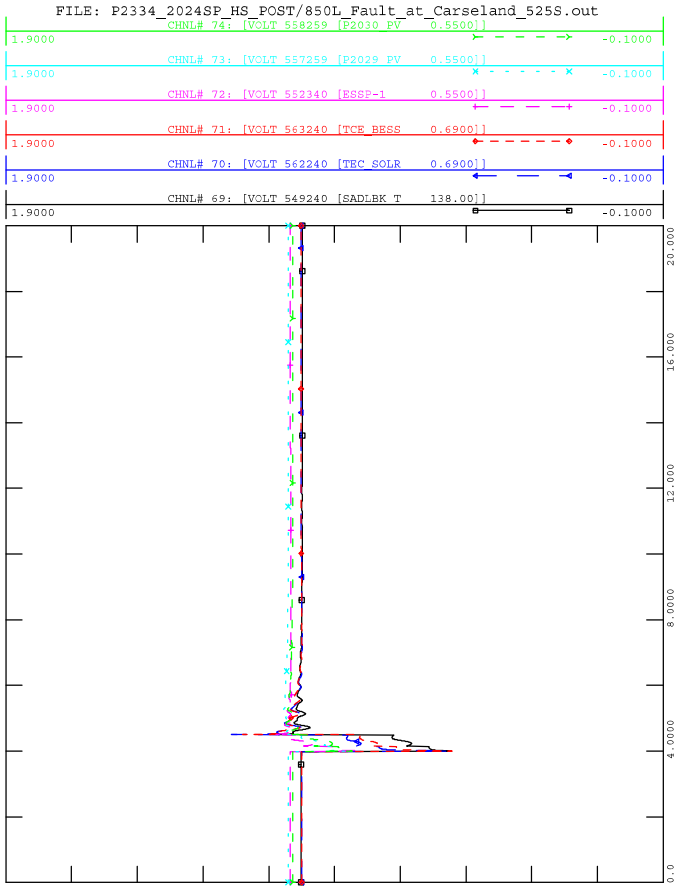
MON, NOV 01 2021 21:04
MACHINE VAR (2)



P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out

MON, NOV 01 2021 21:04
MACHINE VOLTAGE (2)

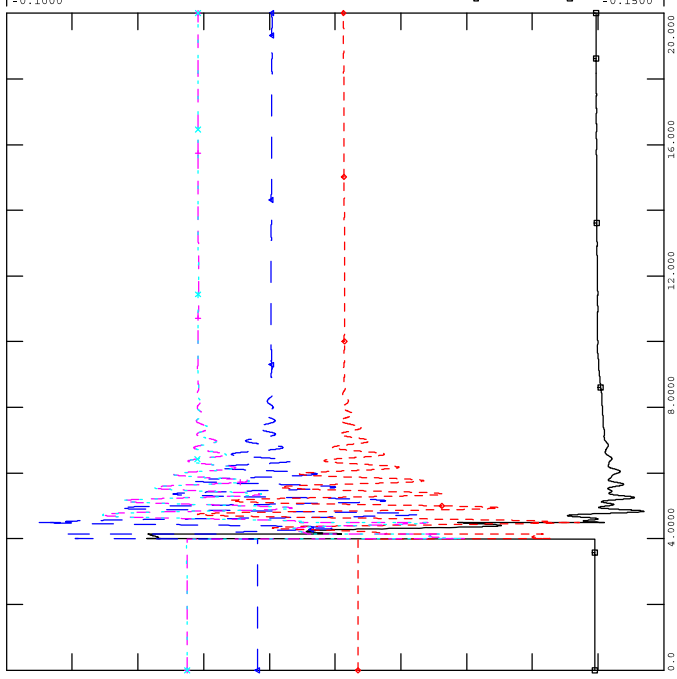


P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out

MON, NOV 01 2021 21:04
LINE POWER (3)

CHNL# 107: [POWR 617 TO 544 CKT '06'] 350.00 / 100.00
CHNL# 105: [POWR 617 TO 544 CKT '07'] 350.00 / 100.00
CHNL# 103: [POWR 259 TO 949 CKT '65'] 250.00 / 0.0
CHNL# 101: [POWR 259 TO 340 CKT '33'] 0.0 / -250.0
CHNL# 99: [POWR 315 TO 340 CKT '86'] -0.1000 / -0.1500

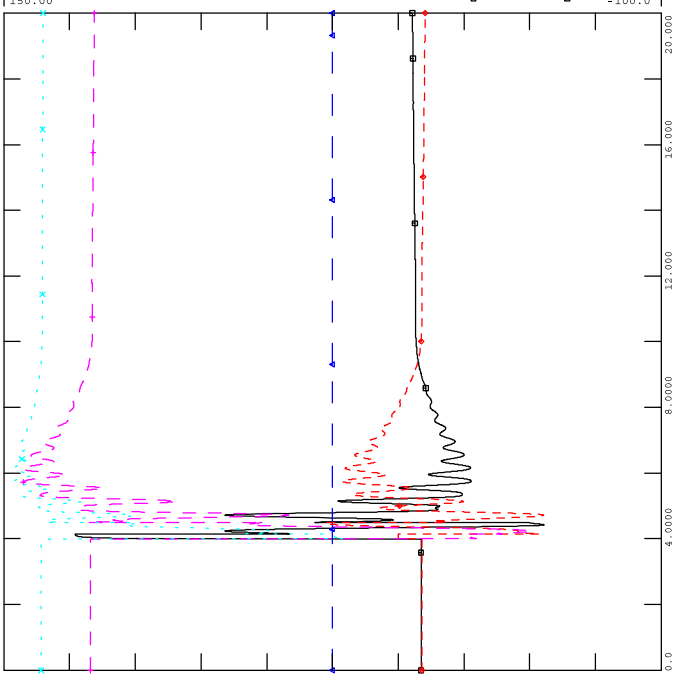


P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out

MON, NOV 01 2021 21:04
LINE VAR (2)

CHNL# 98: [VARS 254 TO 340 CKT '33'] 0.0 / -250.0
CHNL# 96: [VARS 253 TO 254 CKT '76'] 0.0 / -100.0
CHNL# 94: [VARS 252 TO 253 CKT '51'] 150.00 / -100.0
CHNL# 92: [VARS 239 TO 252 CKT '50'] 0.50000 / -0.5000
CHNL# 90: [VARS 242 TO 253 CKT '53'] 150.00 / -100.0

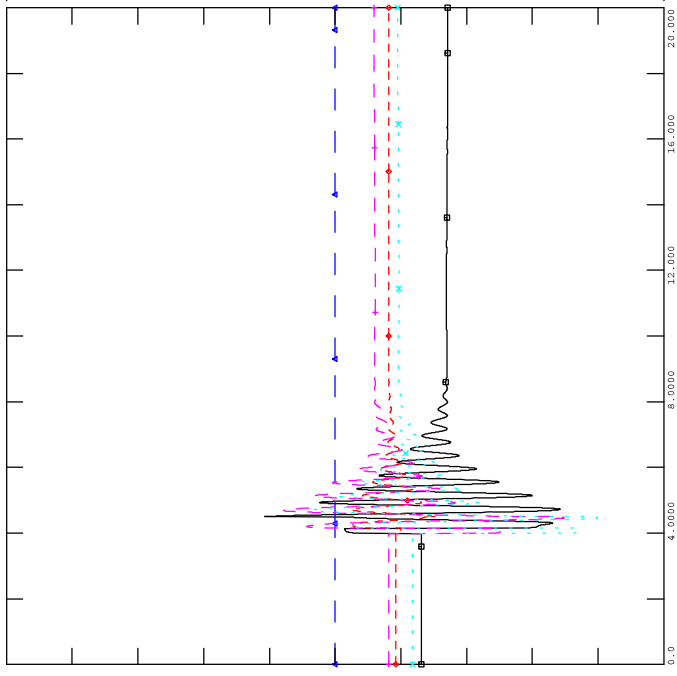


P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out

MON, NOV 01 2021 21:04
LINE POWER (2)

CHNL# 97: [POWR 254 TO 340 CKT '33'] 150.00 / -100.0
CHNL# 95: [POWR 253 TO 254 CKT '76'] 150.00 / -100.0
CHNL# 93: [POWR 252 TO 253 CKT '51'] 1500.0 / -1000.
CHNL# 91: [POWR 239 TO 252 CKT '50'] 0.50000 / -0.5000
CHNL# 89: [POWR 242 TO 253 CKT '53'] 300.00 / -200.0

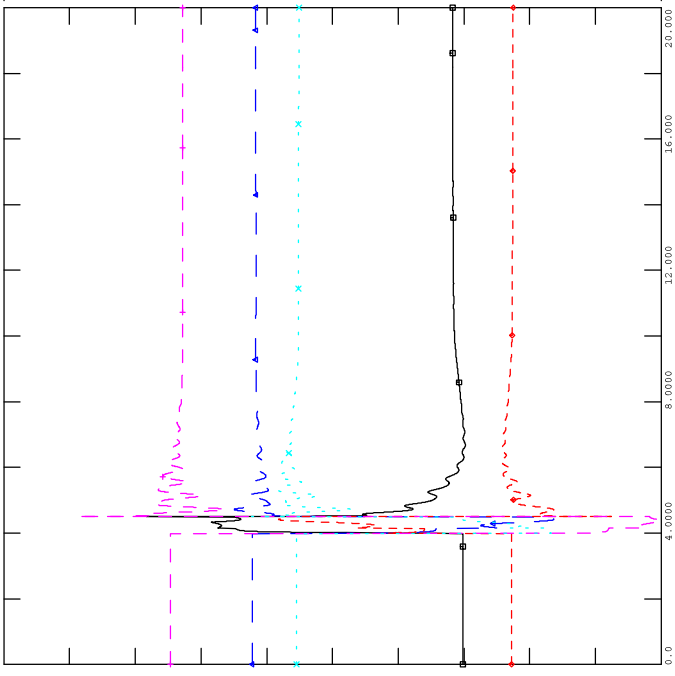


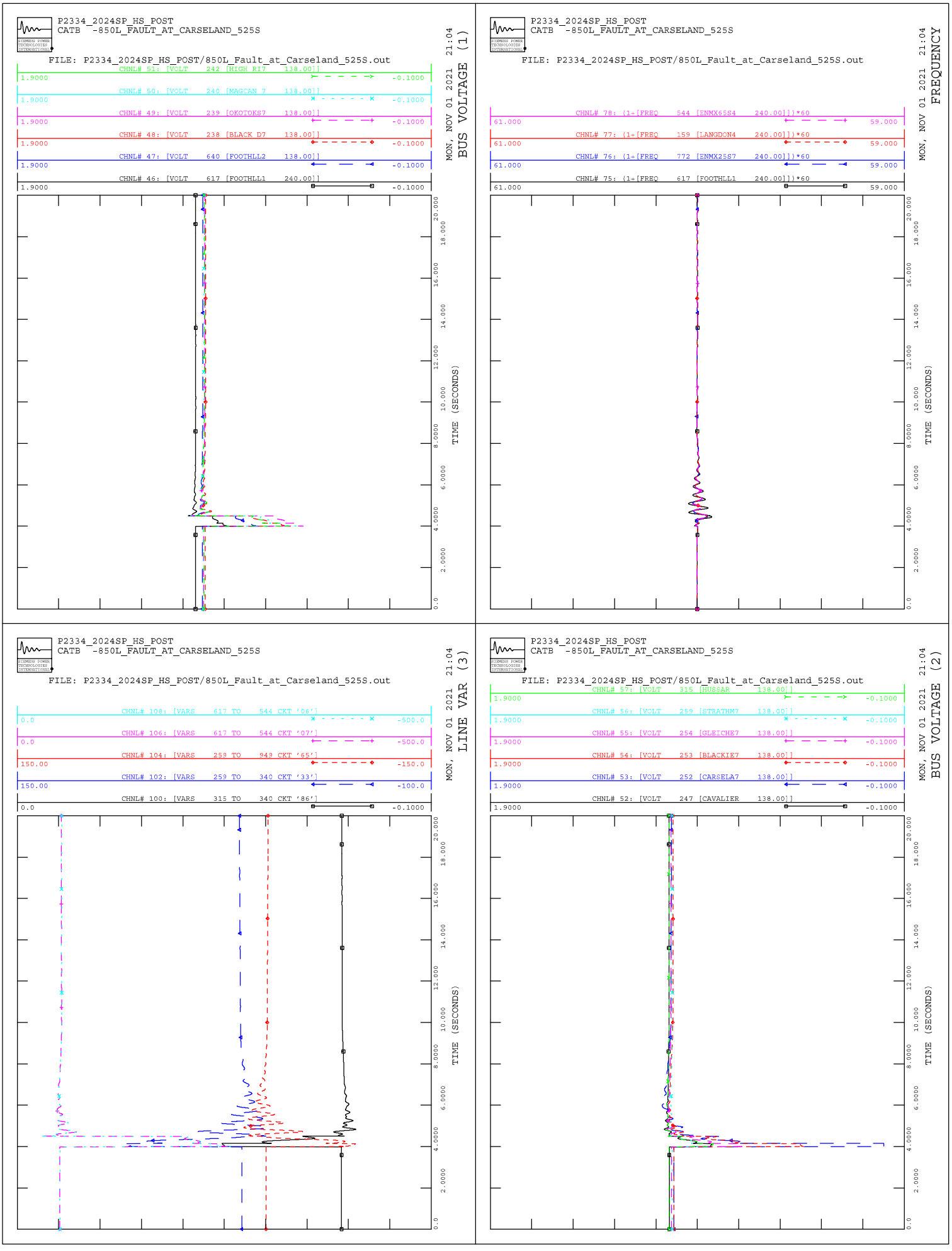
P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out

MON, NOV 01 2021 21:04
LINE VAR (1)

CHNL# 88: [VARS 242 TO 640 CKT '34'] 200.00 / -300.0
CHNL# 86: [VARS 239 TO 640 CKT '46'] 50.000 / -200.0
CHNL# 84: [VARS 242 TO 886 CKT '27'] 400.00 / -100.0
CHNL# 82: [VARS 239 TO 886 CKT '27'] 200.00 / -300.0
CHNL# 80: [VARS 549240 TO 886 CKT '27'] 150.00 / -100.0



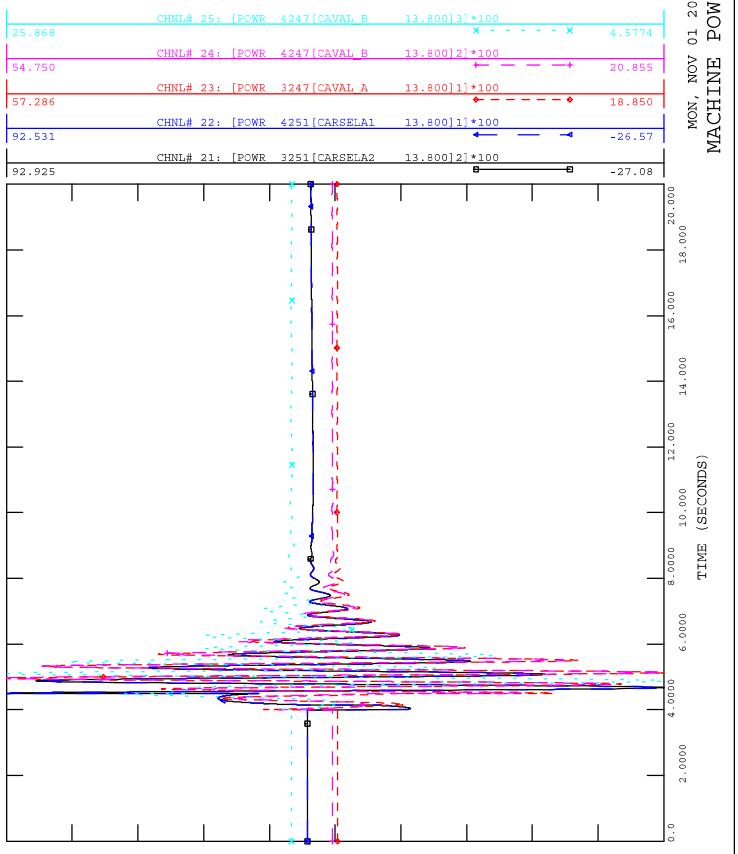

P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out
CHNL# 51: [VOLT 242 [HIGH RI7 138.00]]
CHNL# 50: [VOLT 240 [MAGCAN 7 138.00]]
CHNL# 49: [VOLT 239 [OKOTOKS7 138.00]]
CHNL# 48: [VOLT 238 [BLACK D7 138.00]]
CHNL# 47: [VOLT 640 [FOOTHLL2 138.00]]
CHNL# 46: [VOLT 617 [FOOTHLL1 240.00]]
1.9000
-0.1000
MON, NOV 01 2021 21:04
BUS VOLTAGE (1)
TIME (SECONDS)
0.0
2.0000
4.0000
6.0000
8.0000
10.000
12.000
14.000
16.000
18.000
20.000
P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out
CHNL# 78: (1+[FREQ 544 [ENMX65S4 240.00]])*60
CHNL# 77: (1+[FREQ 159 [LANGDON4 240.00]])*60
CHNL# 76: (1+[FREQ 772 [ENMX25S7 240.00]])*60
CHNL# 75: (1+[FREQ 617 [FOOTHLL1 240.00]])*60
61.000
59.000
MON, NOV 01 2021 21:04
FREQUENCY
TIME (SECONDS)
P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out
CHNL# 108: [VARS 617 TO 544 CKT '06']
CHNL# 106: [VARS 617 TO 544 CKT '07']
CHNL# 104: [VARS 259 TO 949 CKT '65']
CHNL# 102: [VARS 259 TO 340 CKT '33']
CHNL# 100: [VARS 315 TO 340 CKT '86']
0.0
150.00
-500.0
-150.0
-100.0
MON, NOV 01 2021 21:04
LINE VAR (3)
TIME (SECONDS)
P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_CARSELAND_525S
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Carseland_525S.out
CHNL# 57: [VOLT 315 [HUSSAR 138.00]]
CHNL# 56: [VOLT 259 [STRATHM7 138.00]]
CHNL# 55: [VOLT 254 [GLEICHE7 138.00]]
CHNL# 54: [VOLT 253 [BLACKIE7 138.00]]
CHNL# 53: [VOLT 252 [CARSELA7 138.00]]
CHNL# 52: [VOLT 247 [CAVALIER 138.00]]
MON, NOV 01 2021 21:04
BUS VOLTAGE (2)
TIME (SECONDS)

P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

MACHINE POWER (1)

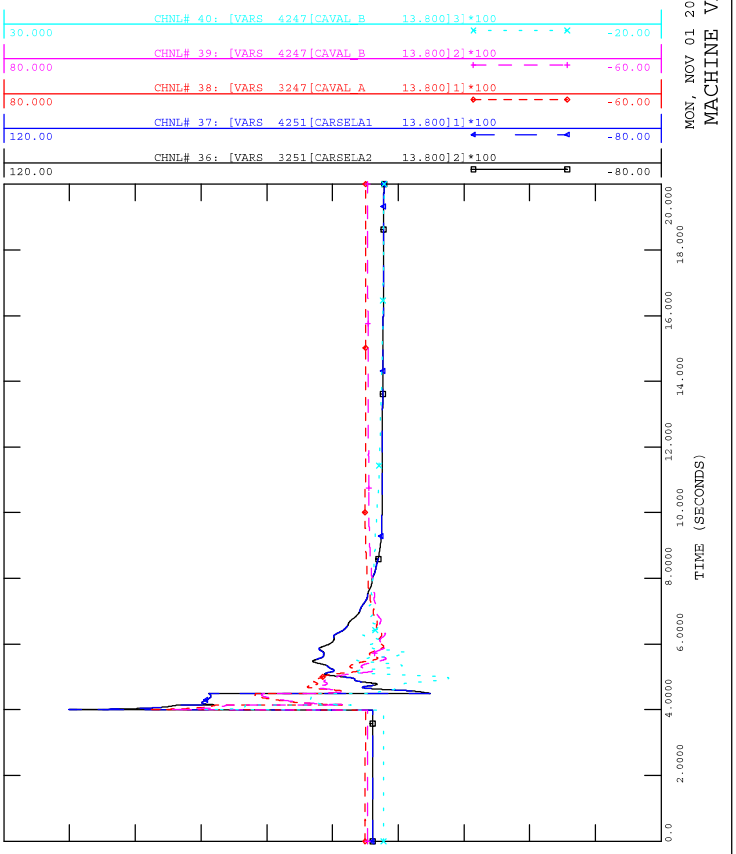


P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

MACHINE VAR (1)

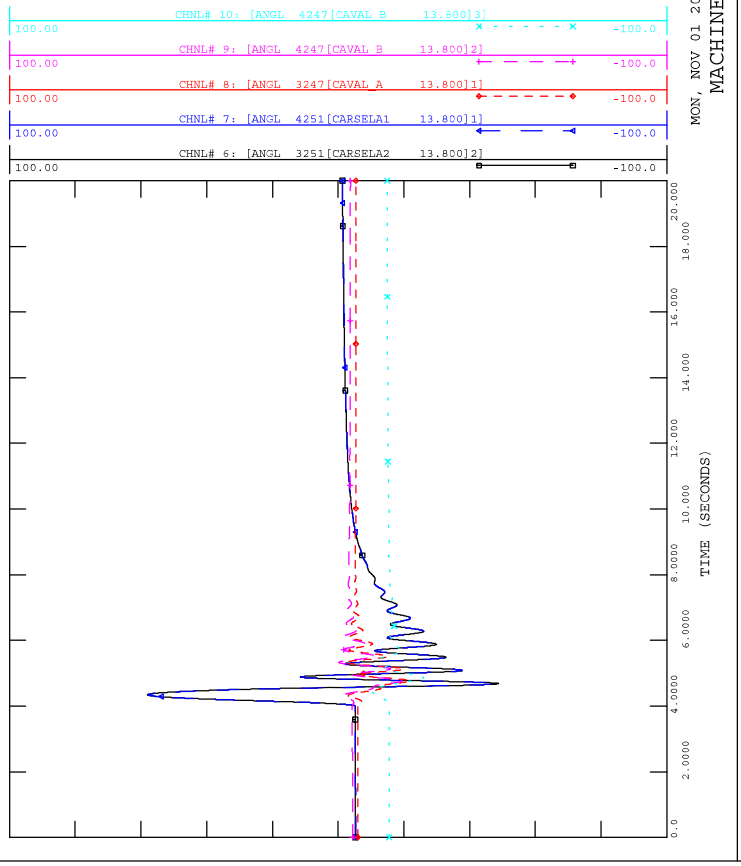


P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out

MON, NOV 01 2021 21:04

MACHINE ANGEL

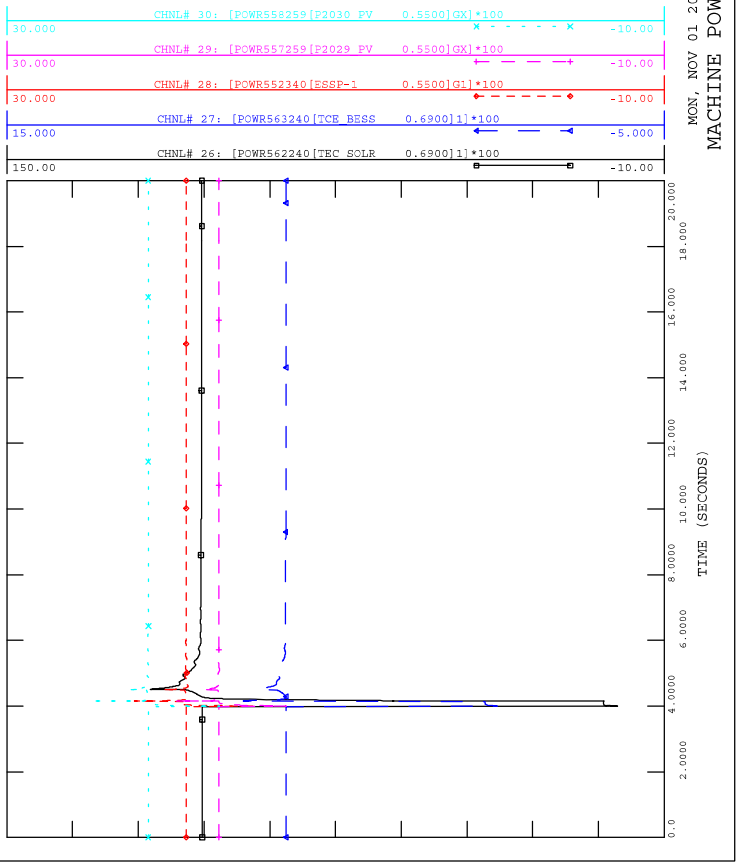


P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out

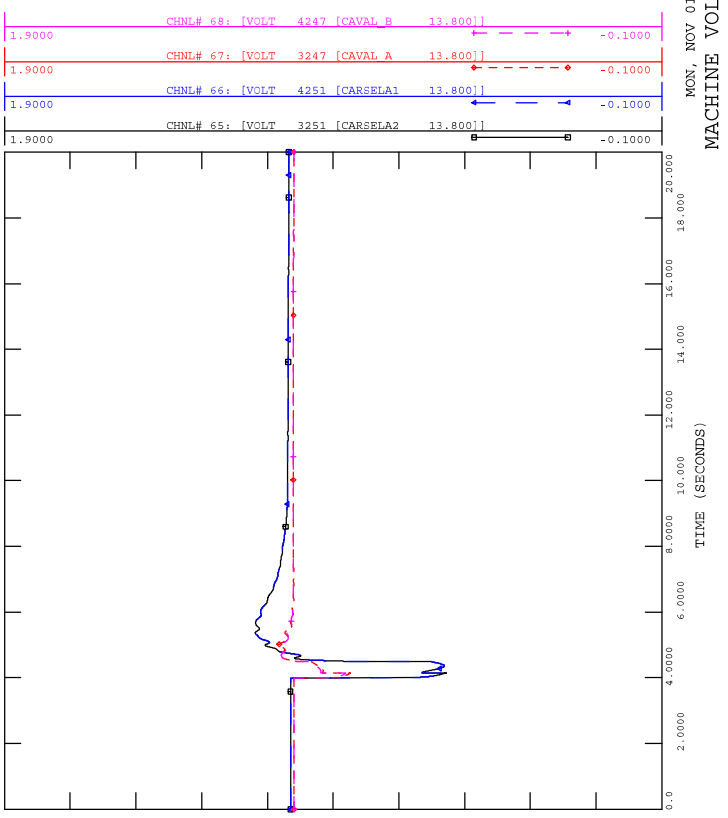
MON, NOV 01 2021 21:04

MACHINE POWER (2)



P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

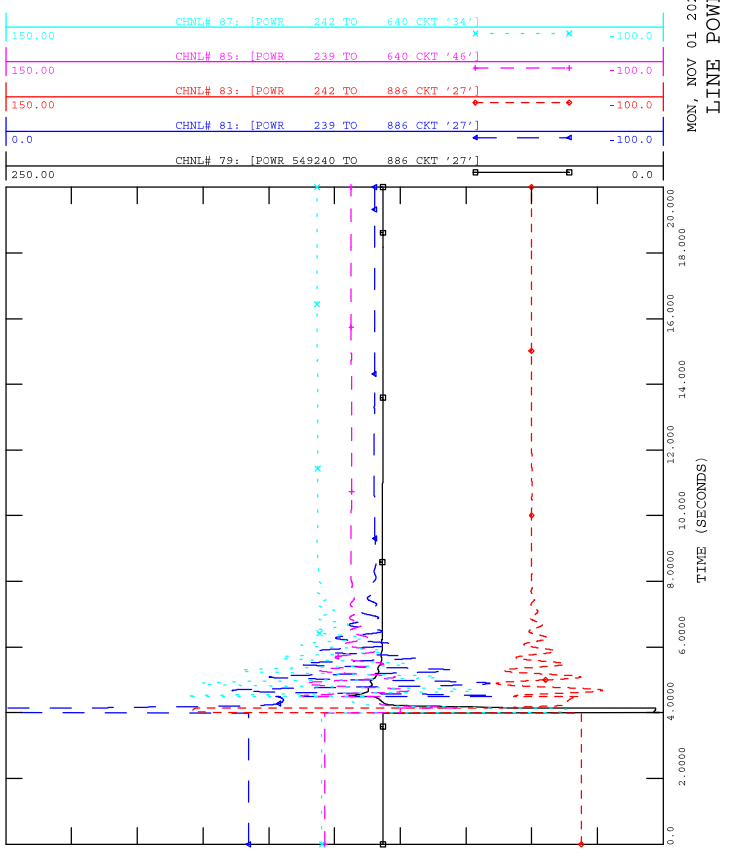
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
MACHINE VOLTAGE (1)

P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

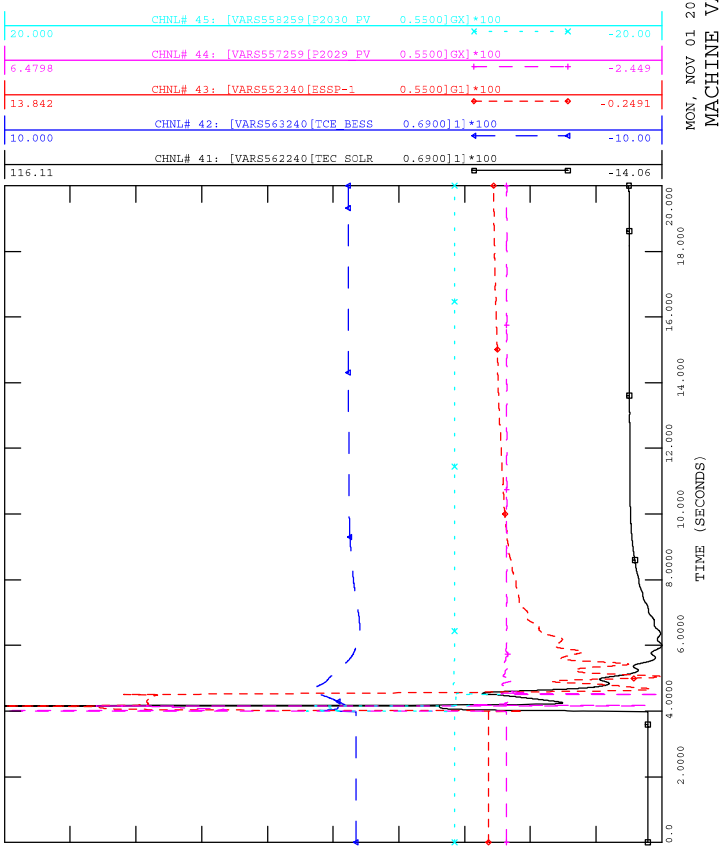
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
LINE POWER (1)

P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

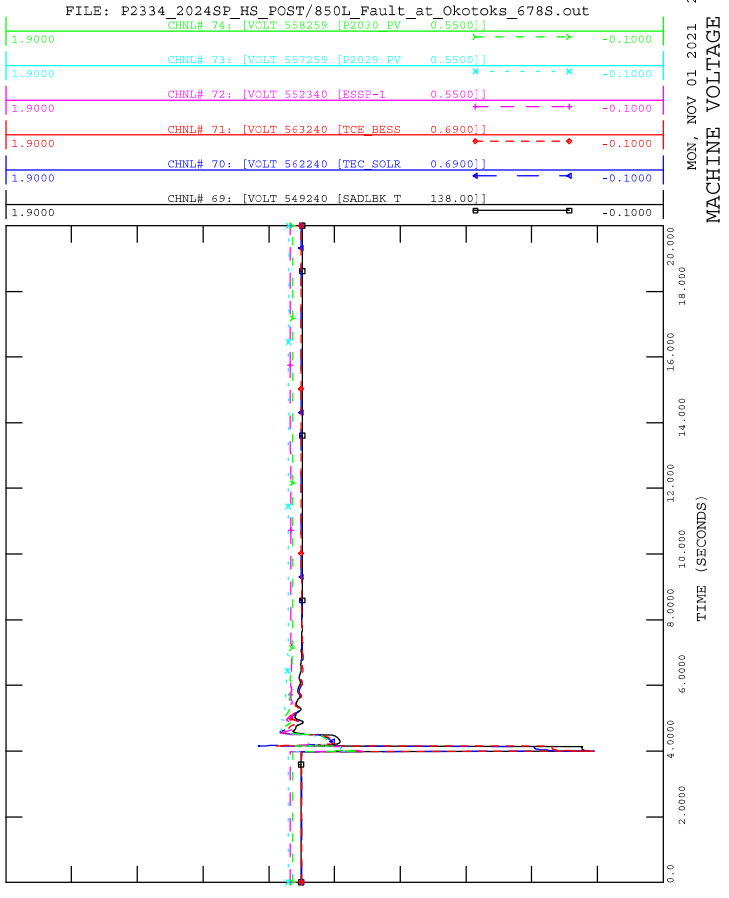
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out



MON, NOV 01 2021 21:04
MACHINE VAR (2)

P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out

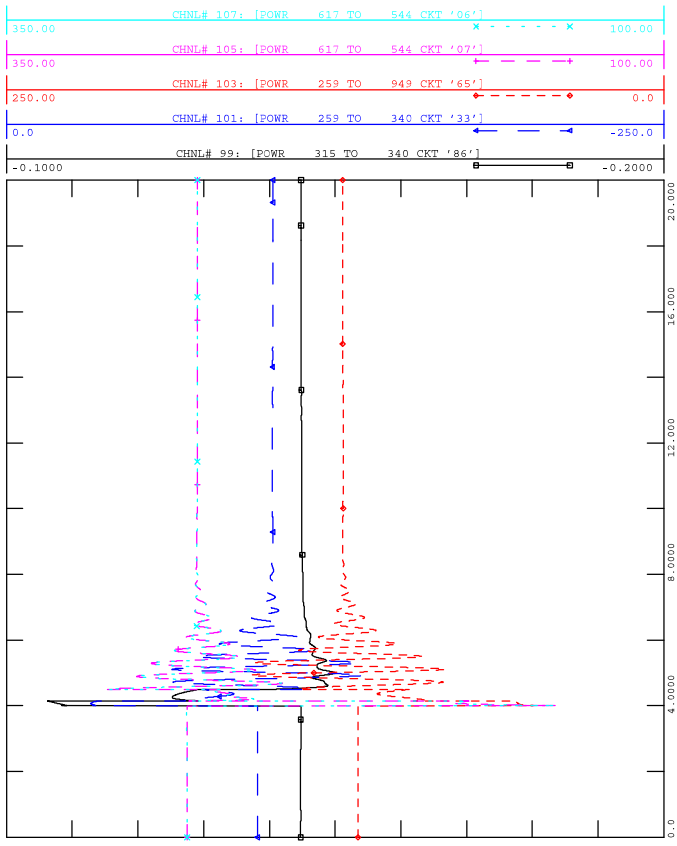


MON, NOV 01 2021 21:04
MACHINE VOLTAGE (2)

P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out

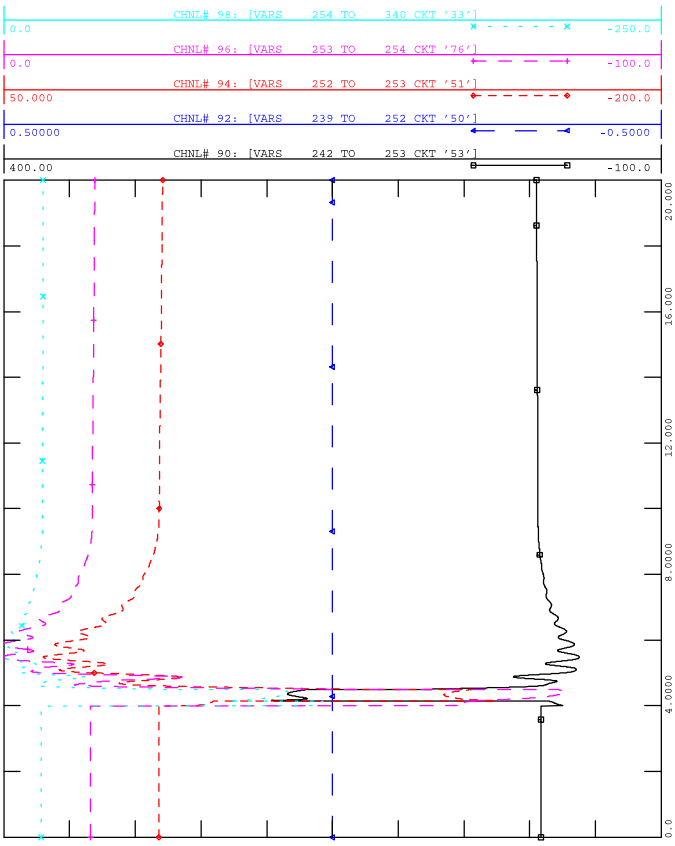
MON, NOV 01 2021 21:04
LINE POWER (3)



P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out

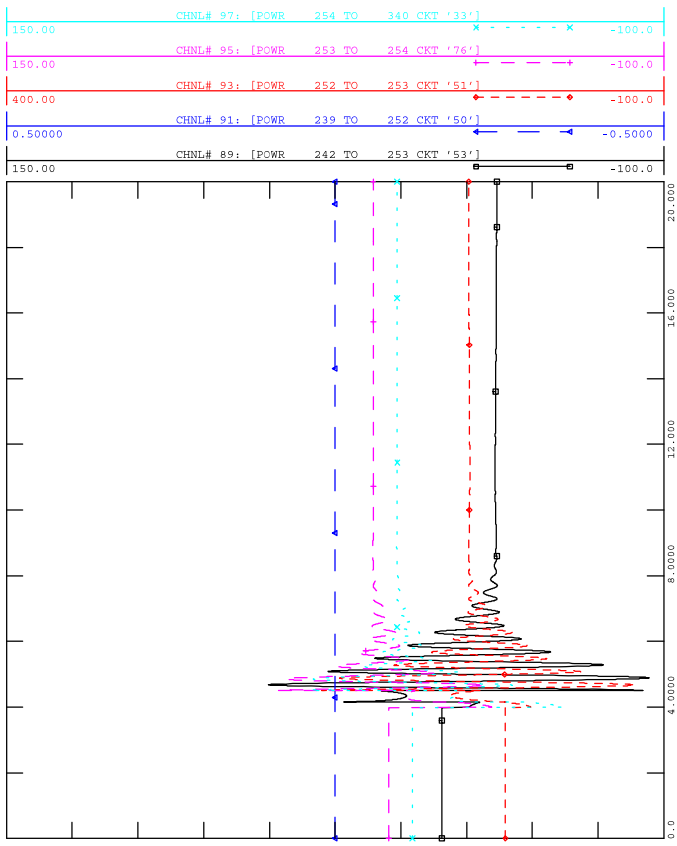
MON, NOV 01 2021 21:04
LINE VAR (2)



P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out

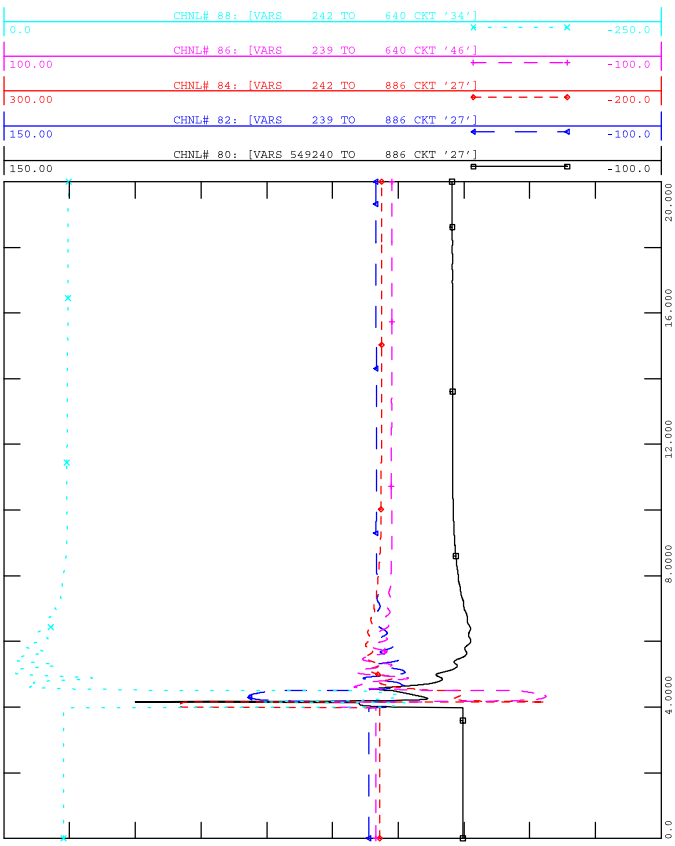
MON, NOV 01 2021 21:04
LINE POWER (2)

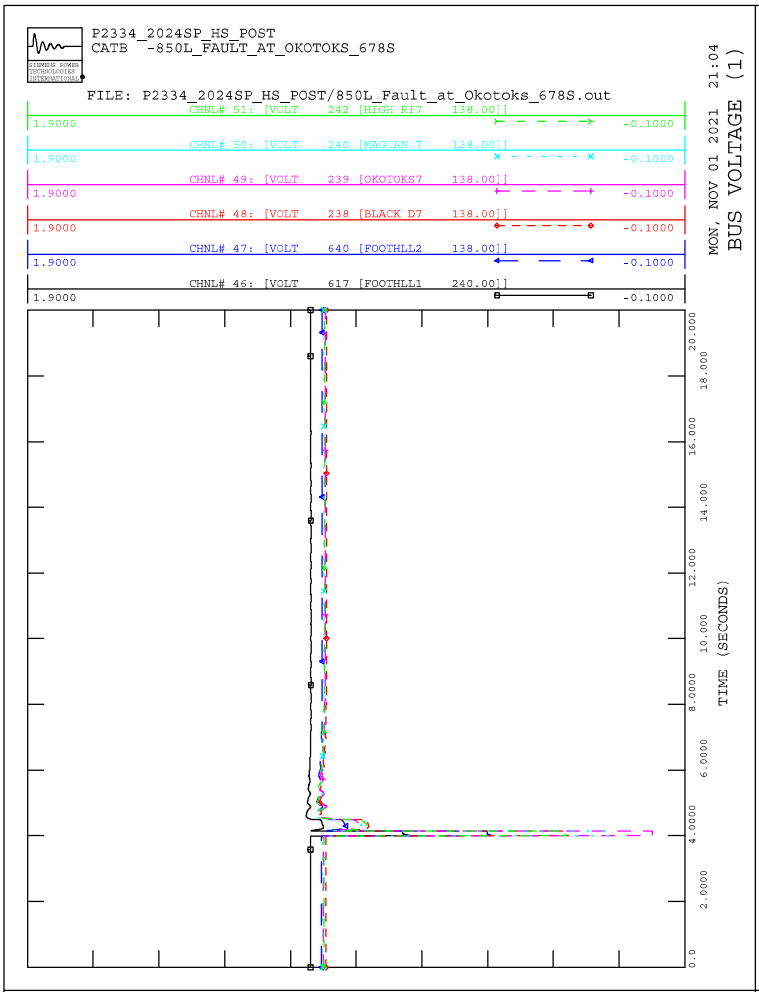


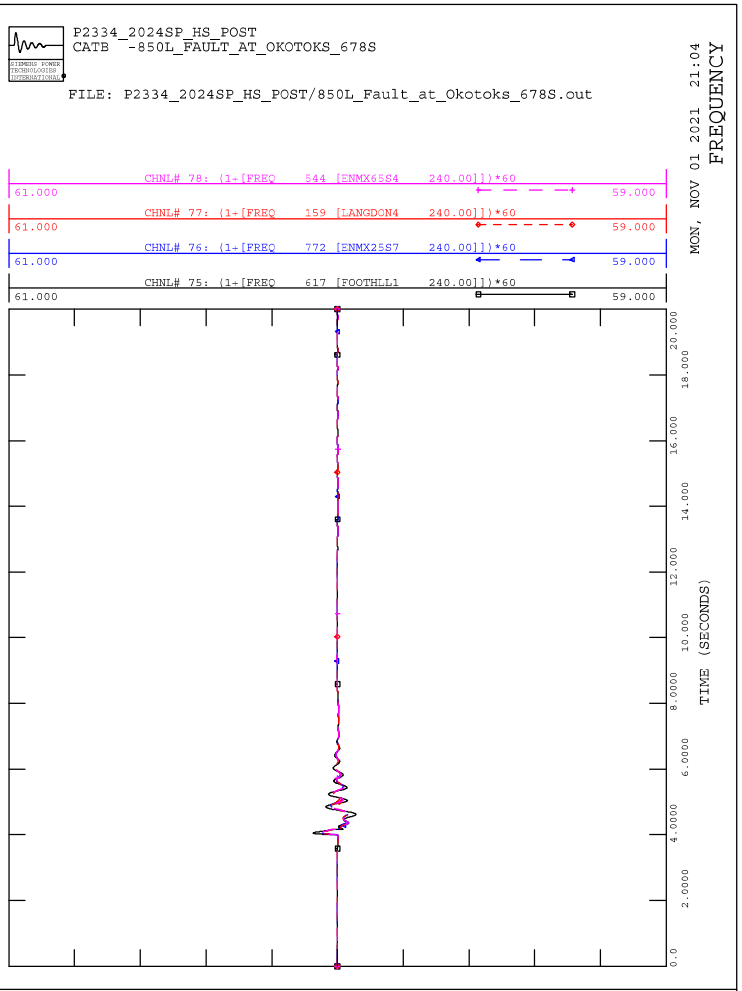
P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S

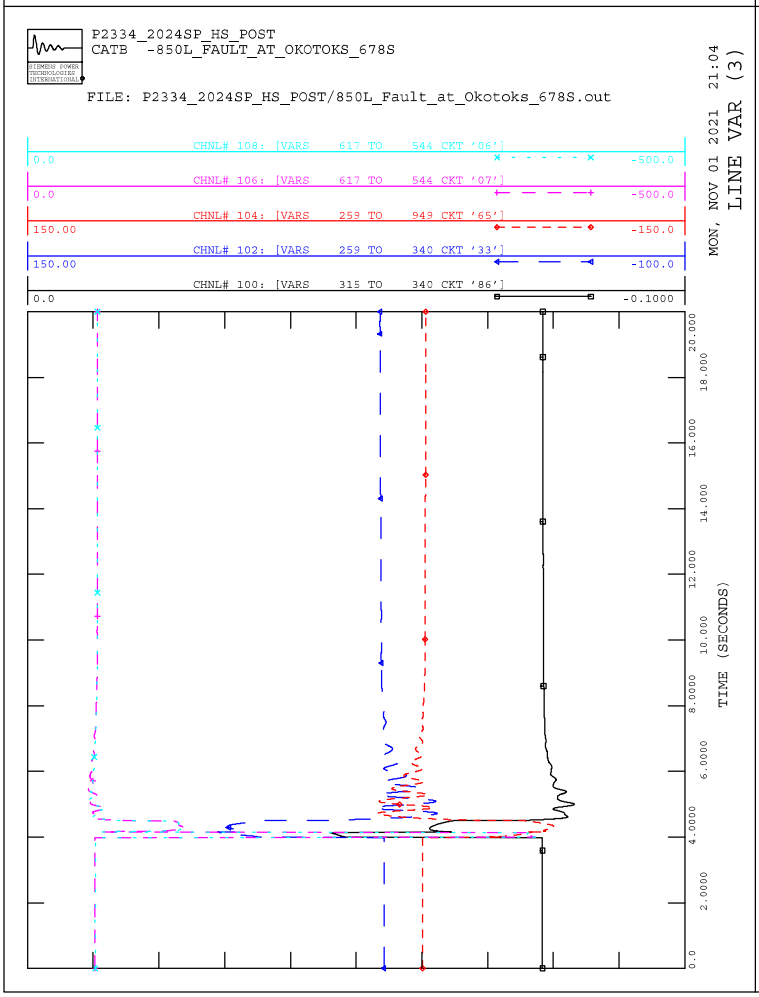
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out

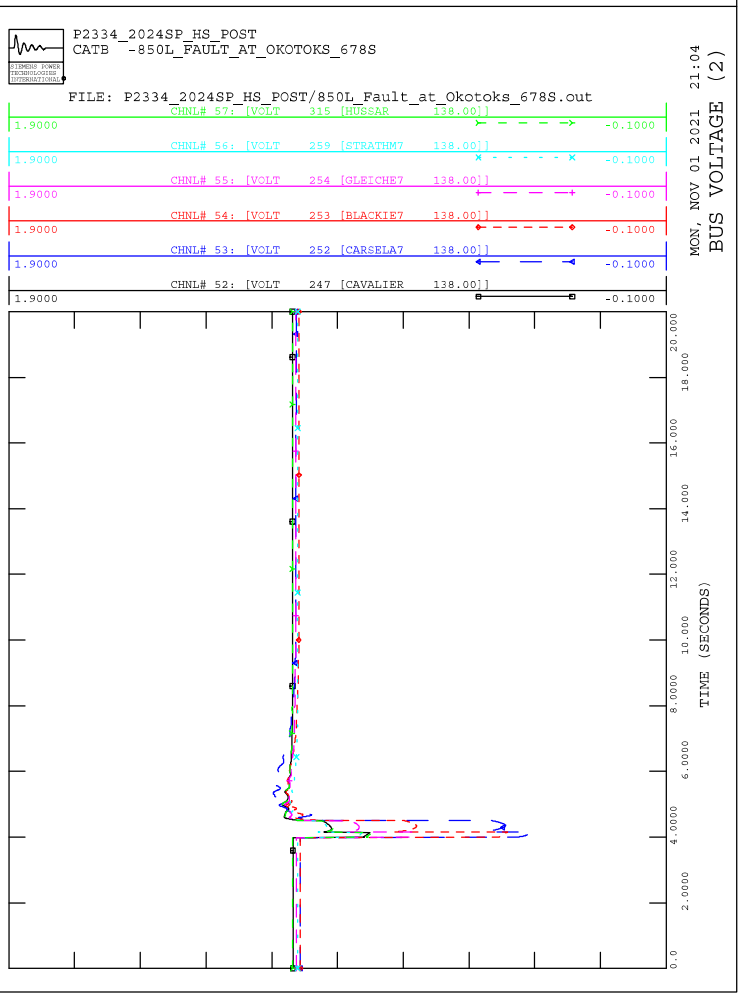
MON, NOV 01 2021 21:04
LINE VAR (1)




P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out
CHNL# 51: [VOLT 242 [HIGH RI7 138.00]]
CHNL# 50: [VOLT 240 [MAGCAN 7 138.00]]
CHNL# 49: [VOLT 239 [OKOTOKS7 138.00]]
CHNL# 48: [VOLT 238 [BLACK D7 138.00]]
CHNL# 47: [VOLT 640 [FOOTHLL2 138.00]]
CHNL# 46: [VOLT 617 [FOOTHLL1 240.00]]
1.9000
-0.1000
0.0
2.0000
4.0000
6.0000
8.0000
10.000
12.000
14.000
16.000
18.000
20.000
TIME (SECONDS)
MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

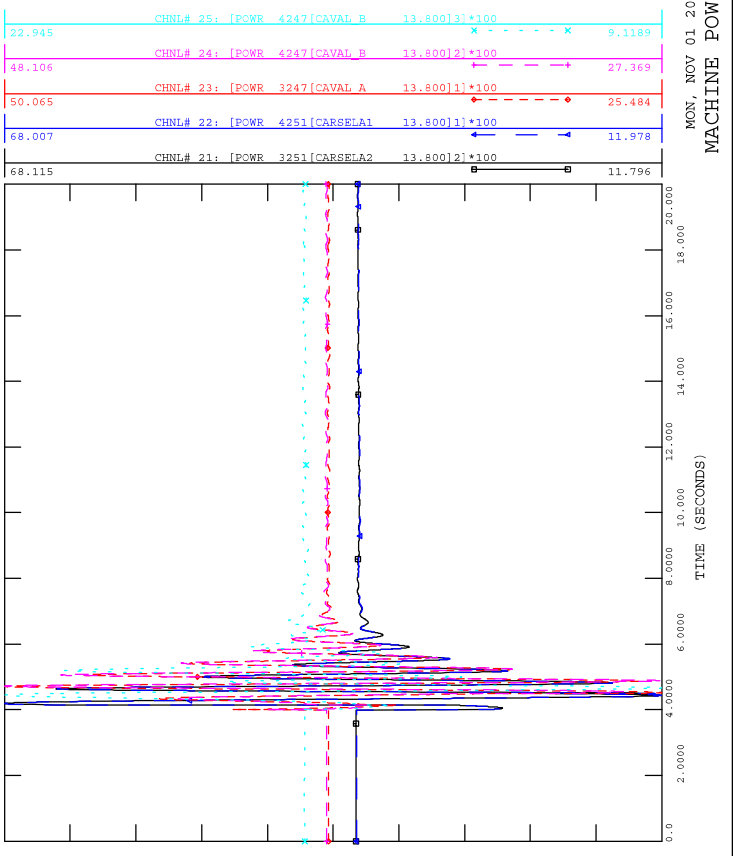

P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out
CHNL# 78: (1+[FREQ 544 [ENMX65S4 240.00]])*60
CHNL# 77: (1+[FREQ 159 [LANGDON4 240.00]])*60
CHNL# 76: (1+[FREQ 772 [ENMX25S7 240.00]])*60
CHNL# 75: (1+[FREQ 617 [FOOTHLL1 240.00]])*60
61.000
59.000
0.0
2.0000
4.0000
6.0000
8.0000
10.000
12.000
14.000
16.000
18.000
20.000
TIME (SECONDS)
MON, NOV 01 2021 21:04
FREQUENCY


P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out
CHNL# 108: [VARS 617 TO 544 CKT '06']
CHNL# 106: [VARS 617 TO 544 CKT '07']
CHNL# 104: [VARS 259 TO 949 CKT '65']
CHNL# 102: [VARS 259 TO 340 CKT '33']
CHNL# 100: [VARS 315 TO 340 CKT '86']
0.0
150.00
-500.0
-150.0
-100.0
-0.1000
0.0
2.0000
4.0000
6.0000
8.0000
10.000
12.000
14.000
16.000
18.000
20.000
TIME (SECONDS)
MON, NOV 01 2021 21:04
LINE VAR (3)


P2334_2024SP_HS_POST
CATB -850L_FAULT_AT_OKOTOKS_678S
FILE: P2334_2024SP_HS_POST/850L_Fault_at_Okotoks_678S.out
CHNL# 57: [VOLT 315 [HUSSAR 138.00]]
CHNL# 56: [VOLT 259 [STRATHM7 138.00]]
CHNL# 55: [VOLT 254 [GLEICHE7 138.00]]
CHNL# 54: [VOLT 253 [BLACKIE7 138.00]]
CHNL# 53: [VOLT 252 [CARSELA7 138.00]]
CHNL# 52: [VOLT 247 [CAVALIER 138.00]]
1.9000
-0.1000
0.0
2.0000
4.0000
6.0000
8.0000
10.000
12.000
14.000
16.000
18.000
20.000
TIME (SECONDS)
MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

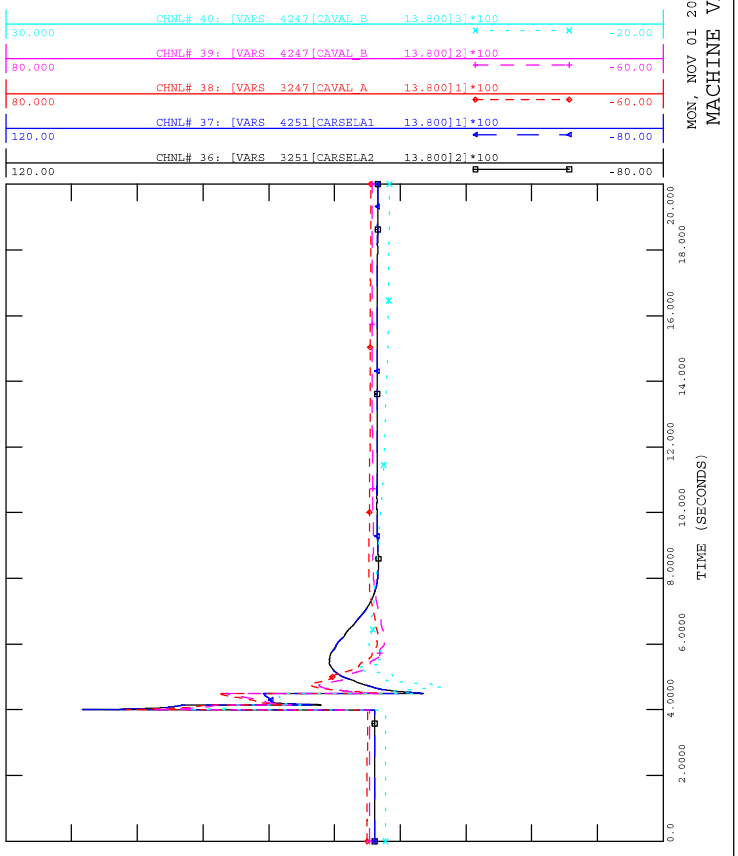
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
MACHINE POWER (1)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

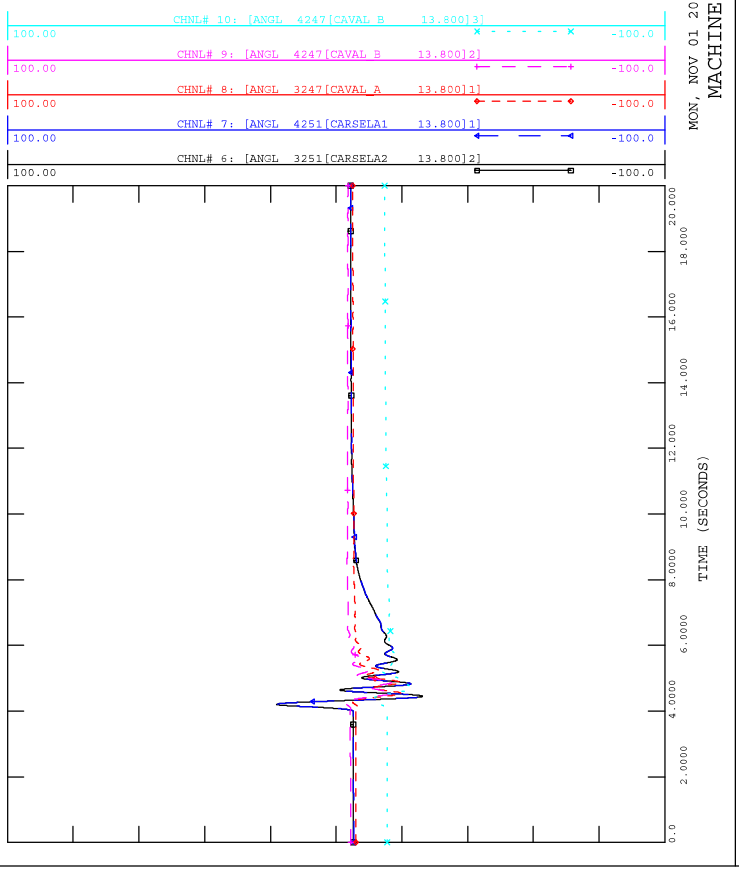
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
MACHINE VAR (1)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

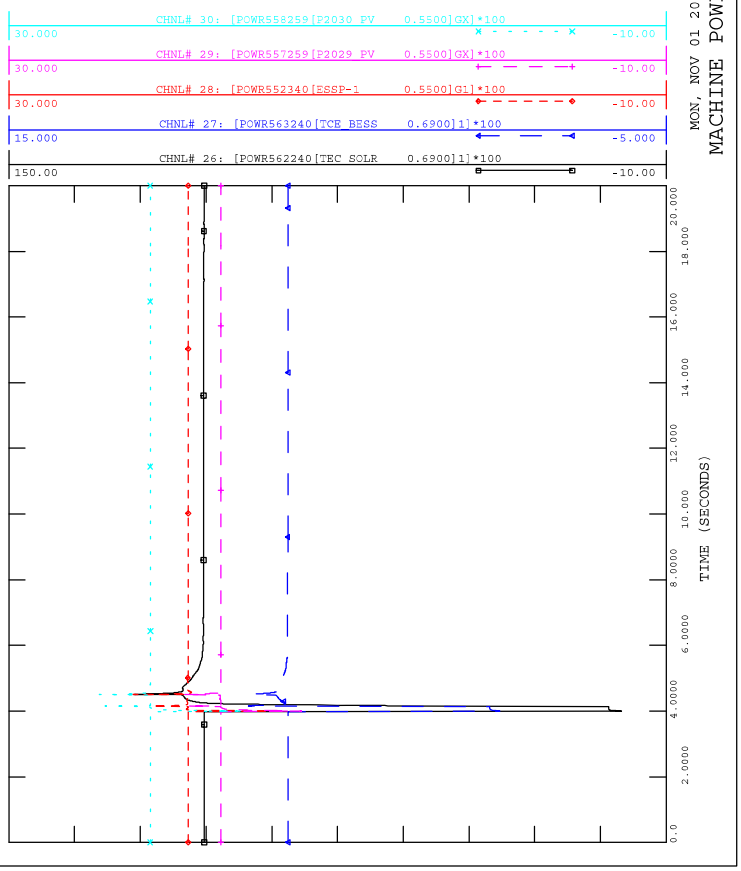
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
MACHINE ANGEL

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

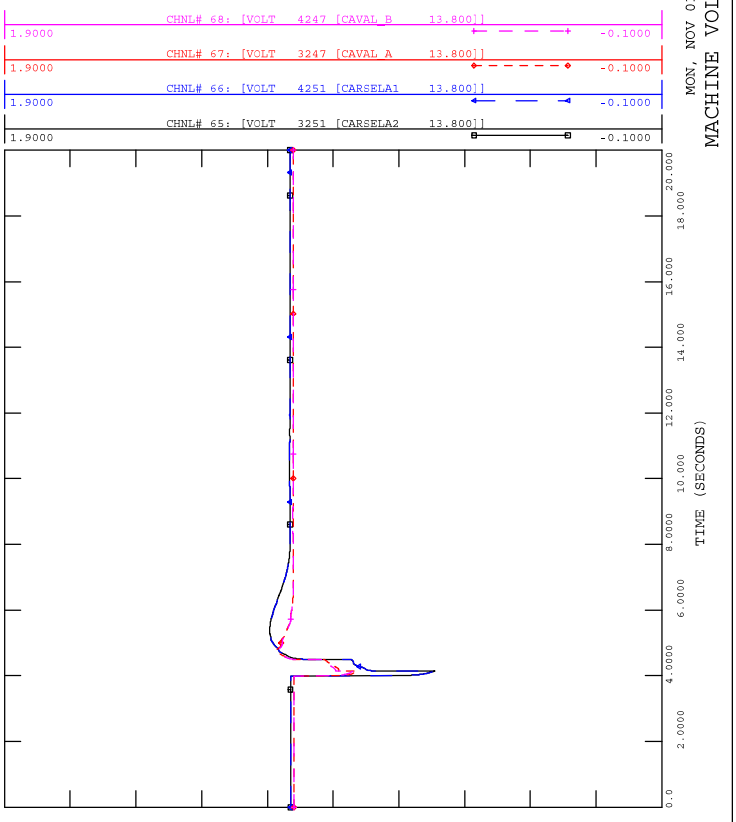
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
MACHINE POWER (2)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

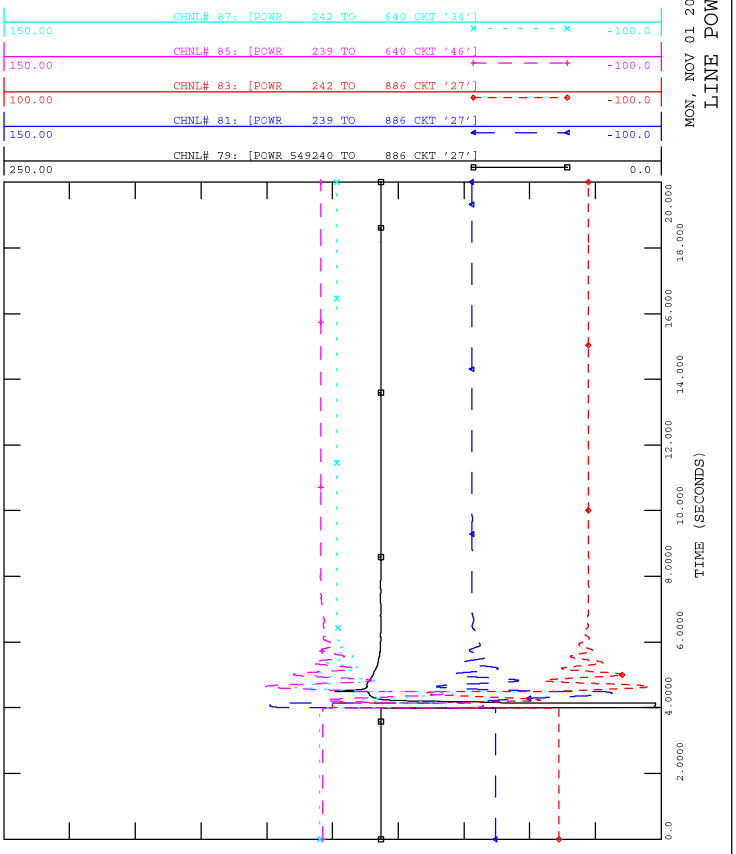
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
MACHINE VOLTAGE (1)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

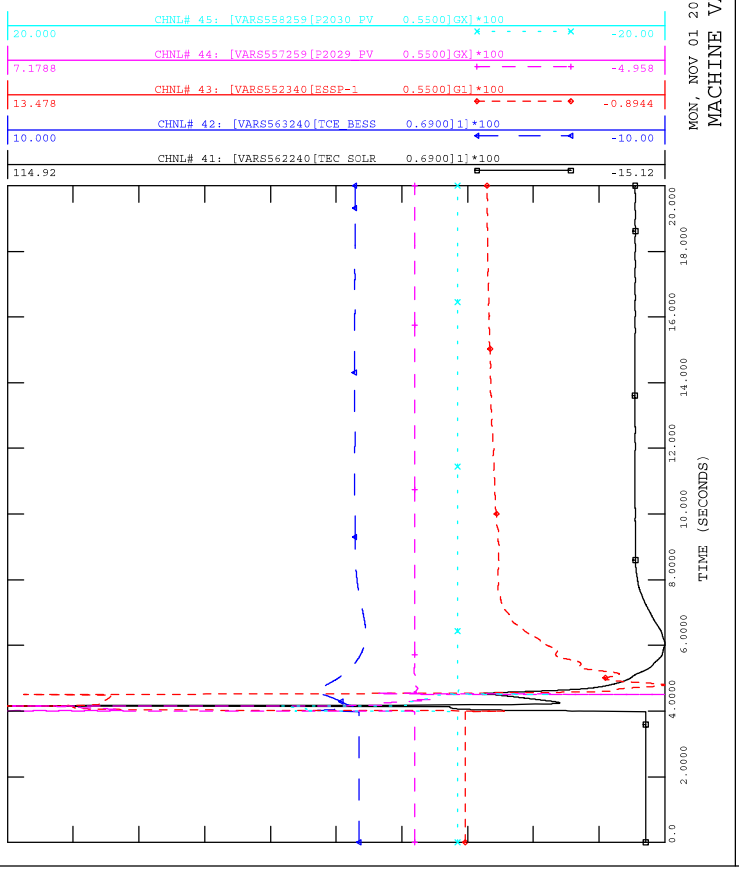
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE POWER (1)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

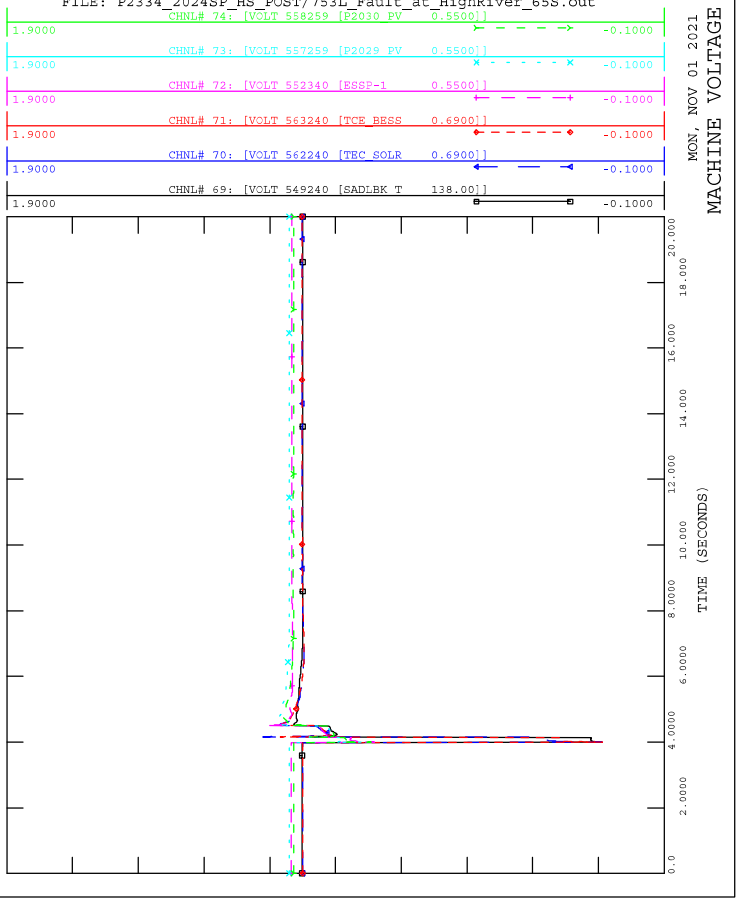
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
MACHINE VAR (2)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

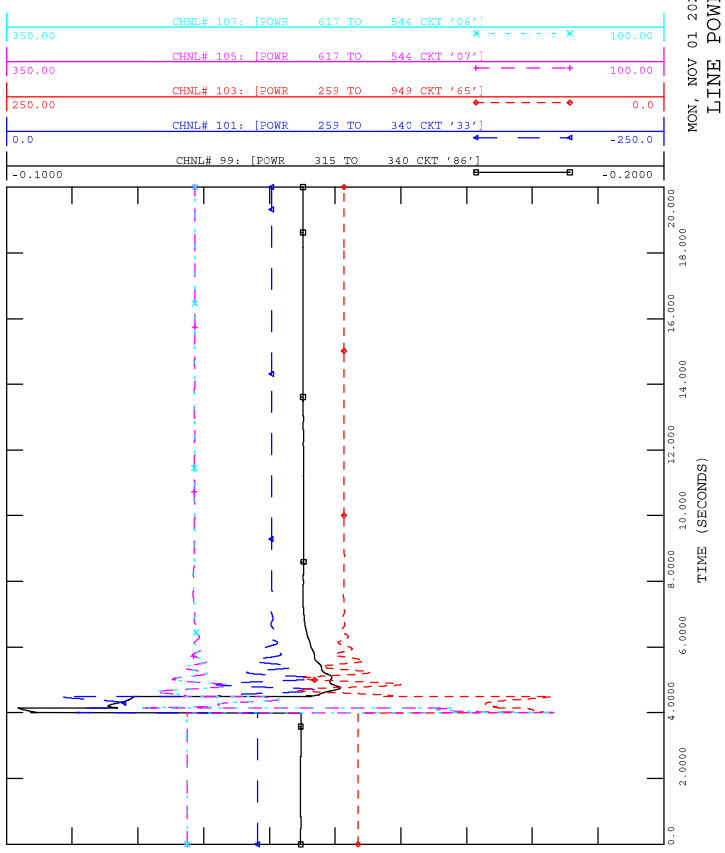
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
MACHINE VOLTAGE (2)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

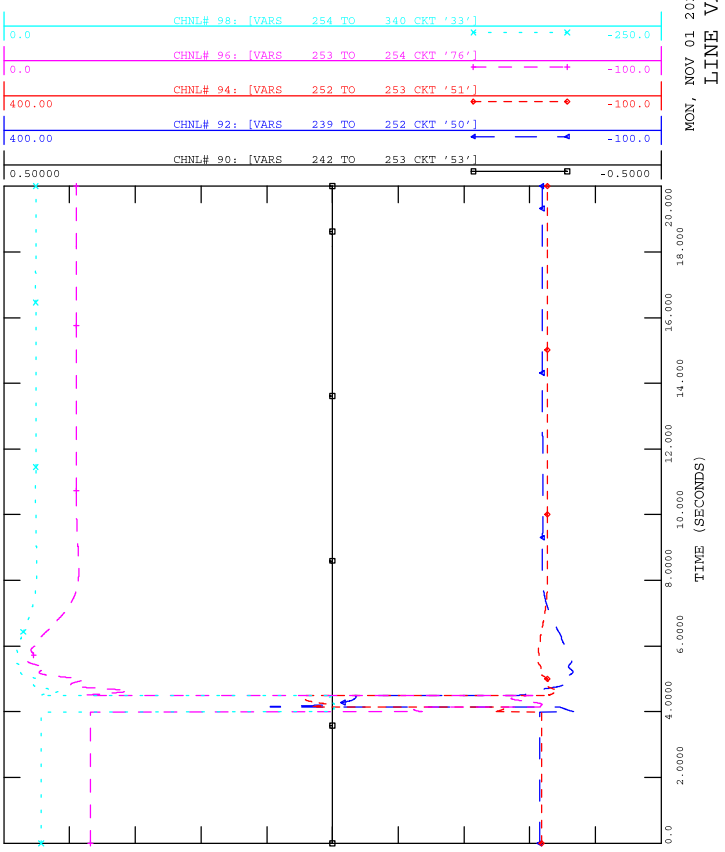
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE POWER (3)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

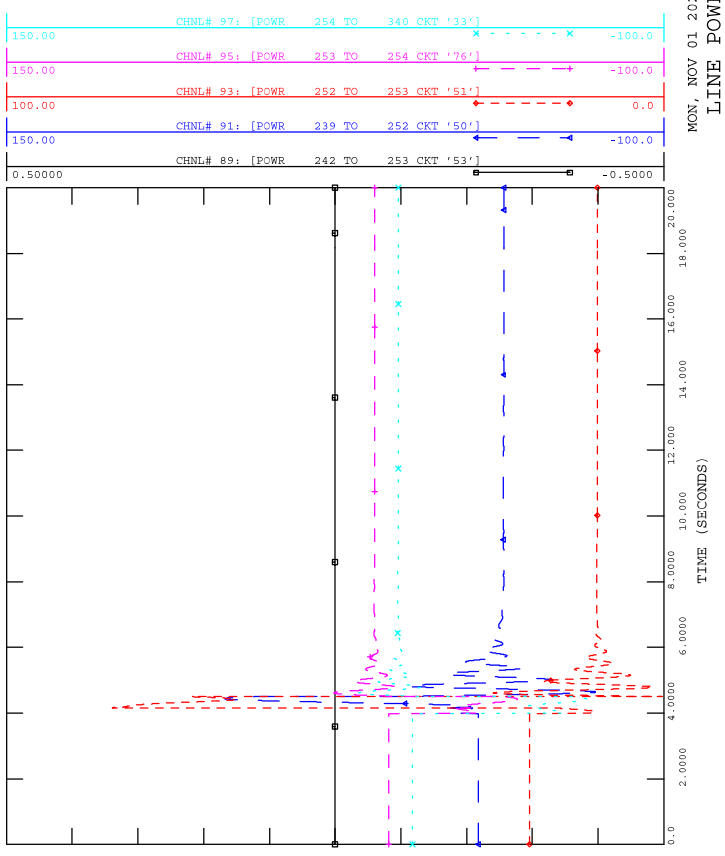
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE VAR (2)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

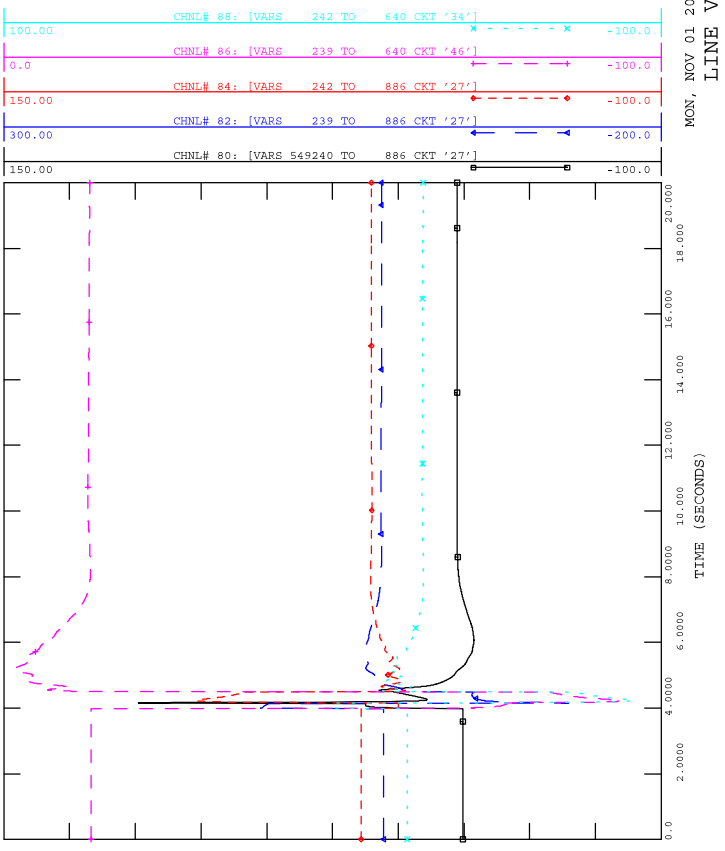
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE POWER (2)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

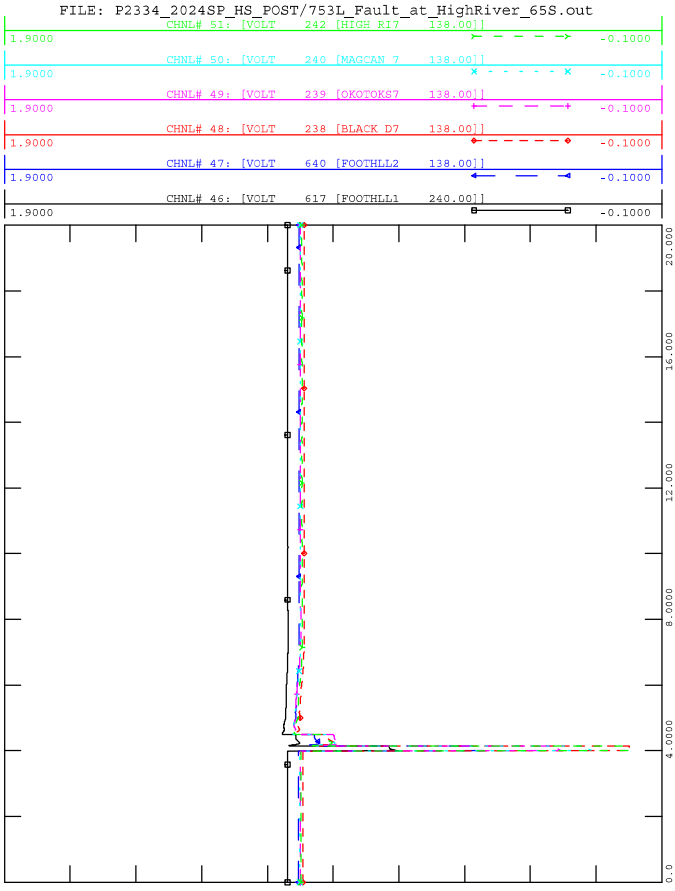
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE VAR (1)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

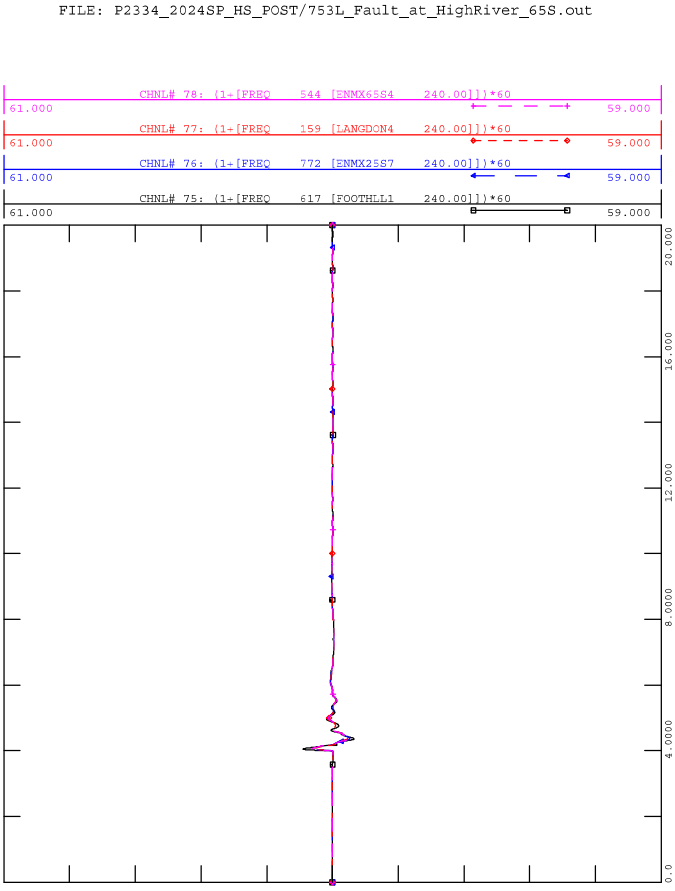
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

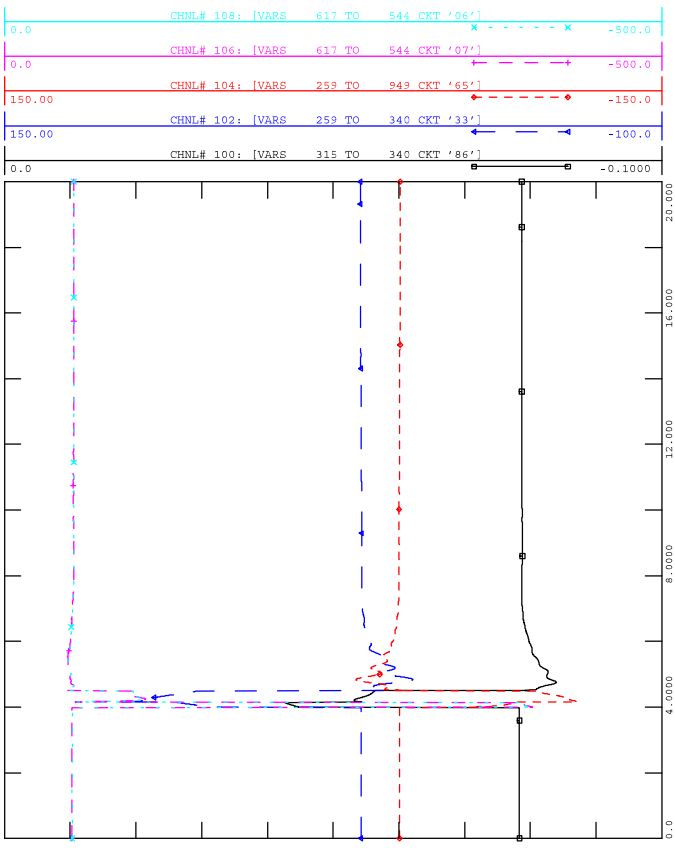
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
FREQUENCY

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

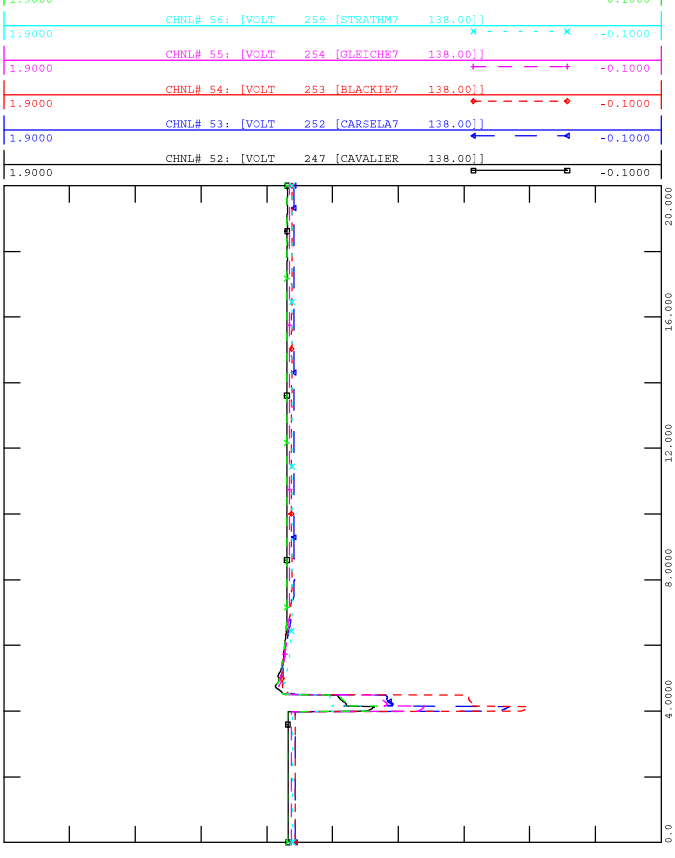
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE VAR (3)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_HIGHRIVER_65S

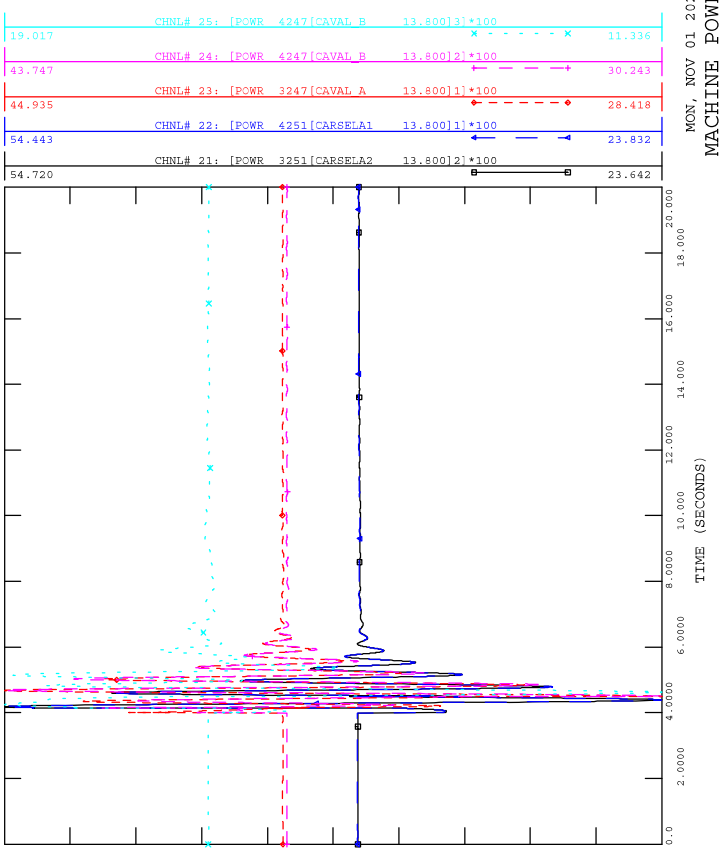
FILE: P2334_2024SP_HS_POST/753L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

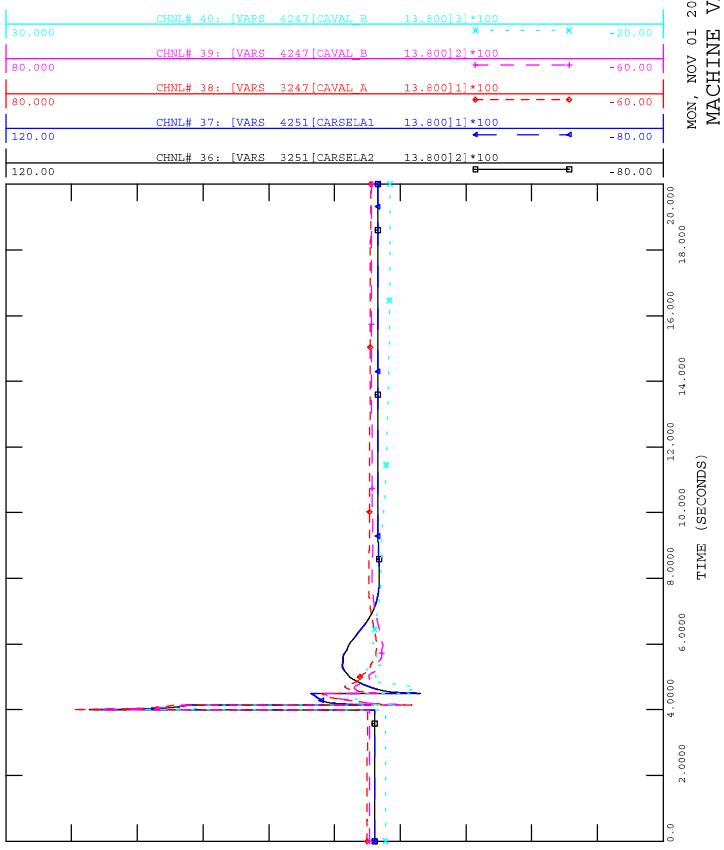
FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out



MON, NOV 01 2021 21:04
MACHINE POWER (1)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

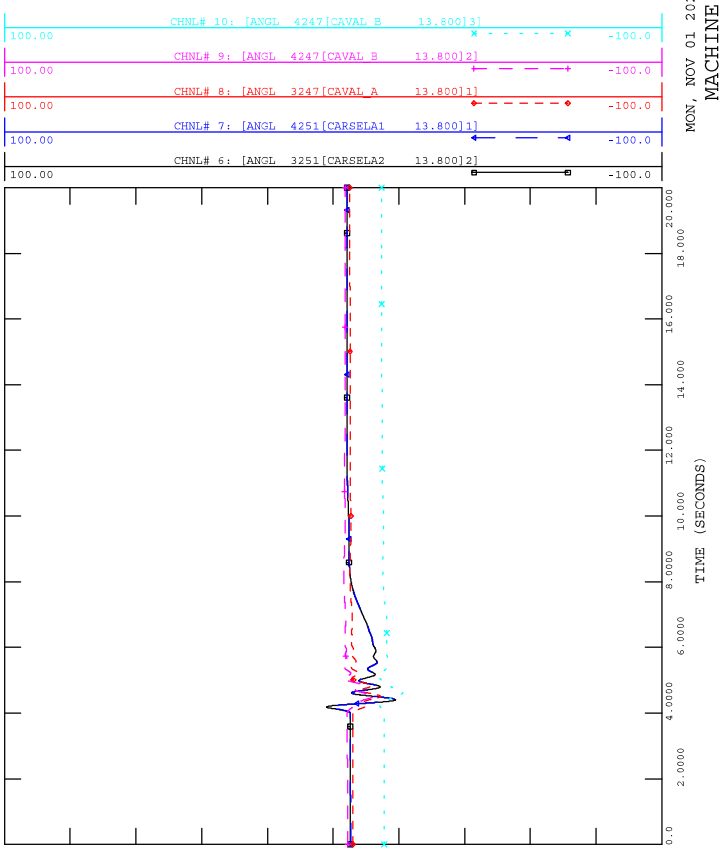
FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out



MON, NOV 01 2021 21:04
MACHINE VAR (1)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

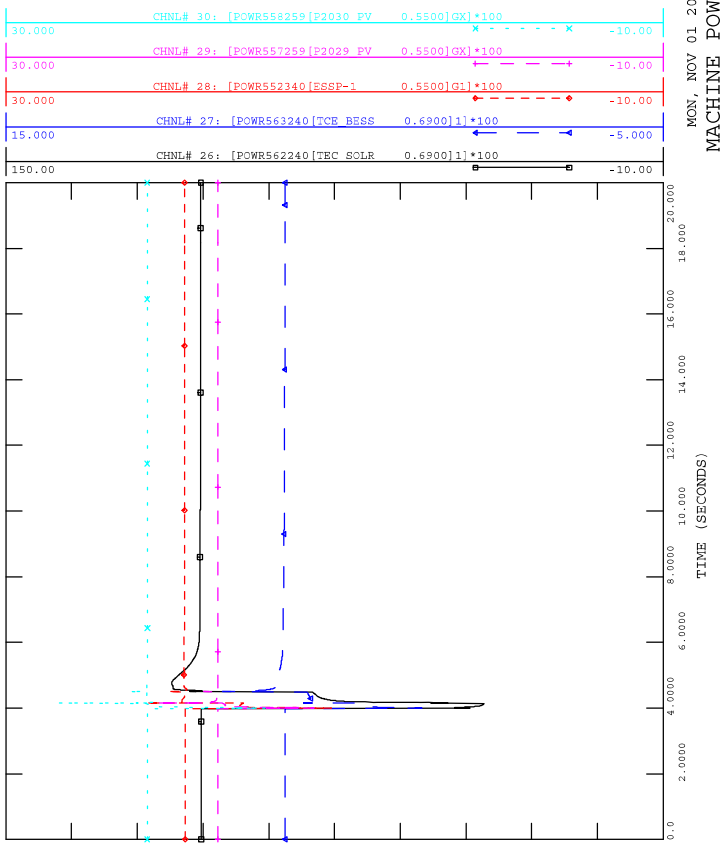
FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out



MON, NOV 01 2021 21:04
MACHINE ANGEL

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out



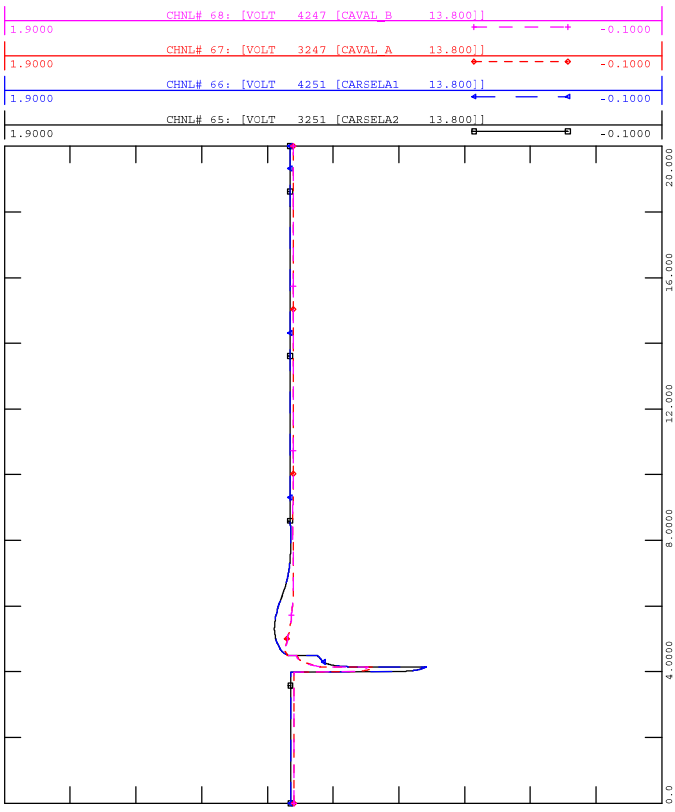
MON, NOV 01 2021 21:04
MACHINE POWER (2)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (1)

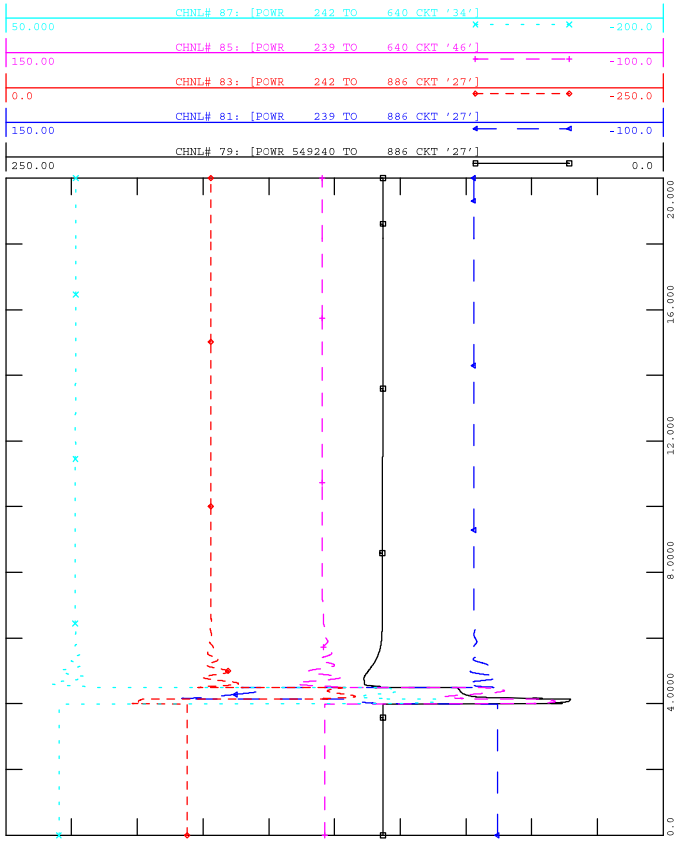


P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out

MON, NOV 01 2021 21:04

LINE POWER (1)

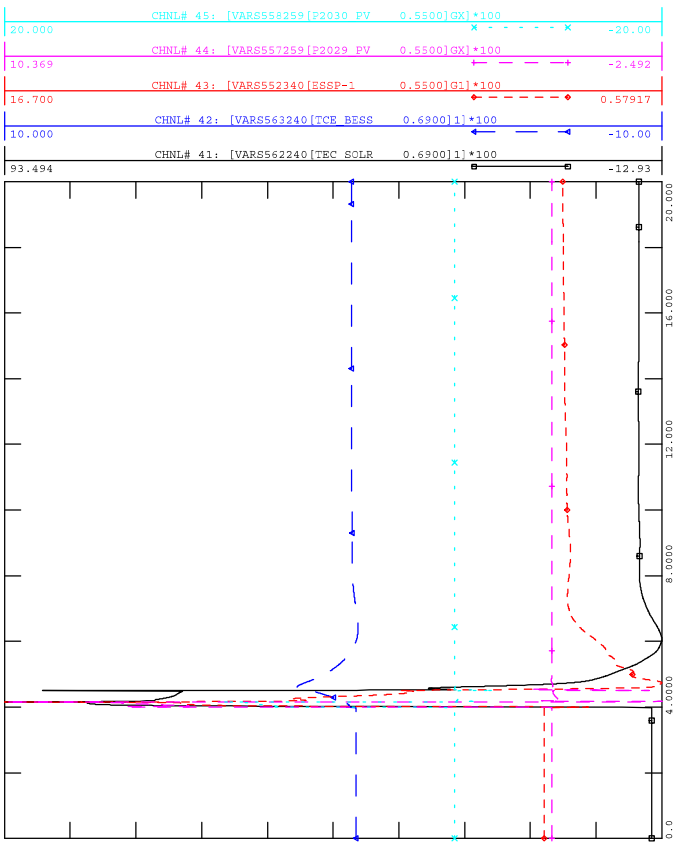


P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out

MON, NOV 01 2021 21:04

MACHINE VAR (2)

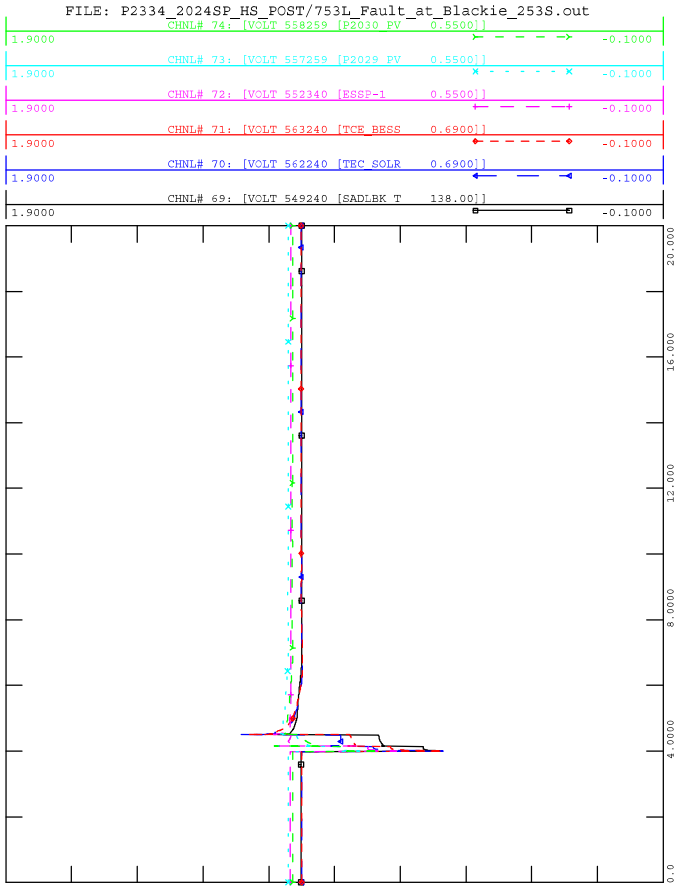


P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out

MON, NOV 01 2021 21:04

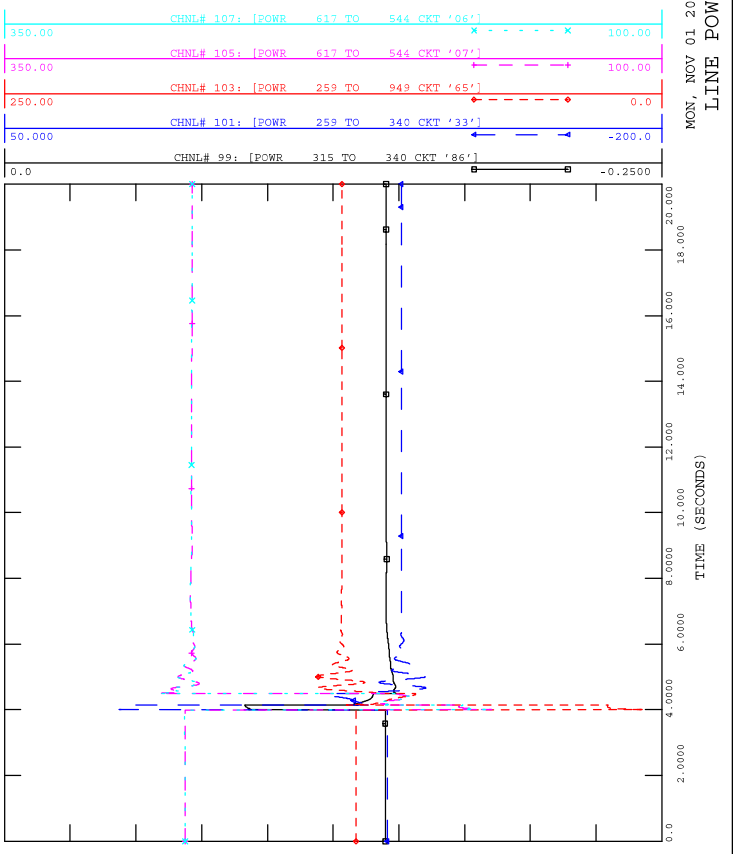
MACHINE VOLTAGE (2)



P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out

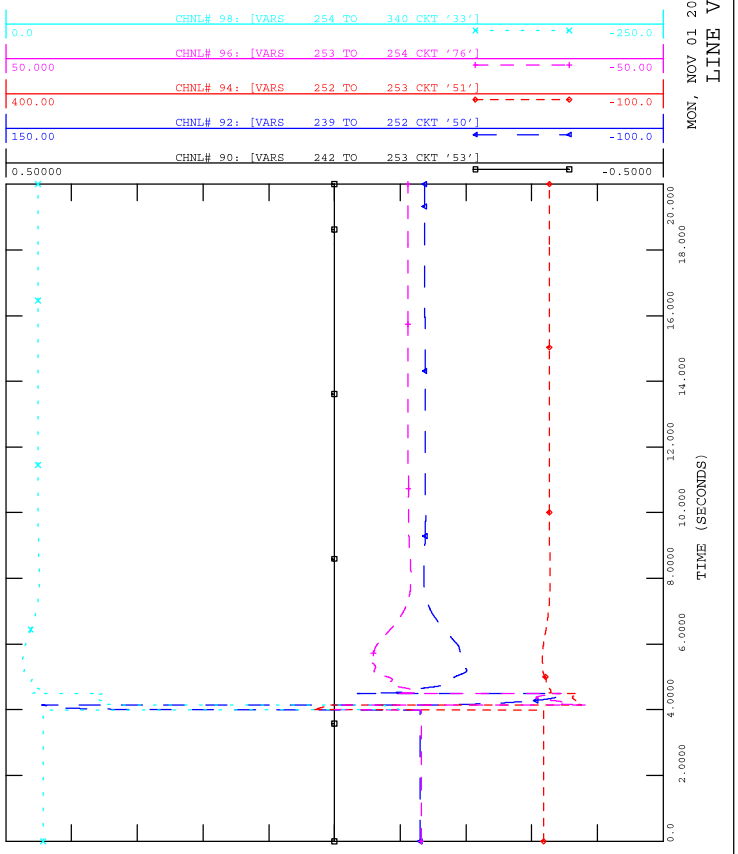
MON, NOV 01 2021 21:04
LINE POWER (3)



P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out

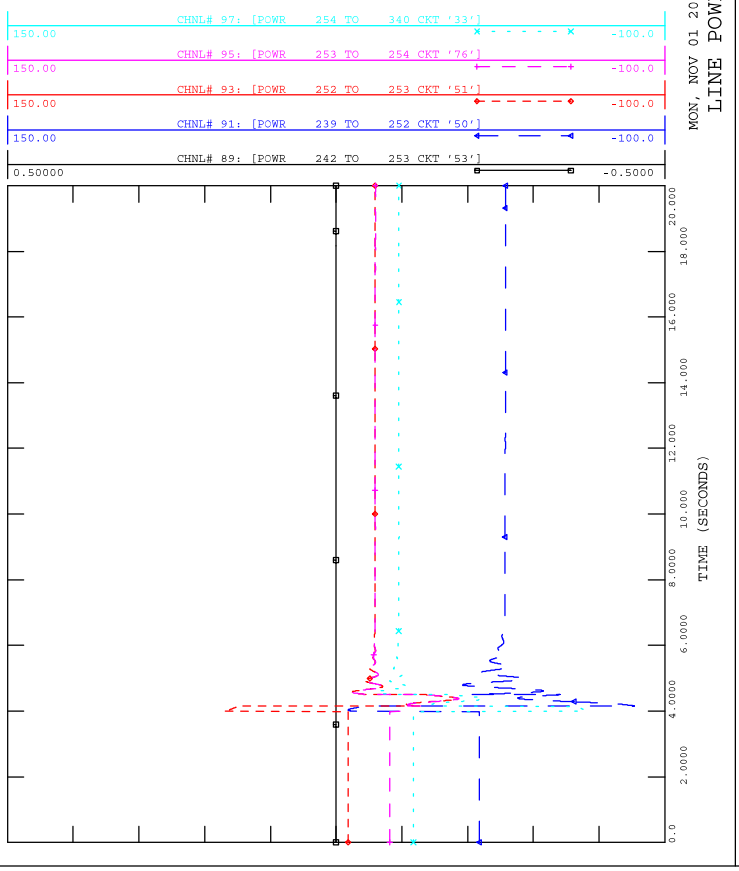
MON, NOV 01 2021 21:04
LINE VAR (2)



P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out

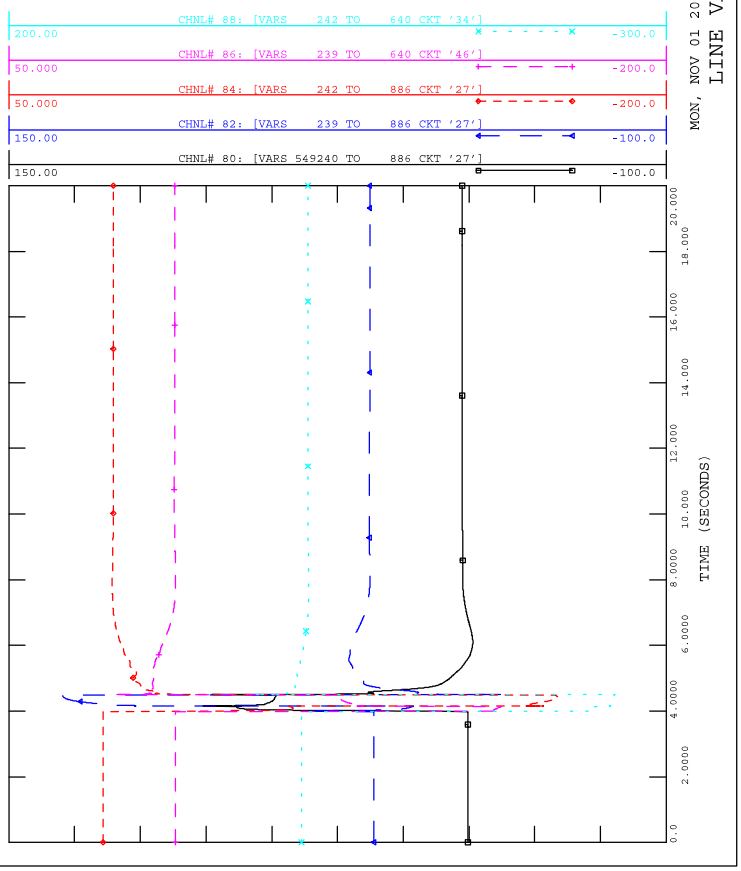
MON, NOV 01 2021 21:04
LINE POWER (2)



P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

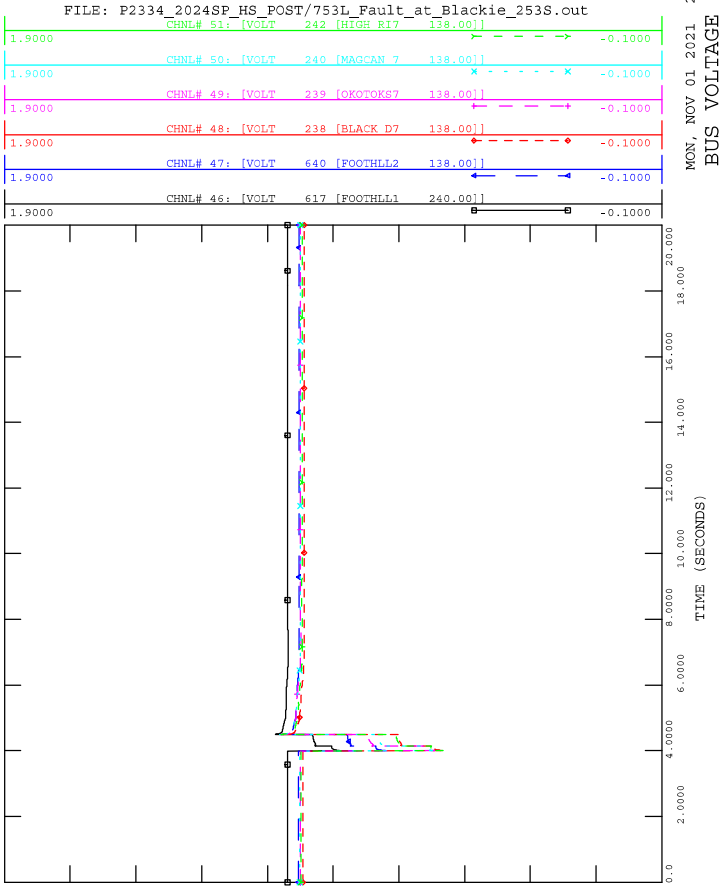
FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out

MON, NOV 01 2021 21:04
LINE VAR (1)



P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

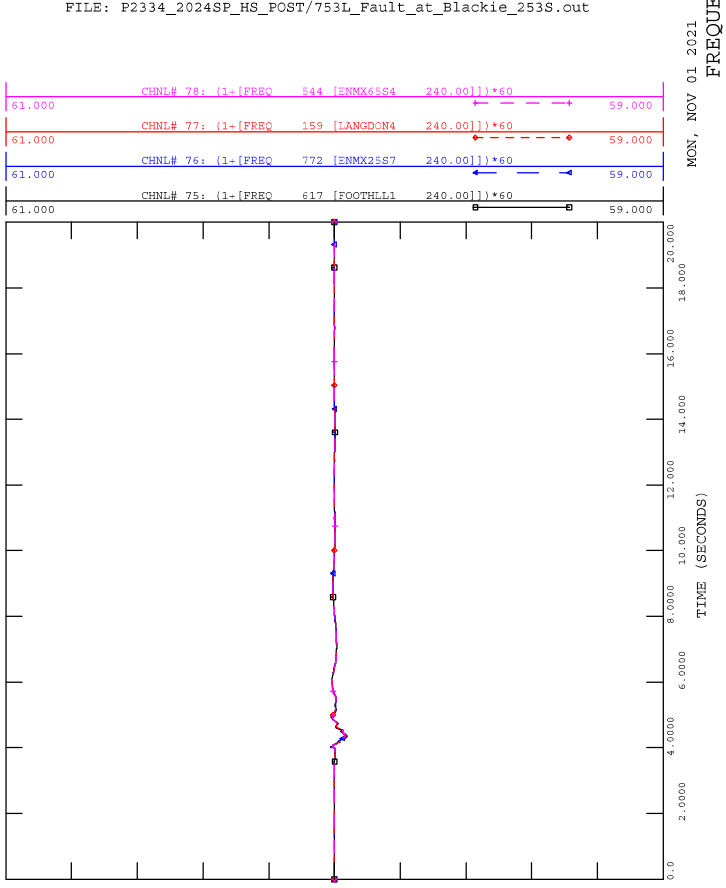
FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

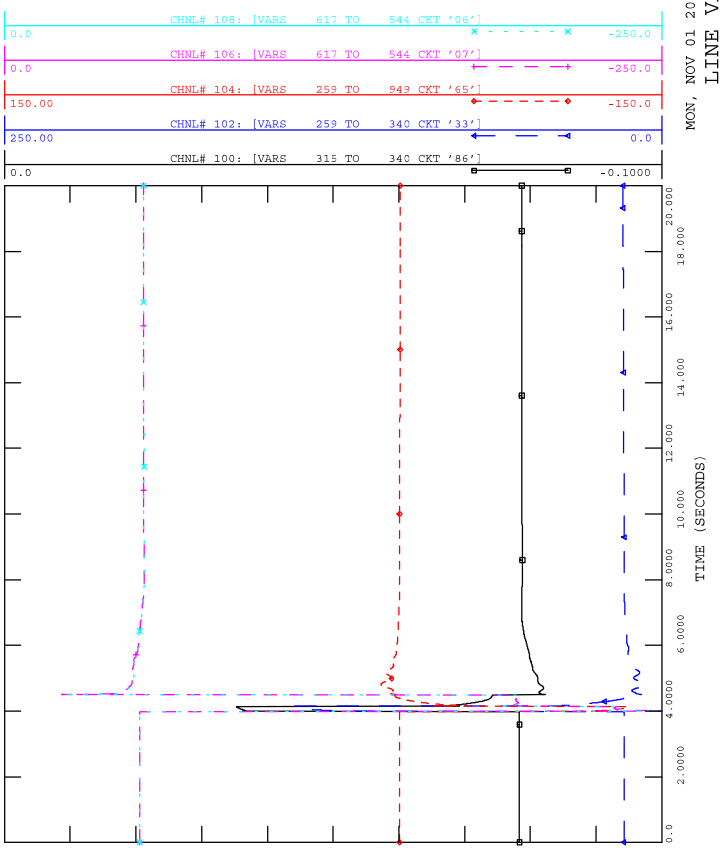
FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out



MON, NOV 01 2021 21:04
FREQUENCY

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

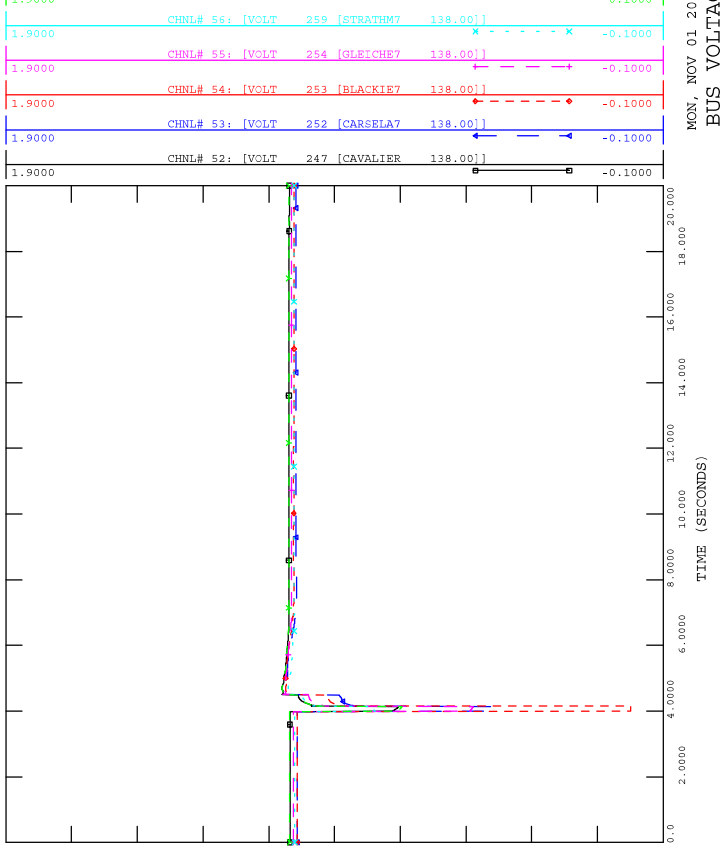
FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out



MON, NOV 01 2021 21:04
LINE VAR (3)

P2334_2024SP_HS_POST
CATB -753L_FAULT_AT_BLACKIE_253S

FILE: P2334_2024SP_HS_POST/753L_Fault_at_Blackie_253S.out

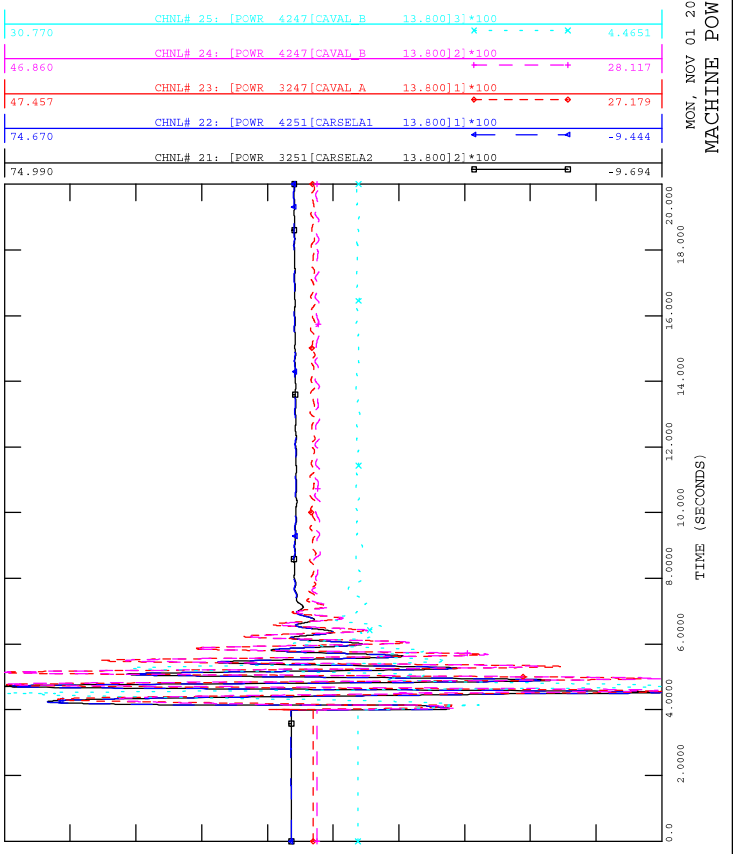


MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out

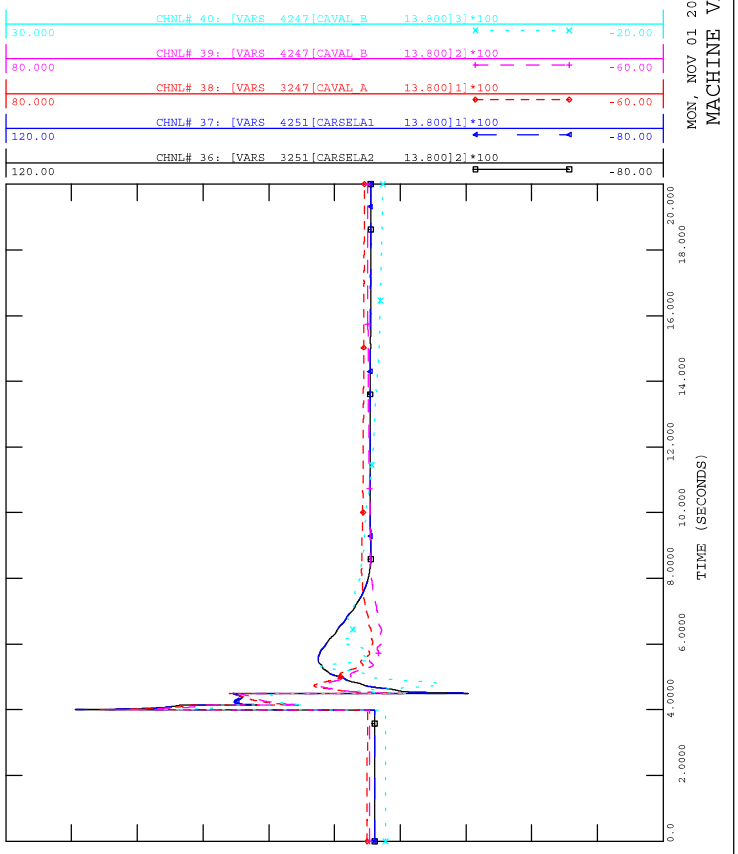
MON, NOV 01 2021 21:04
MACHINE POWER (1)



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out

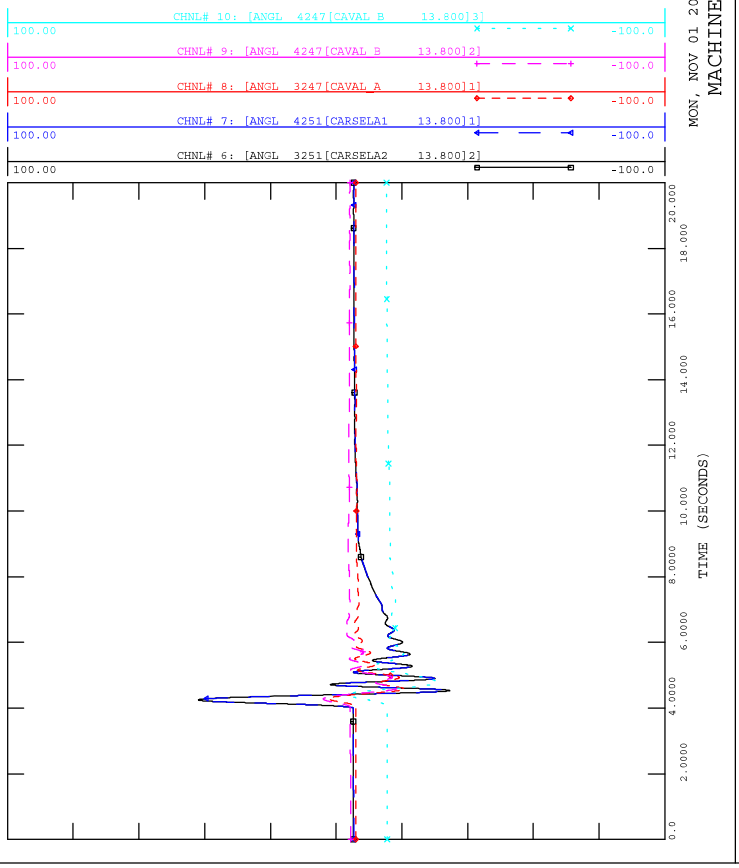
MON, NOV 01 2021 21:04
MACHINE VAR (1)



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out

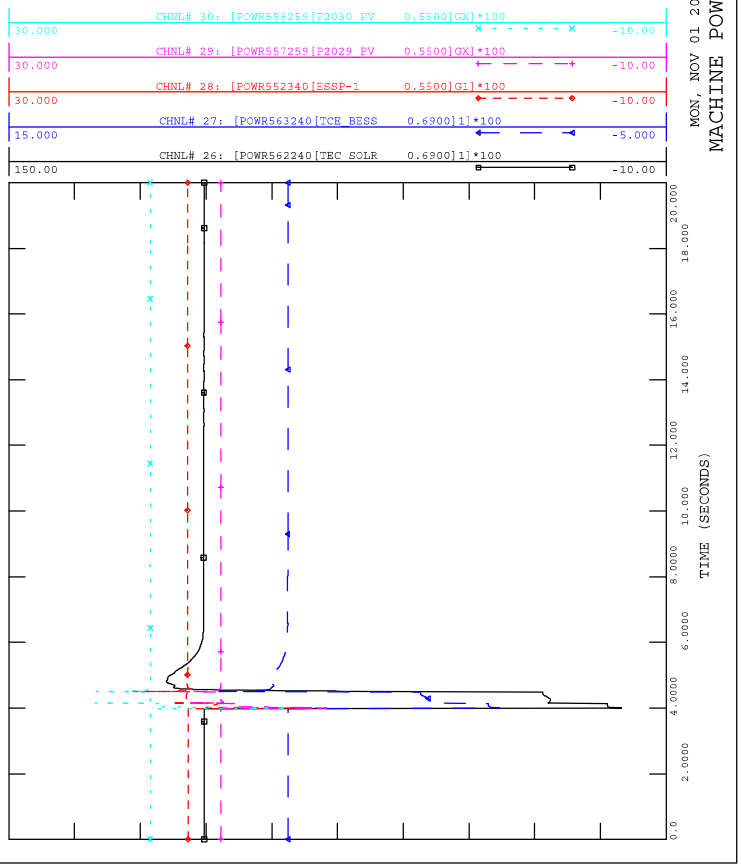
MON, NOV 01 2021 21:04
MACHINE ANGEL



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out

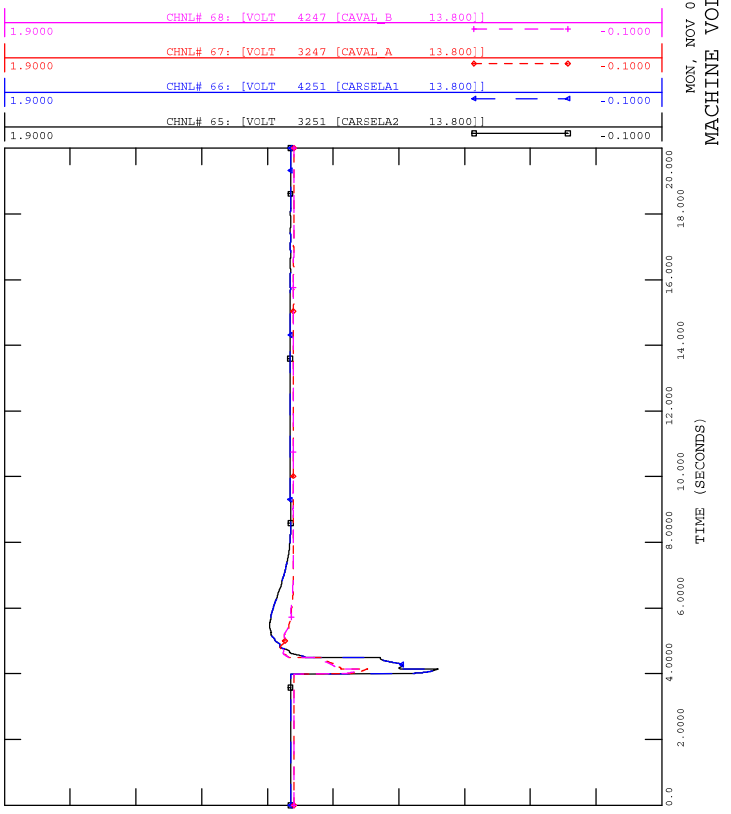
MON, NOV 01 2021 21:04
MACHINE POWER (2)



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out

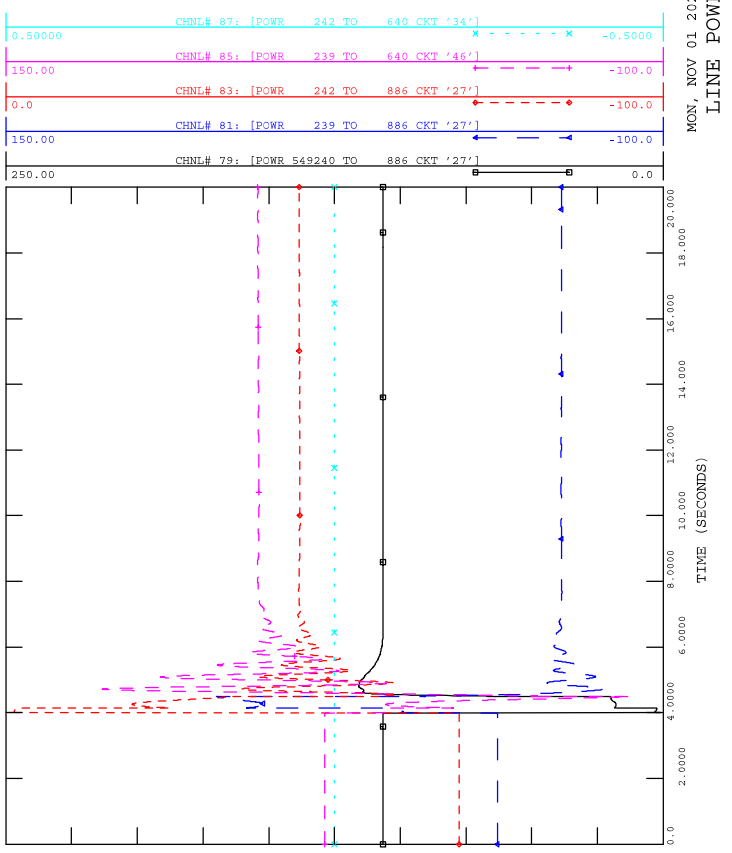
MON, NOV 01 2021 21:04
MACHINE VOLTAGE (1)



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out

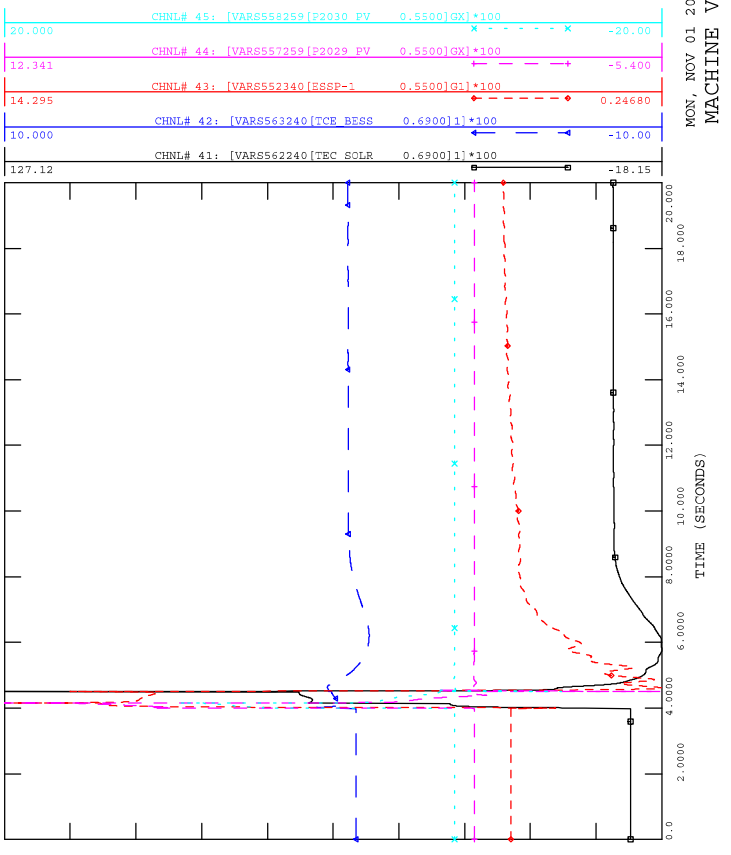
MON, NOV 01 2021 21:04
LINE POWER (1)



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out

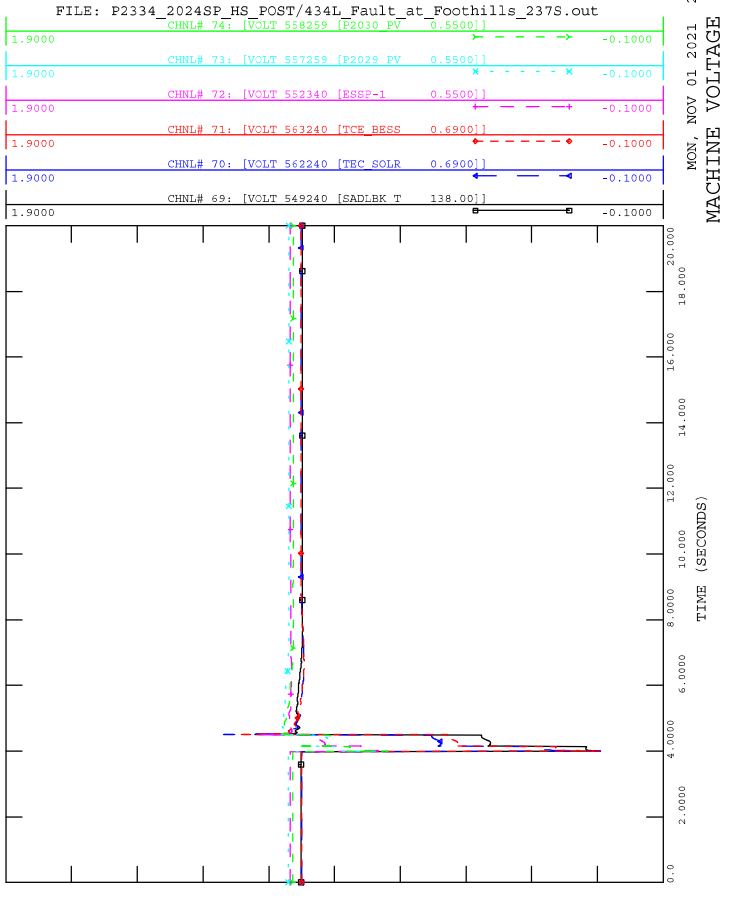
MON, NOV 01 2021 21:04
MACHINE VAR (2)



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

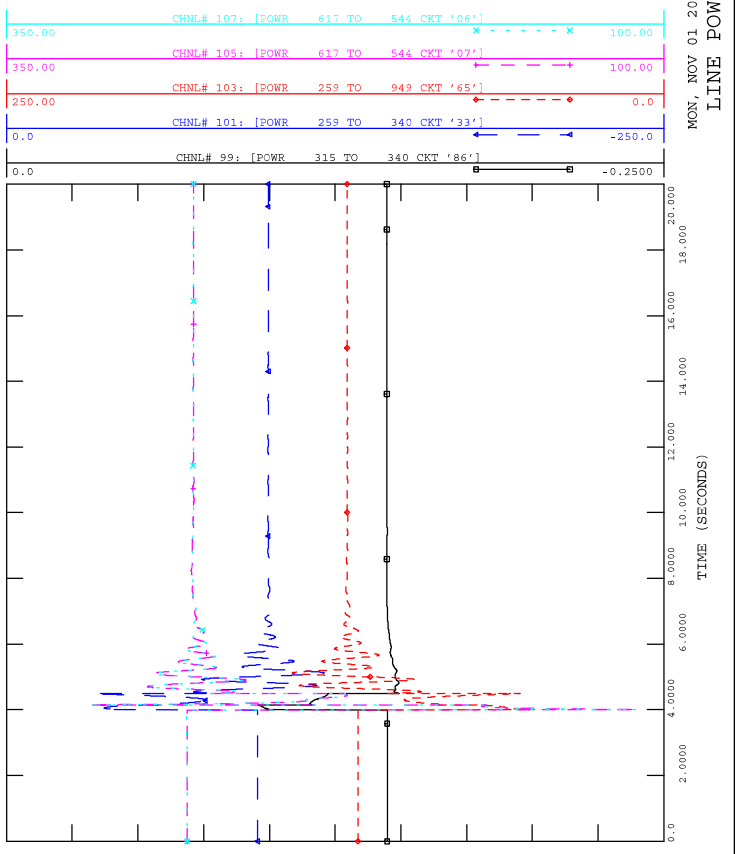
FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04
MACHINE VOLTAGE (2)



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

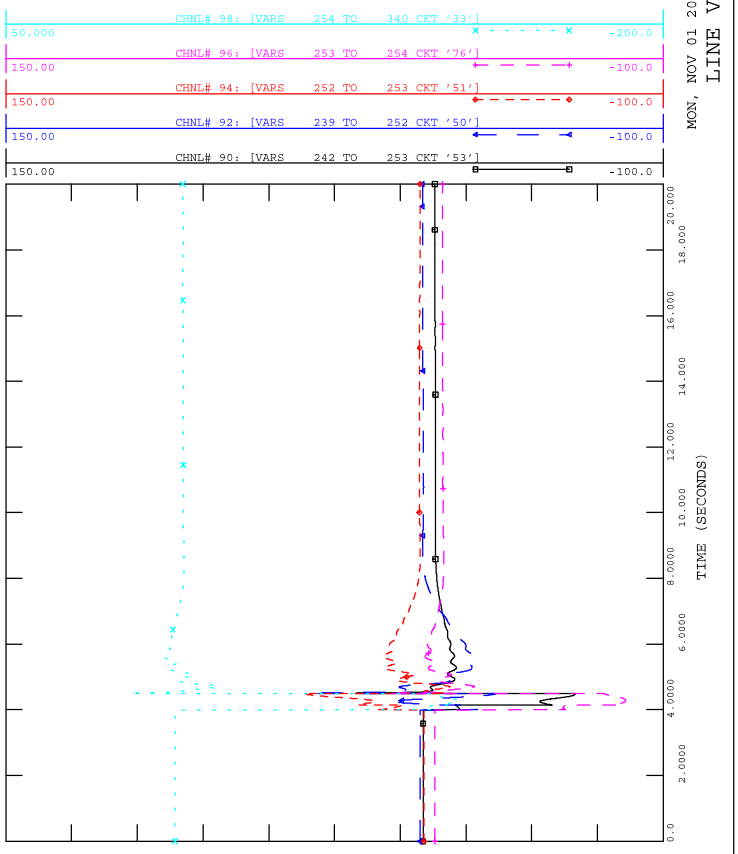
FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE POWER (3)

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

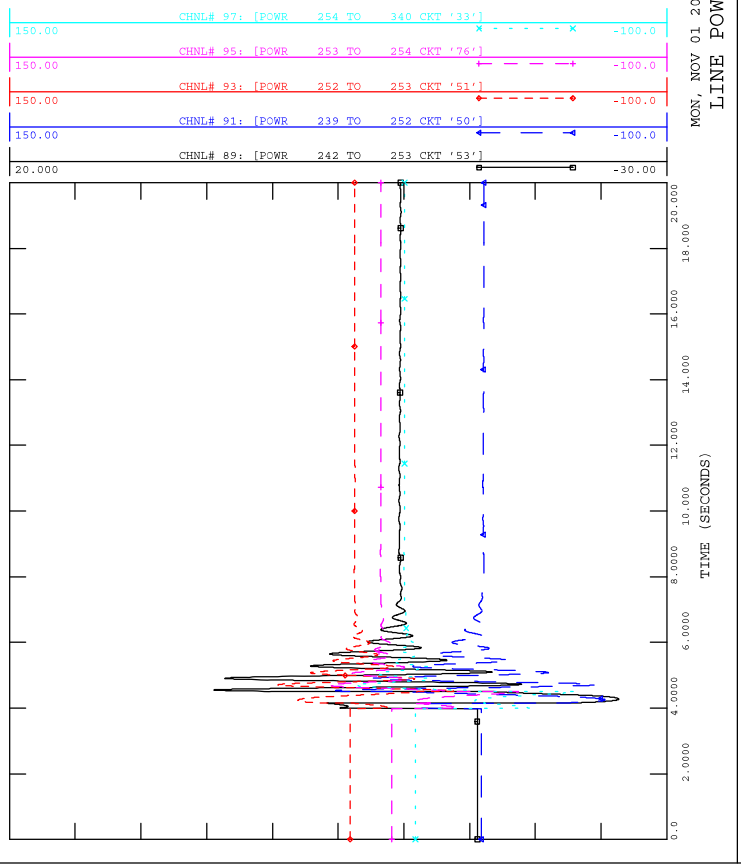
FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE VAR (2)

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

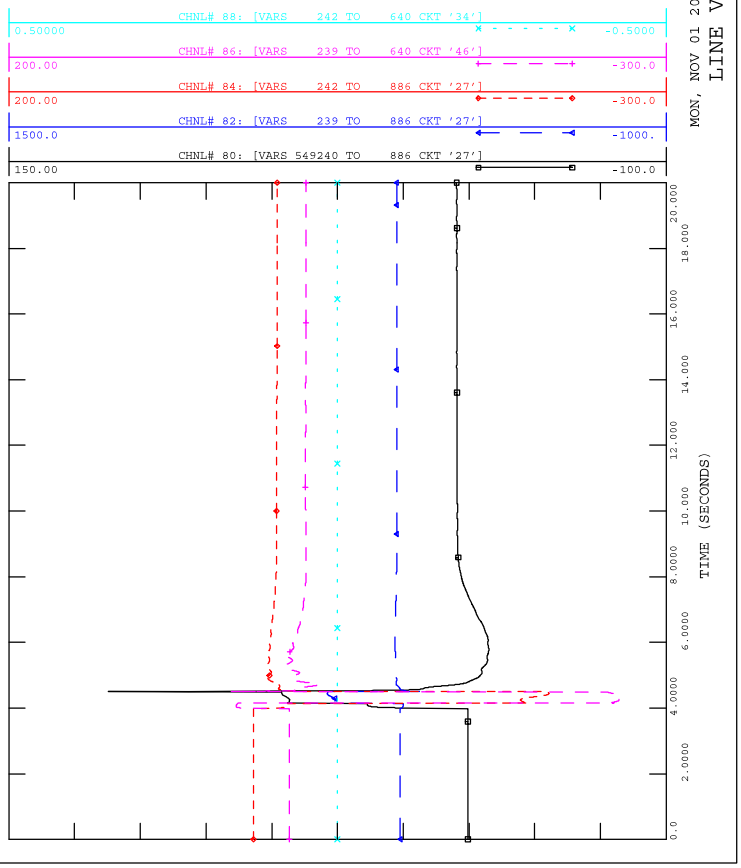
FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE POWER (2)

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

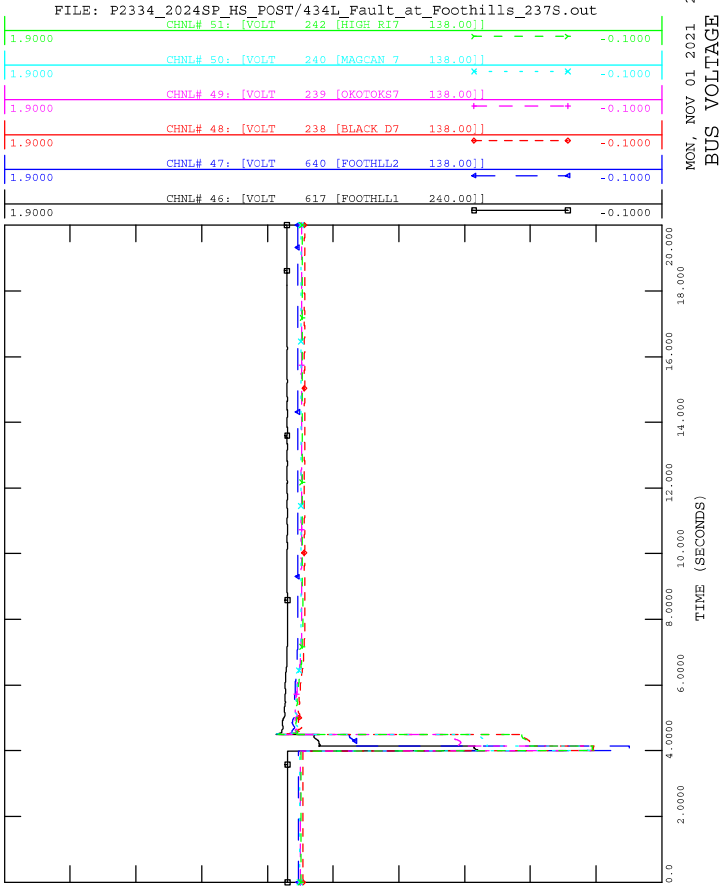
FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE VAR (1)

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

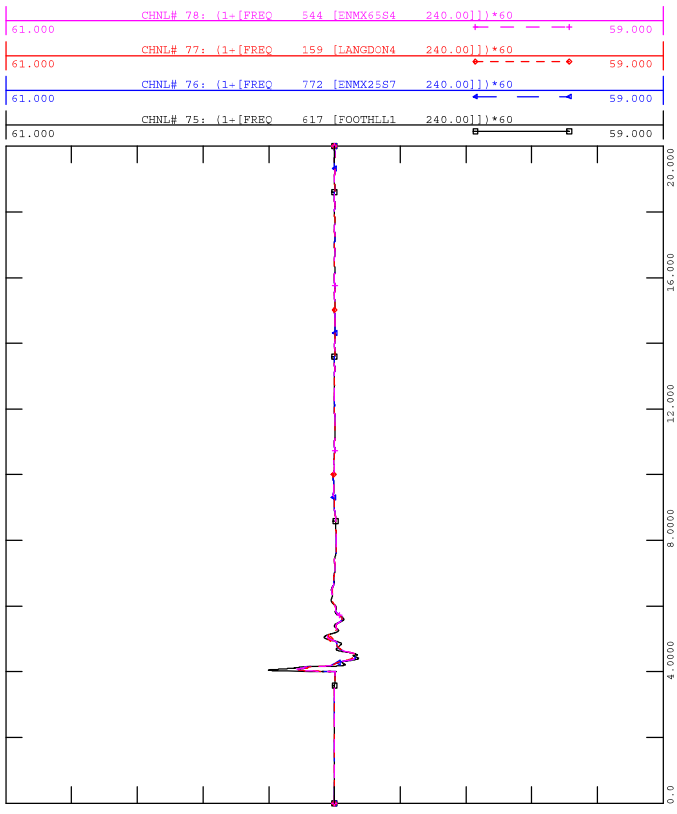
FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

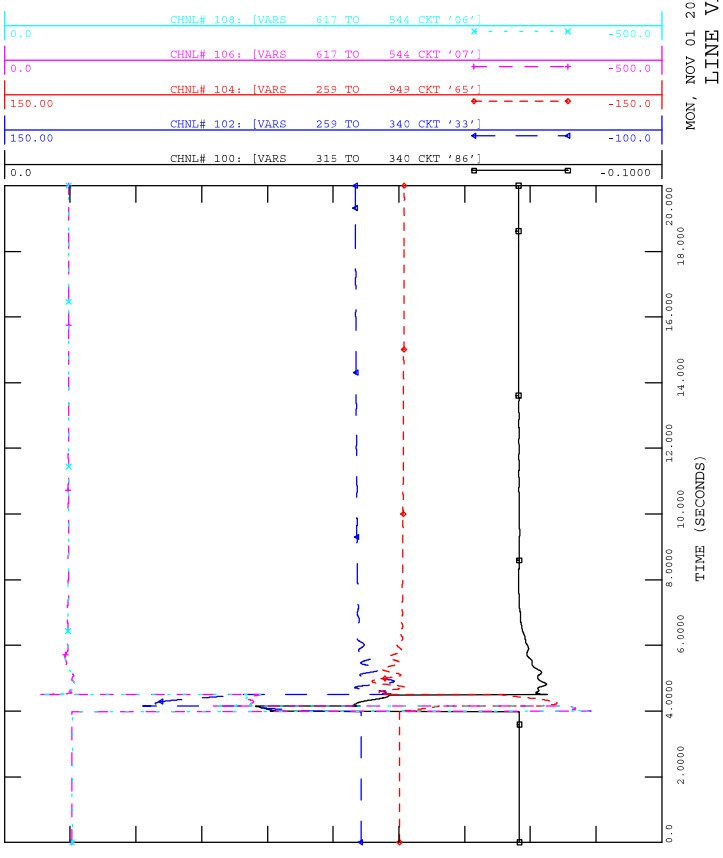
FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
FREQUENCY

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

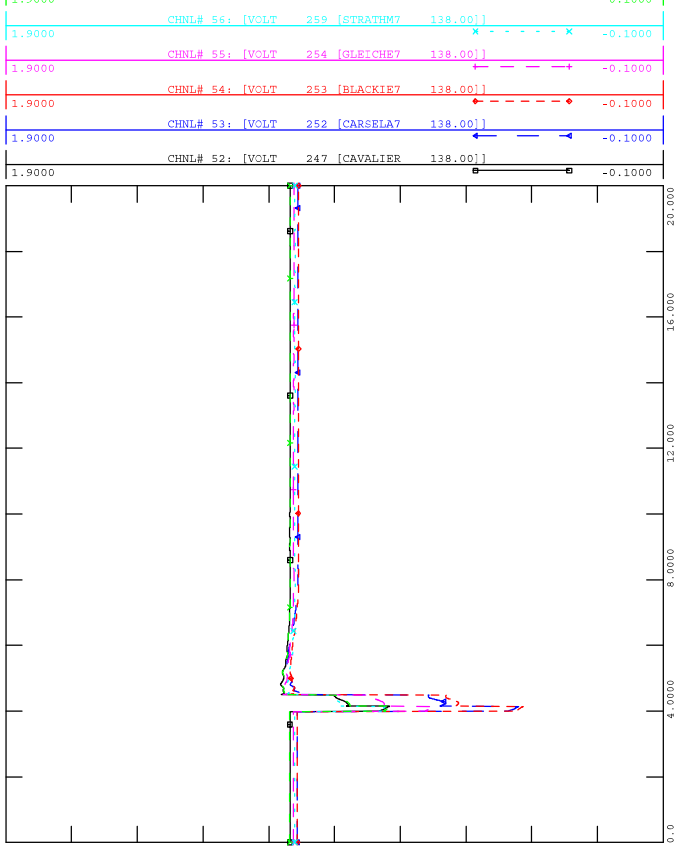
FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE VAR (3)

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_Foothills_237S.out

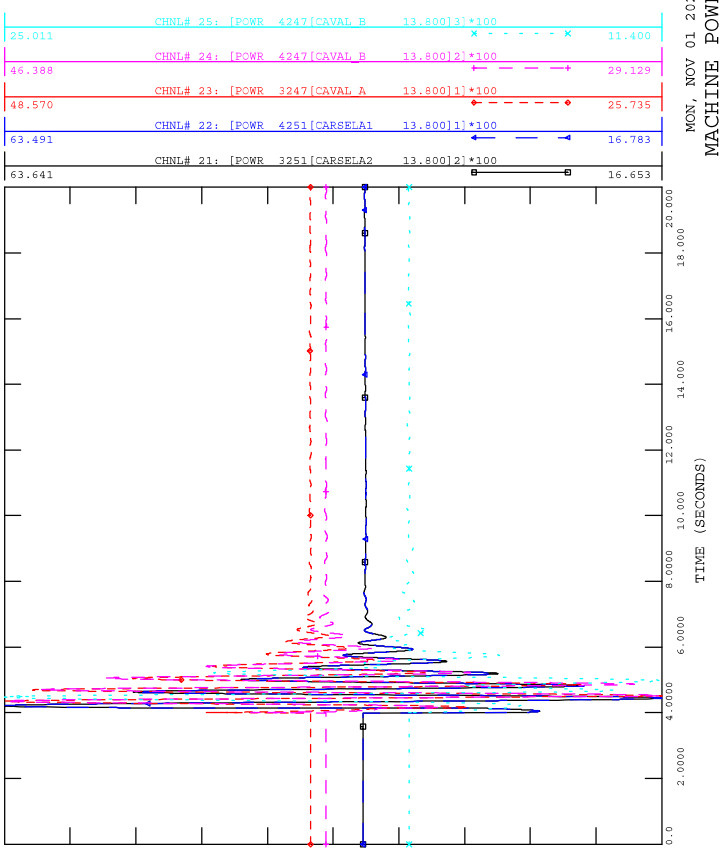


MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04
MACHINE POWER (1)



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

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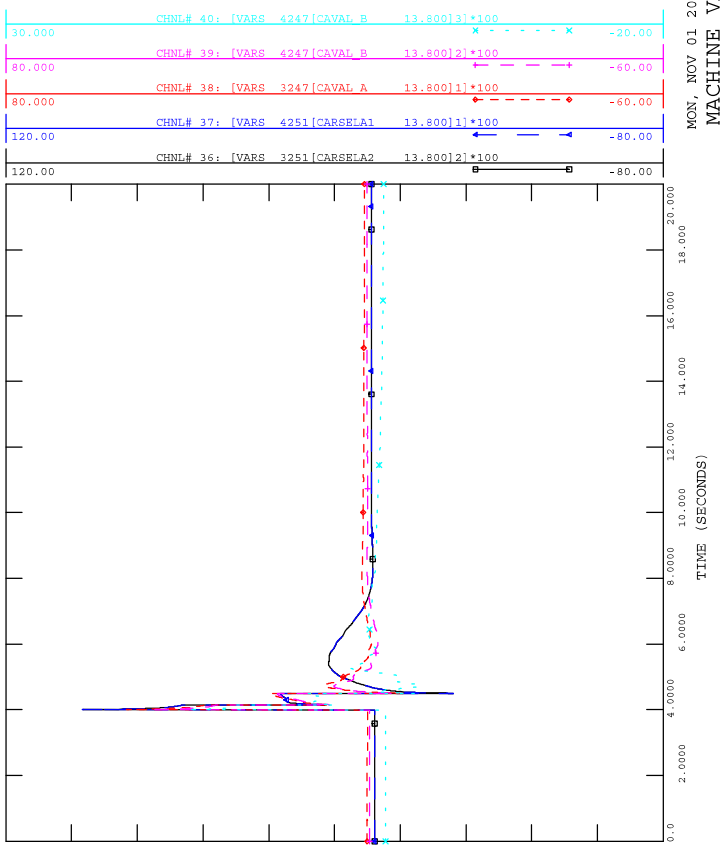
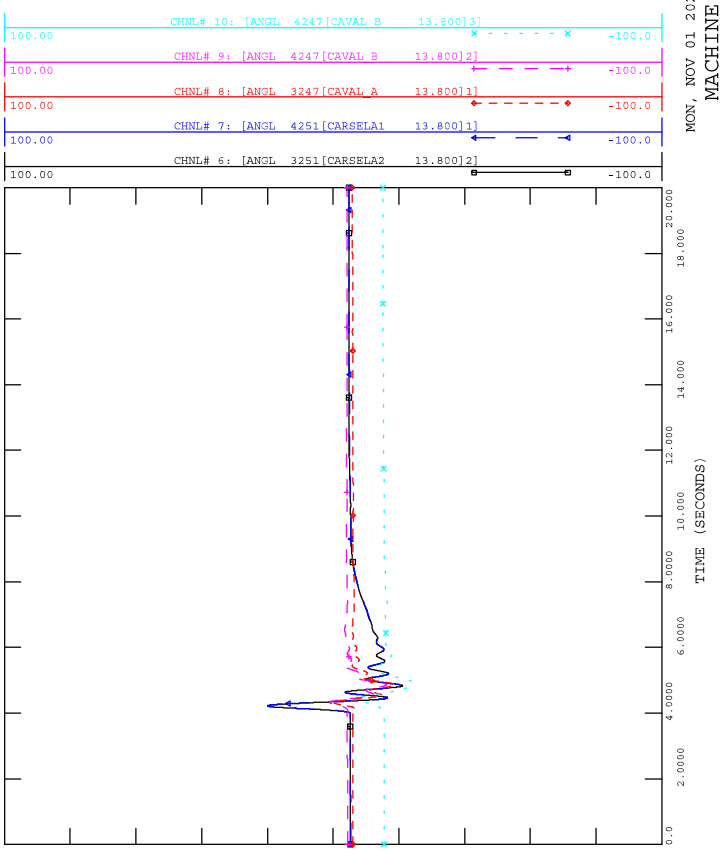
MON, NOV 01 2021 21:04
MACHINE VAR (1)



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04
MACHINE ANGEL



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

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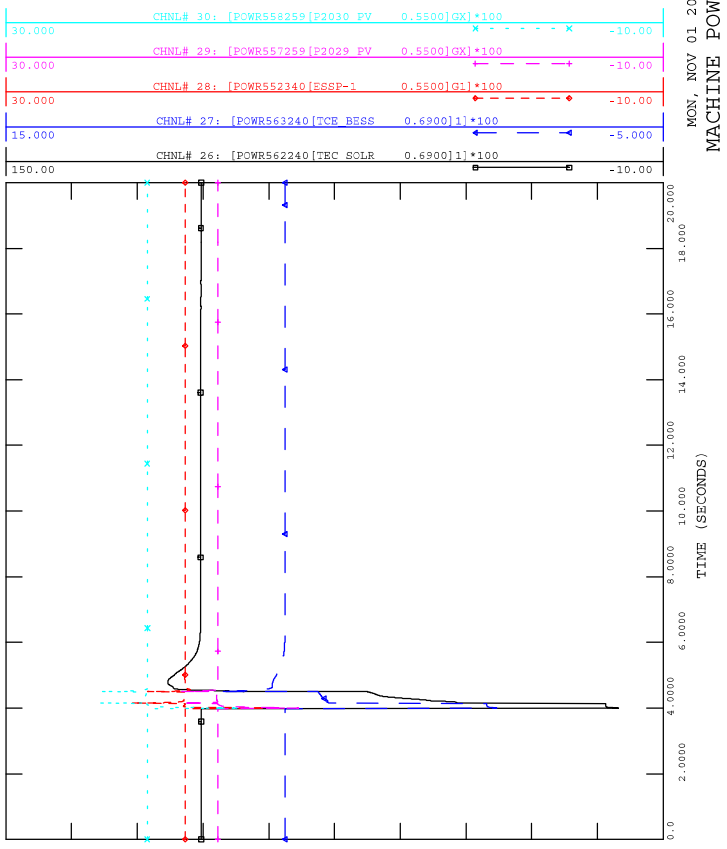
MON, NOV 01 2021 21:04
MACHINE POWER (2)



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (1)

CHNL# 68: [VOLT 4247 [CAVAL_B 13.800]]
CHNL# 67: [VOLT 3247 [CAVAL_A 13.800]]
CHNL# 66: [VOLT 4251 [CARSELA1 13.800]]
CHNL# 65: [VOLT 3251 [CARSELA2 13.800]]

TIME (SECONDS)

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04

LINE POWER (1)

CHNL# 87: [POWR 242 TO 640 CKT '34']
CHNL# 85: [POWR 239 TO 640 CKT '46']
CHNL# 83: [POWR 242 TO 886 CKT '27']
CHNL# 81: [POWR 239 TO 886 CKT '27']
CHNL# 79: [POWR 549240 TO 886 CKT '27']

TIME (SECONDS)

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04

MACHINE VAR (2)

CHNL# 45: [VARS558259[P2030_PV 0.5500]GX]*100
CHNL# 44: [VARS557259[P2029_PV 0.5500]GX]*100
CHNL# 43: [VARS552340[ESSP-1 0.5500]G1]*100
CHNL# 42: [VARS563240[TCE_BESS 0.6900]1]*100
CHNL# 41: [VARS562240[TEC_SOLR 0.6900]1]*100

TIME (SECONDS)

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (2)

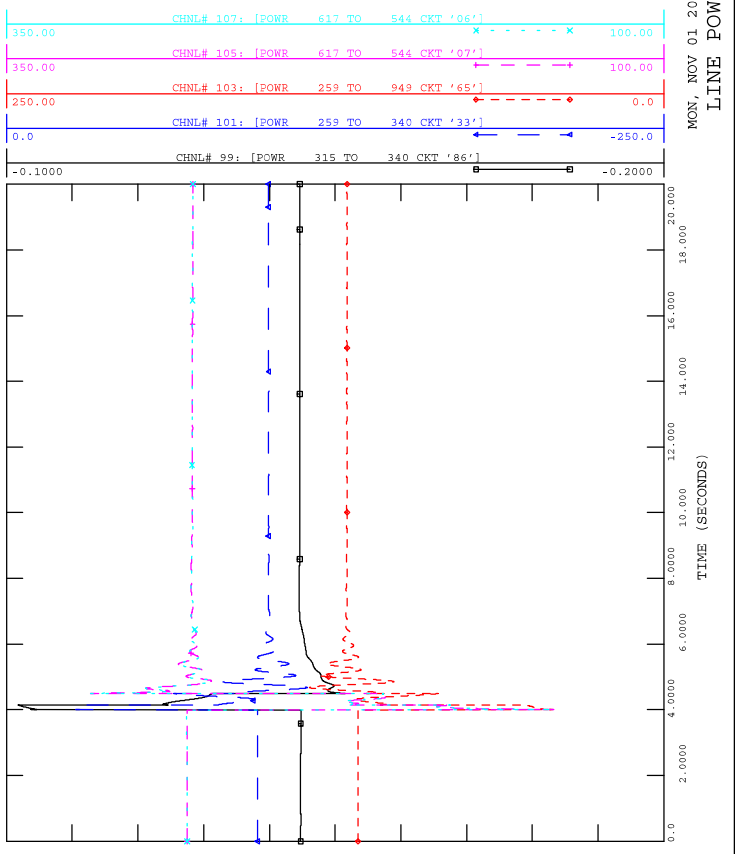
CHNL# 74: [VOLT 558259 [P2030_PV 0.5500]]
CHNL# 73: [VOLT 557259 [P2029_PV 0.5500]]
CHNL# 72: [VOLT 552340 [ESSP-1 0.5500]]
CHNL# 71: [VOLT 563240 [TCE_BESS 0.6900]]
CHNL# 70: [VOLT 562240 [TEC_SOLR 0.6900]]
CHNL# 69: [VOLT 549240 [SADLBK_T 138.00]]

TIME (SECONDS)

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_HighRiver_65S.out

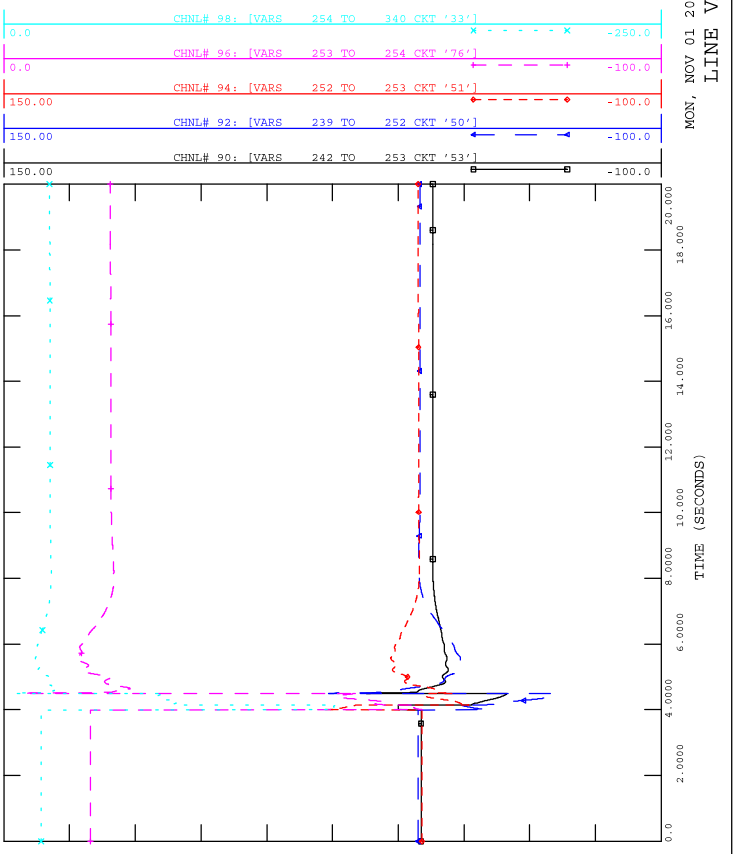
MON, NOV 01 2021 21:04
LINE POWER (3)



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

FILE: P2334_2024SP_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04
LINE VAR (2)



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

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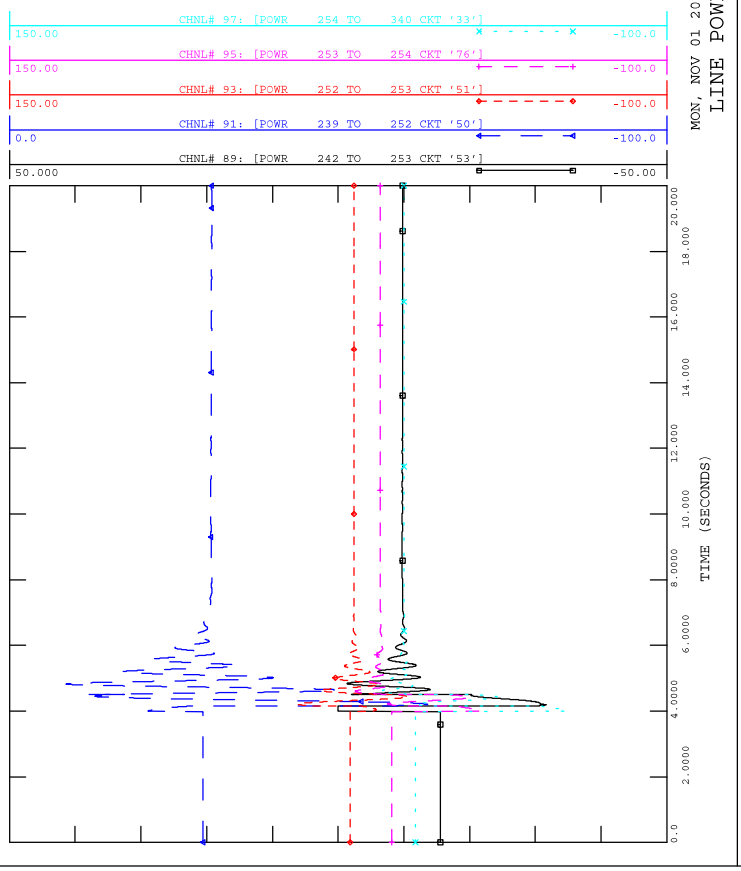
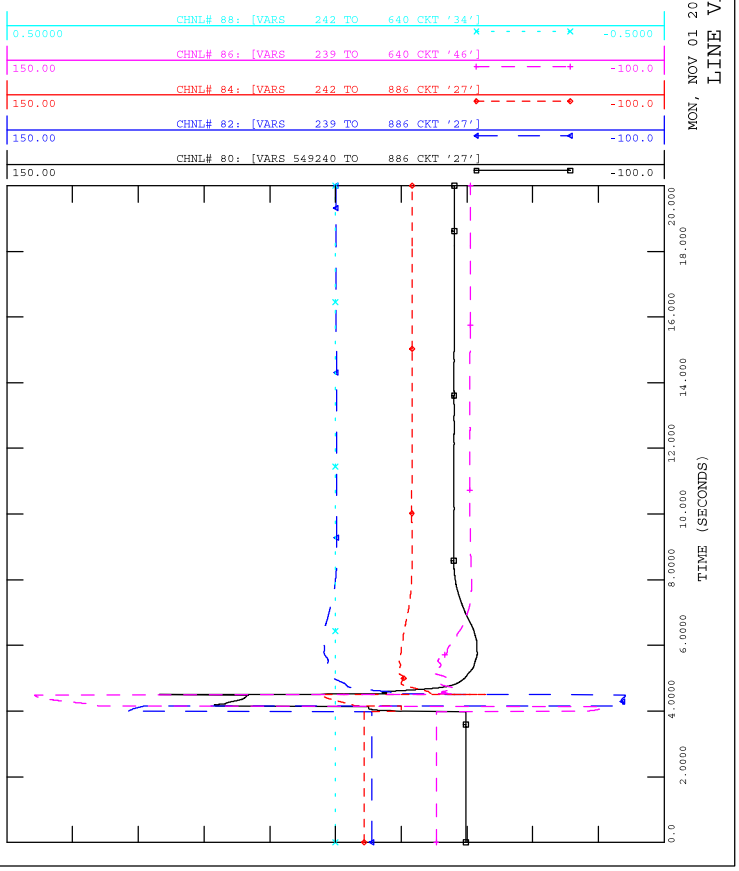
MON, NOV 01 2021 21:04
LINE POWER (2)



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

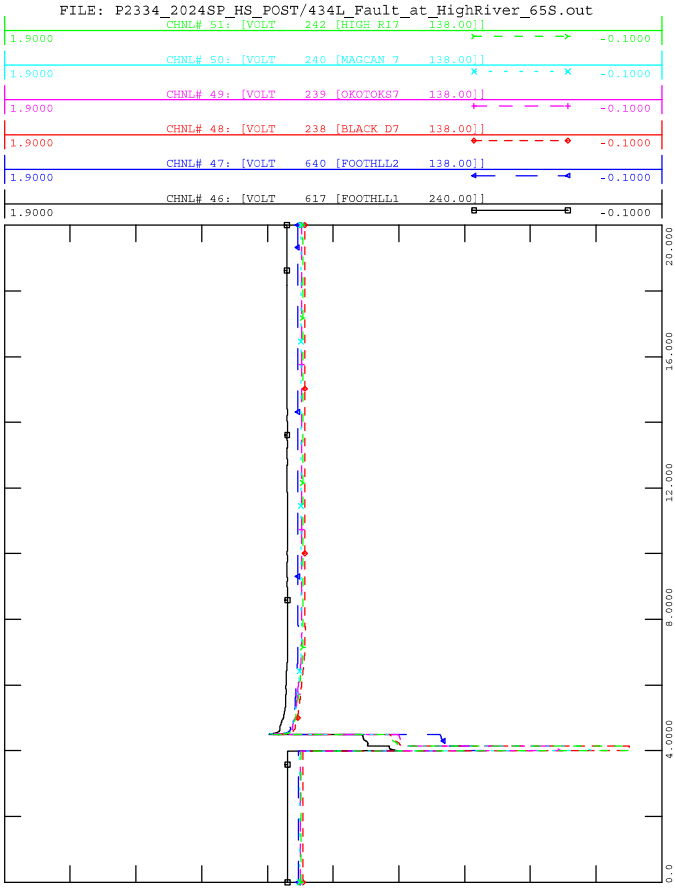
FILE: P2334_2024SP_HS_POST/434L_Fault_at_HighRiver_65S.out

MON, NOV 01 2021 21:04
LINE VAR (1)



P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

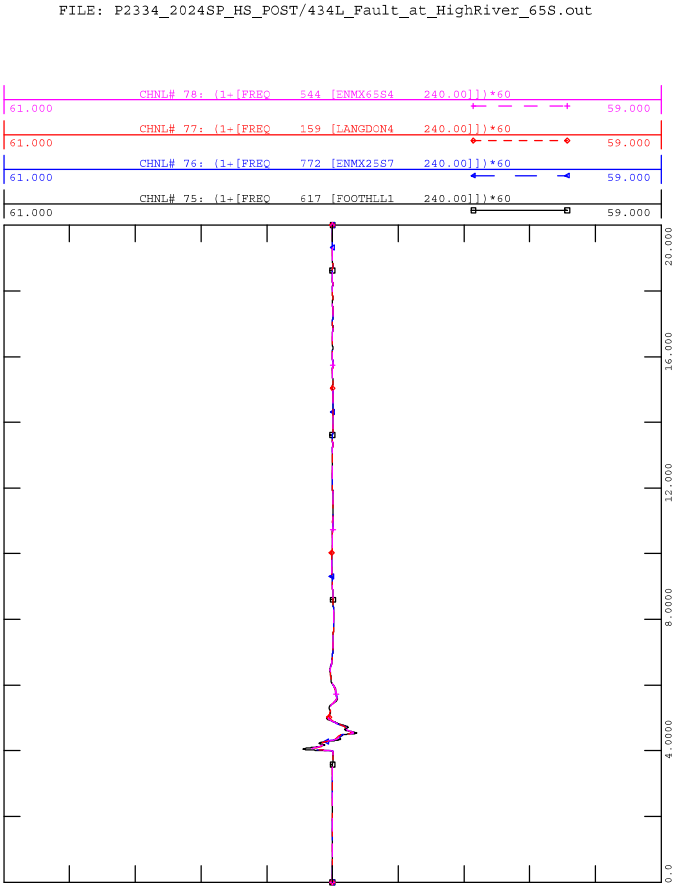
FILE: P2334_2024SP_HS_POST/434L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

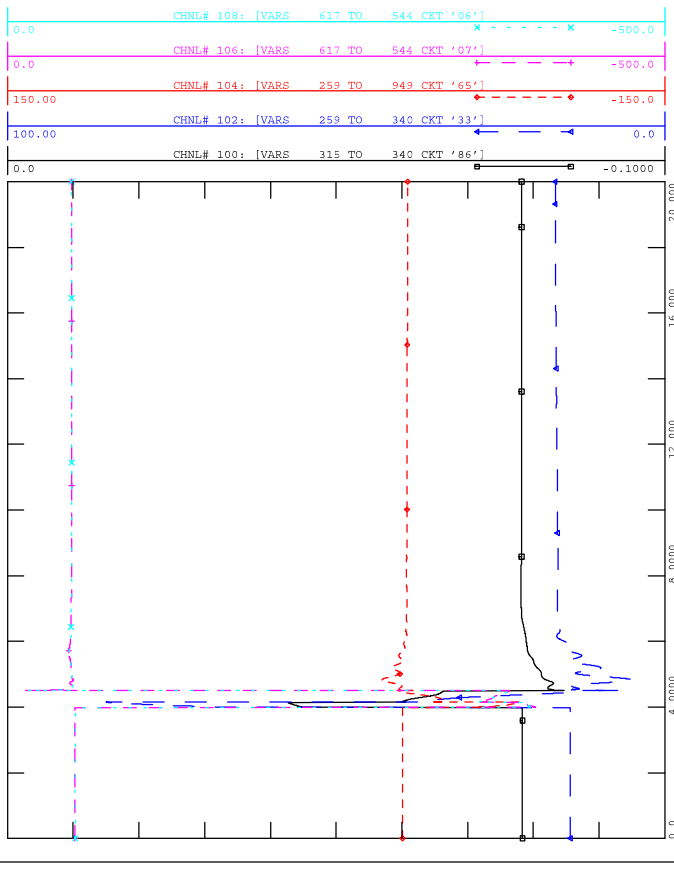
FILE: P2334_2024SP_HS_POST/434L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
FREQUENCY

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

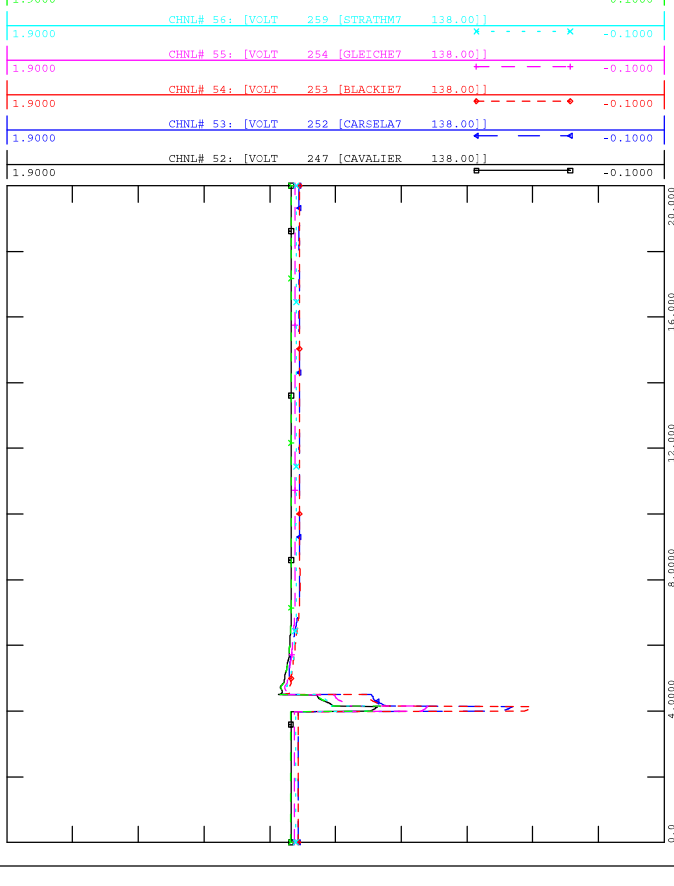
FILE: P2334_2024SP_HS_POST/434L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
LINE VAR (3)

P2334_2024SP_HS_POST
CATB -434L_FAULT_AT_HIGHRIVER_65S

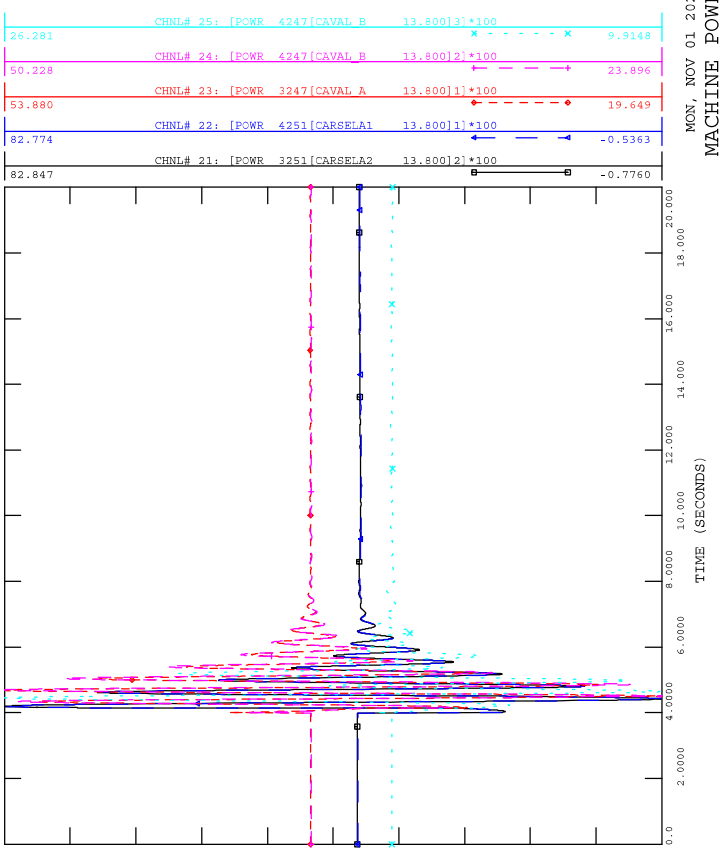
FILE: P2334_2024SP_HS_POST/434L_Fault_at_HighRiver_65S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

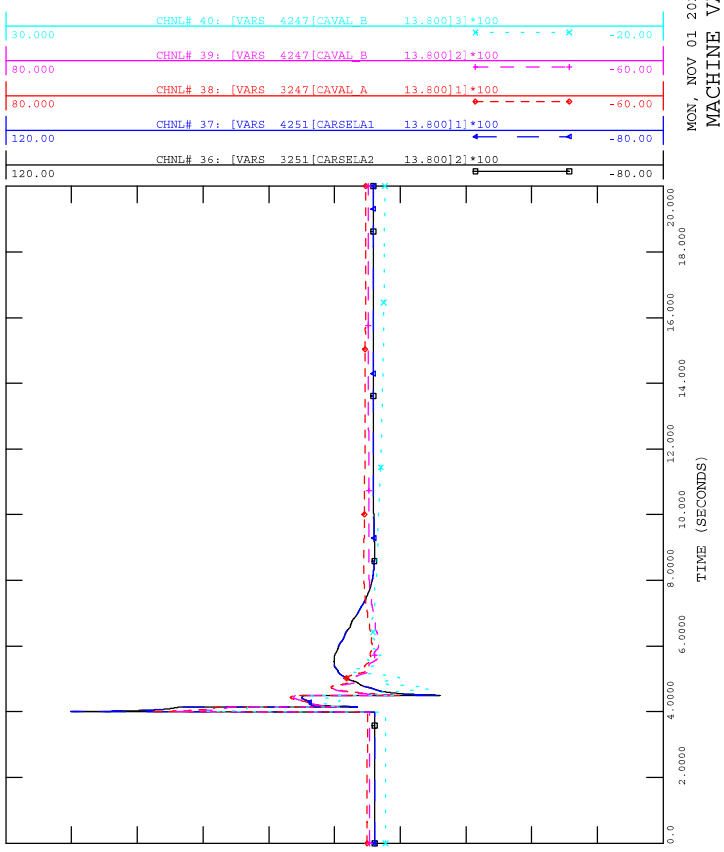
P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out



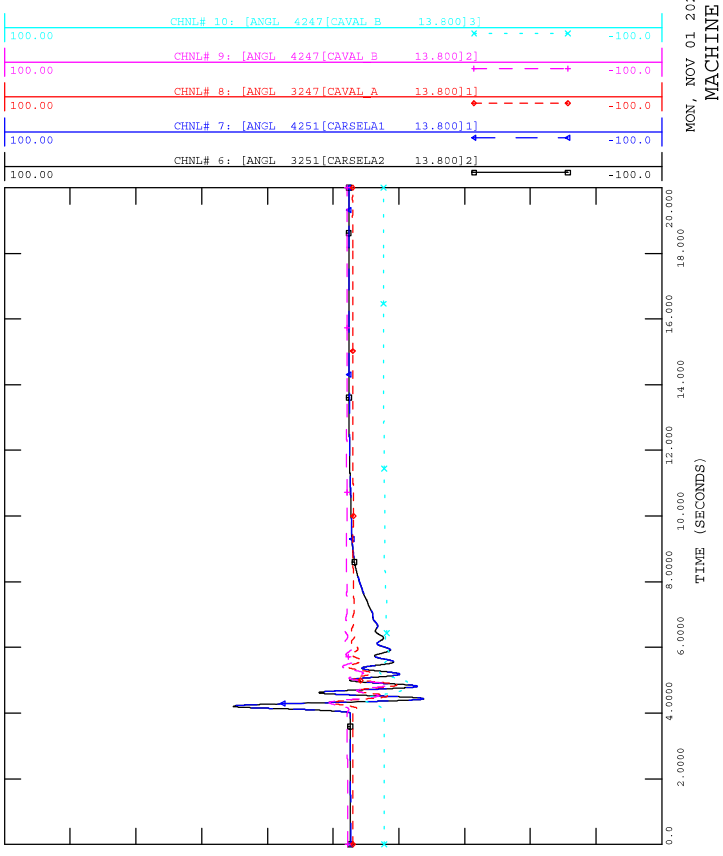
P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

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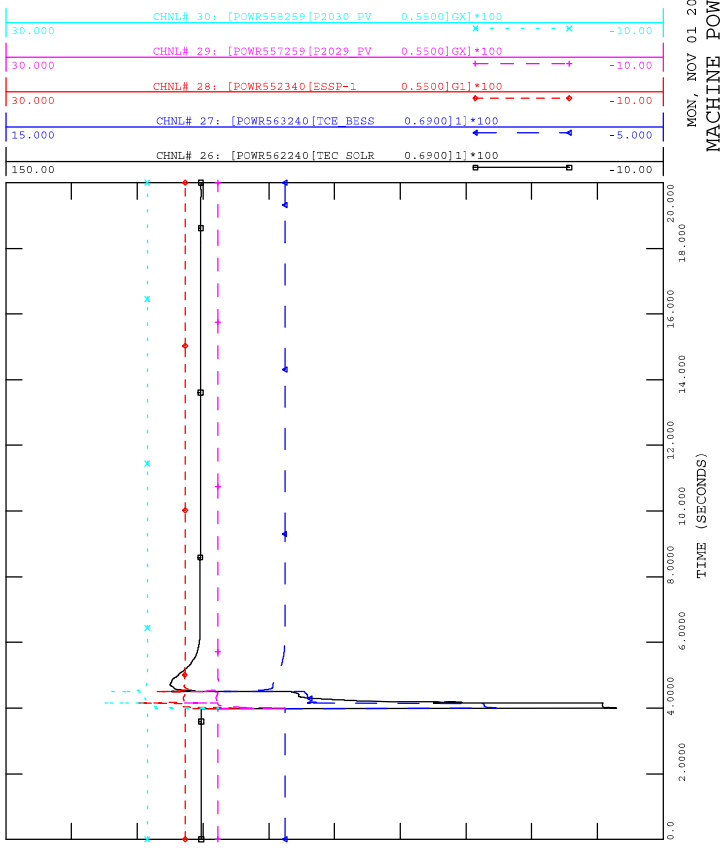
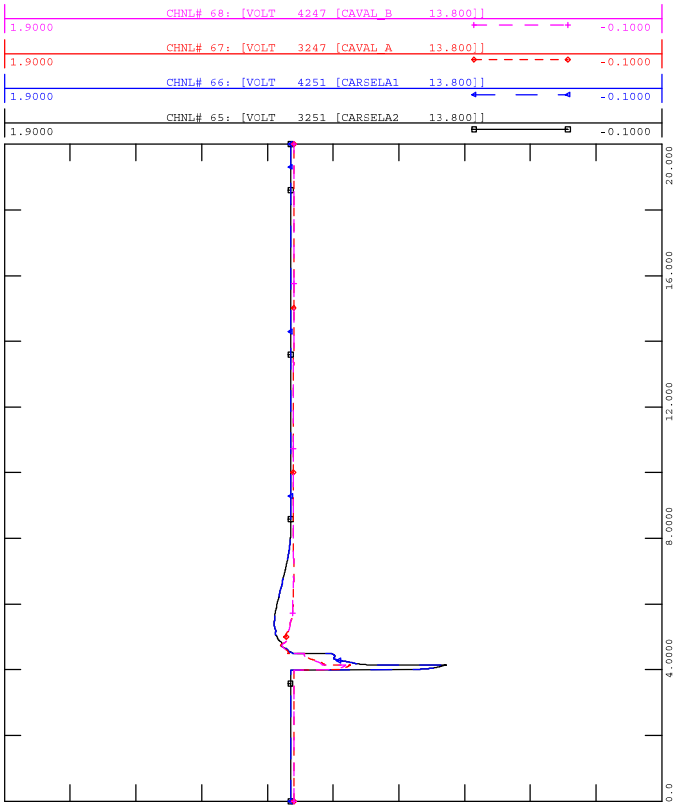


P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out

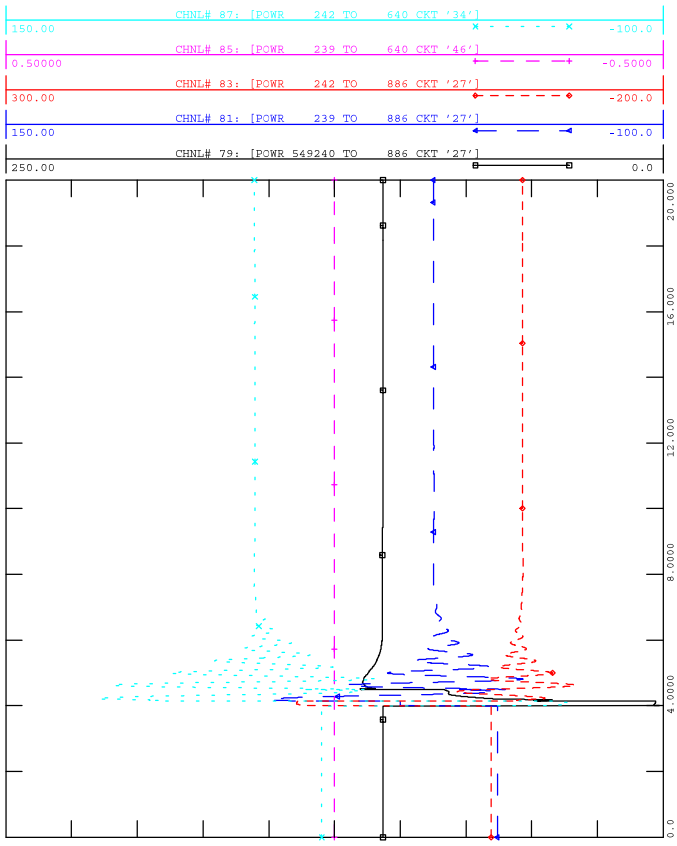
MON, NOV 01 2021 21:04
MACHINE VOLTAGE (1)



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out

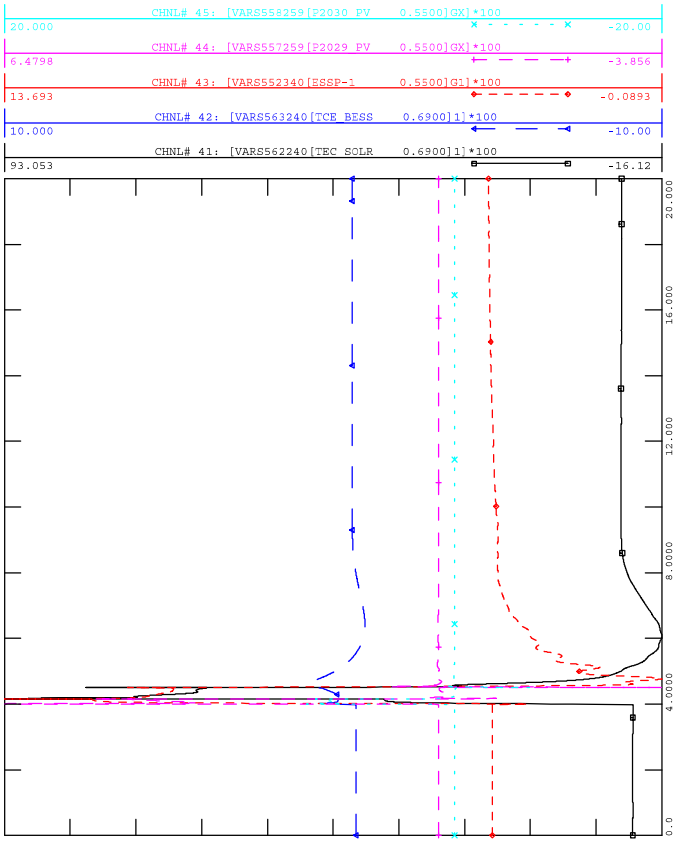
MON, NOV 01 2021 21:04
LINE POWER (1)



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out

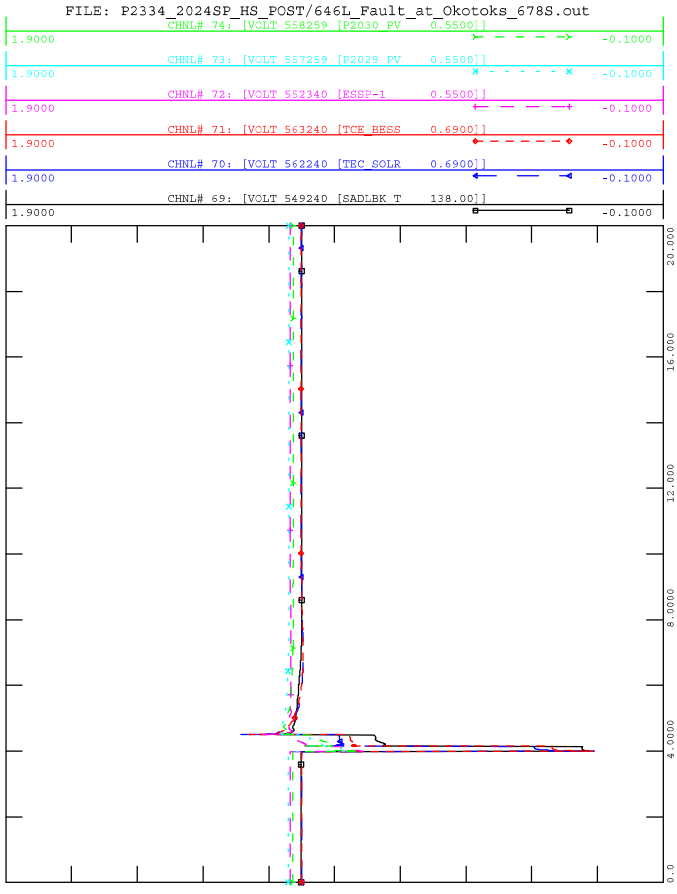
MON, NOV 01 2021 21:04
MACHINE VAR (2)



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out

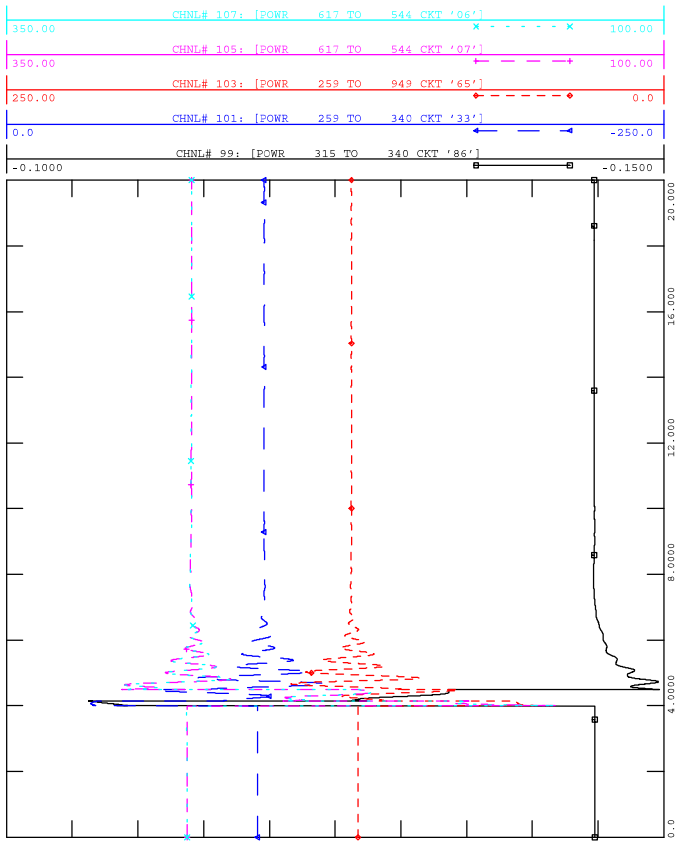
MON, NOV 01 2021 21:04
MACHINE VOLTAGE (2)



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out

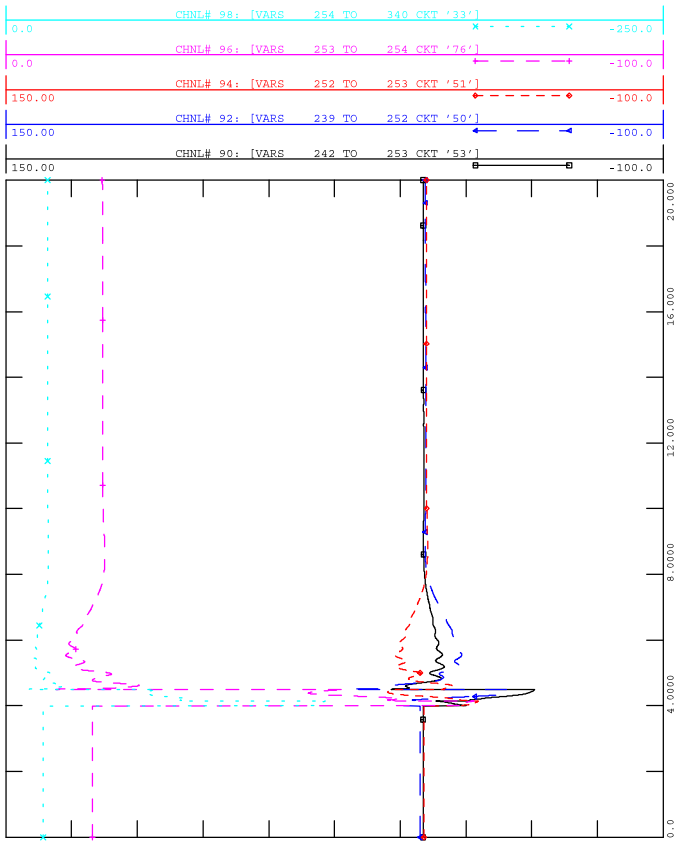
MON, NOV 01 2021 21:04
LINE POWER (3)



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out

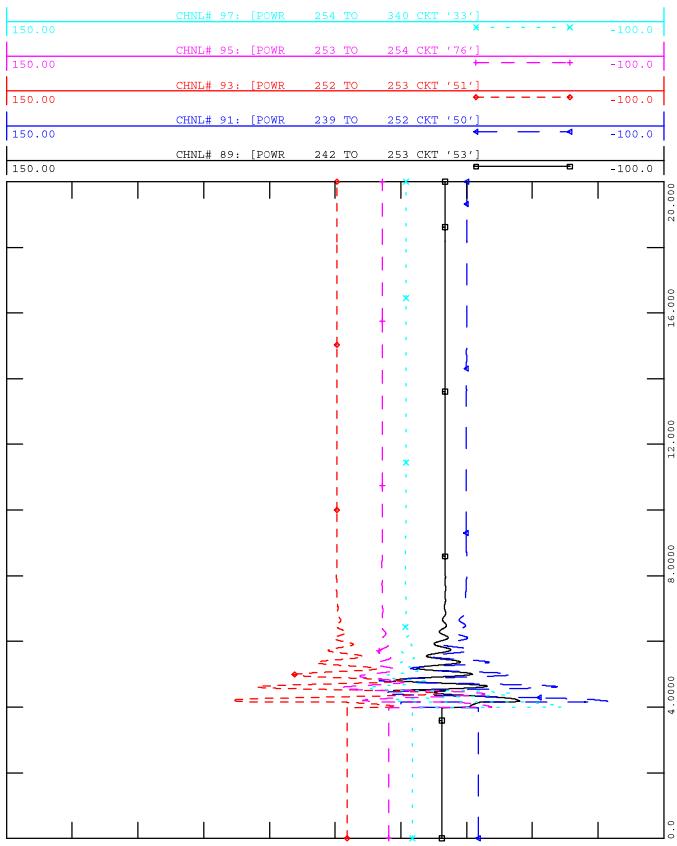
MON, NOV 01 2021 21:04
LINE VAR (2)



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out

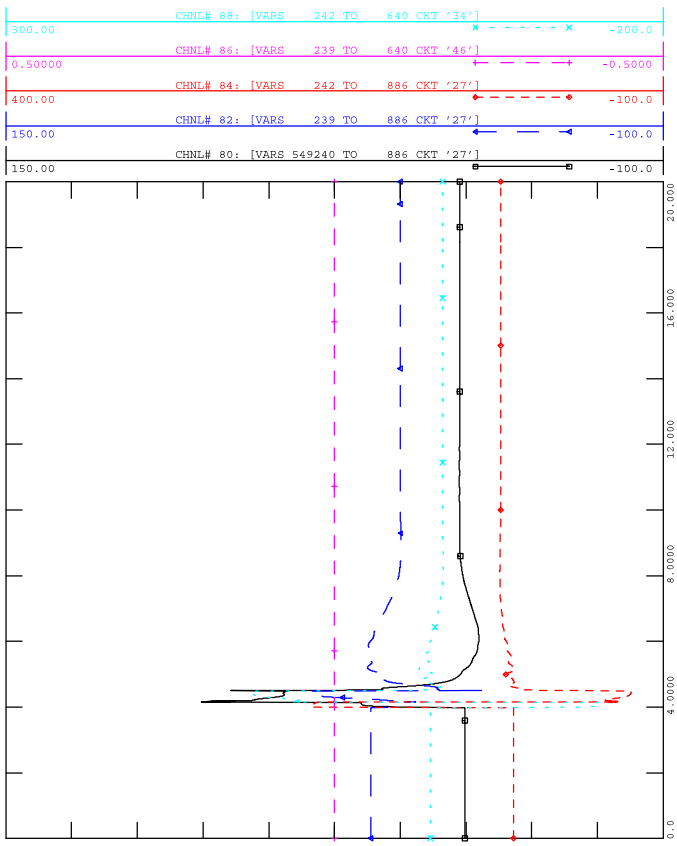
MON, NOV 01 2021 21:04
LINE POWER (2)

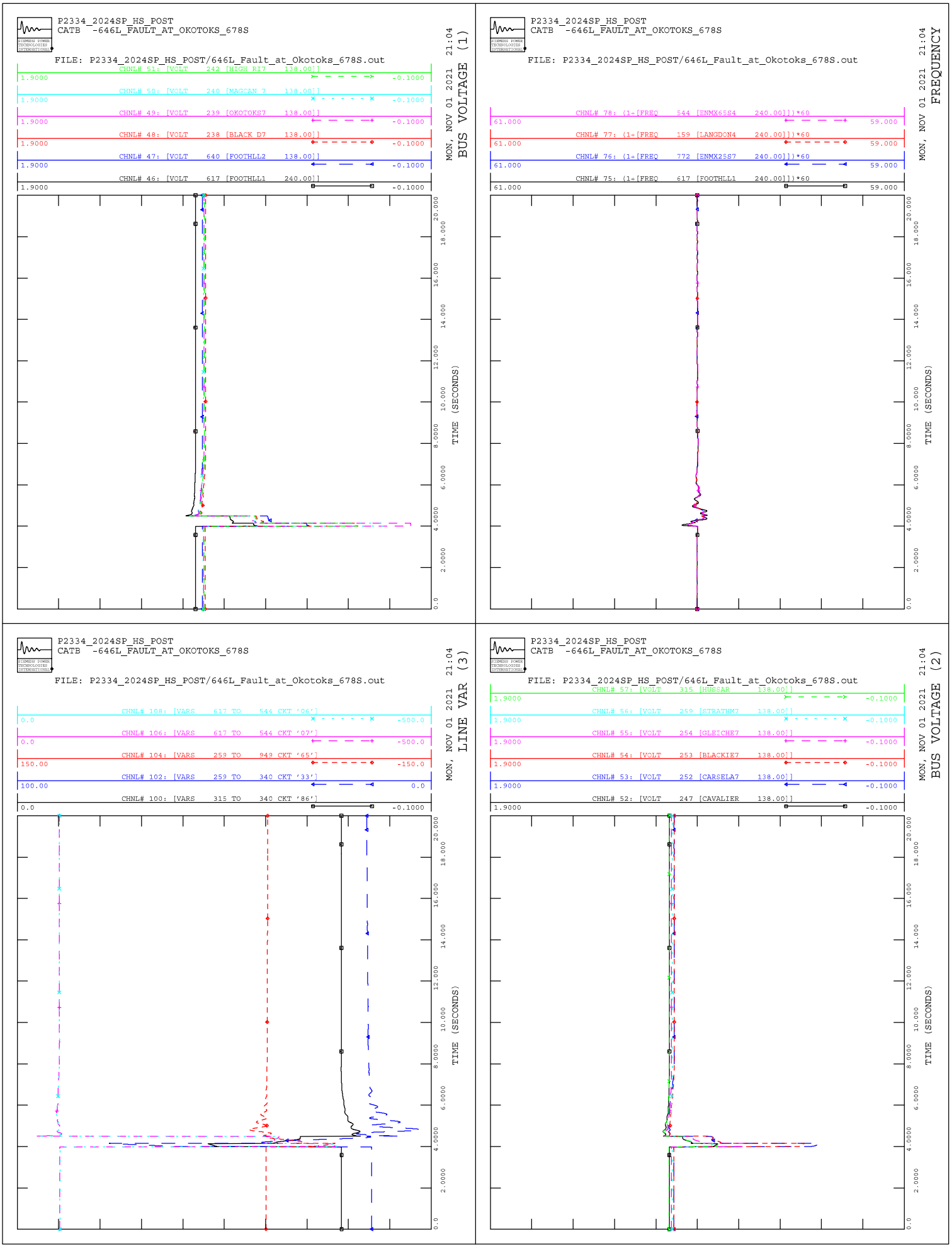


P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out

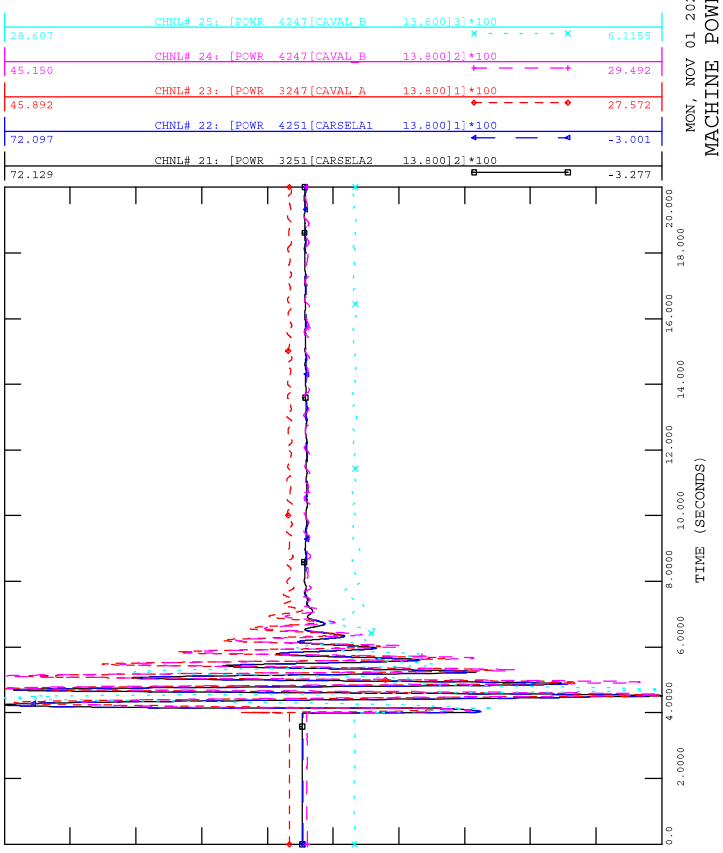
MON, NOV 01 2021 21:04
LINE VAR (1)




P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S
FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out
CHNL# 51: [VOLT 242 [HIGH RI7 138.00]]
CHNL# 50: [VOLT 240 [MAGCAN 7 138.00]]
CHNL# 49: [VOLT 239 [OKOTOKS7 138.00]]
CHNL# 48: [VOLT 238 [BLACK D7 138.00]]
CHNL# 47: [VOLT 640 [FOOTHLL2 138.00]]
CHNL# 46: [VOLT 617 [FOOTHLL1 240.00]]
1.9000
-0.1000
MON, NOV 01 2021 21:04
BUS VOLTAGE (1)
TIME (SECONDS)
0.0
2.0000
4.0000
6.0000
8.0000
10.000
12.000
14.000
16.000
18.000
20.000
P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S
FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out
CHNL# 78: (1+[FREQ 544 [ENMX65S4 240.00]])*60
CHNL# 77: (1+[FREQ 159 [LANGDON4 240.00]])*60
CHNL# 76: (1+[FREQ 772 [ENMX25S7 240.00]])*60
CHNL# 75: (1+[FREQ 617 [FOOTHLL1 240.00]])*60
61.000
59.000
MON, NOV 01 2021 21:04
FREQUENCY
TIME (SECONDS)
P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S
FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out
CHNL# 108: [VARS 617 TO 544 CKT '06']
CHNL# 106: [VARS 617 TO 544 CKT '07']
CHNL# 104: [VARS 259 TO 943 CKT '65']
CHNL# 102: [VARS 259 TO 340 CKT '33']
CHNL# 100: [VARS 315 TO 340 CKT '86']
0.0
100.00
150.00
-500.0
-150.0
MON, NOV 01 2021 21:04
LINE VAR (3)
TIME (SECONDS)
P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_OKOTOKS_678S
FILE: P2334_2024SP_HS_POST/646L_Fault_at_Okotoks_678S.out
CHNL# 57: [VOLT 315 [HUSSAR 138.00]]
CHNL# 56: [VOLT 259 [STRATHM7 138.00]]
CHNL# 55: [VOLT 254 [GLEICHE7 138.00]]
CHNL# 54: [VOLT 253 [BLACKIE7 138.00]]
CHNL# 53: [VOLT 252 [CARSELA7 138.00]]
CHNL# 52: [VOLT 247 [CAVALIER 138.00]]
MON, NOV 01 2021 21:04
BUS VOLTAGE (2)
TIME (SECONDS)

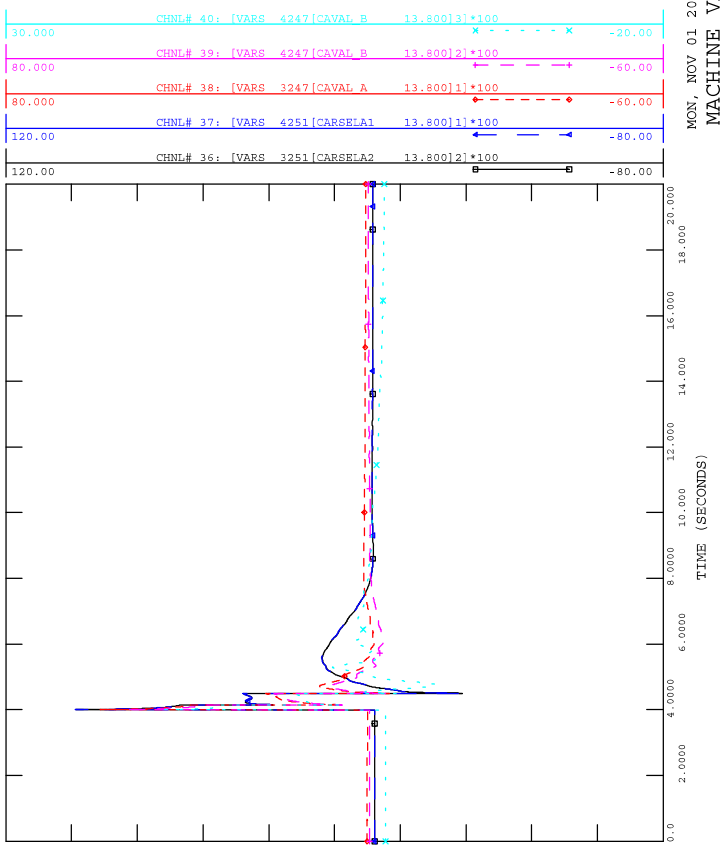
P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out



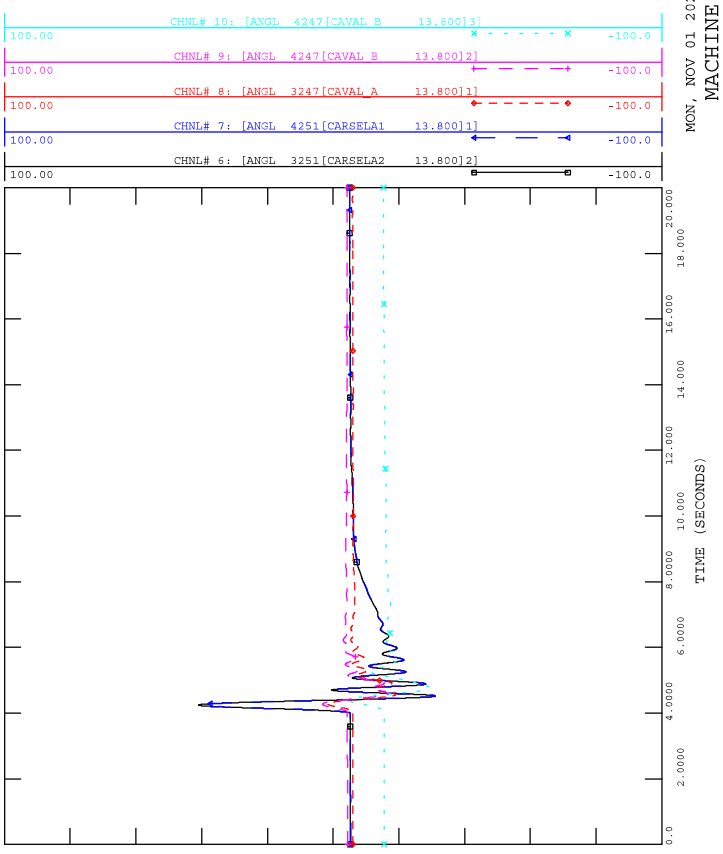
P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out



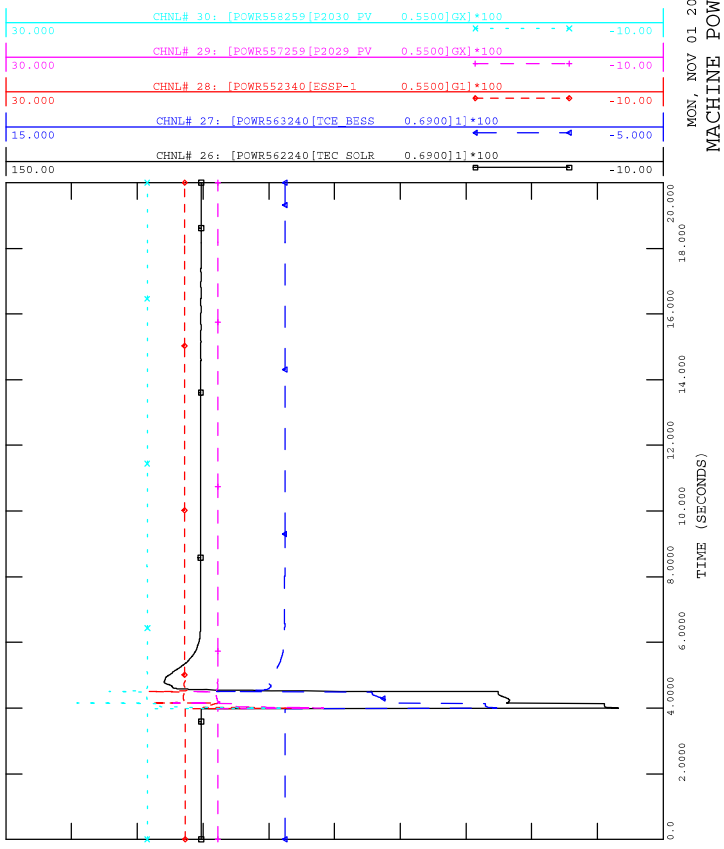
P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

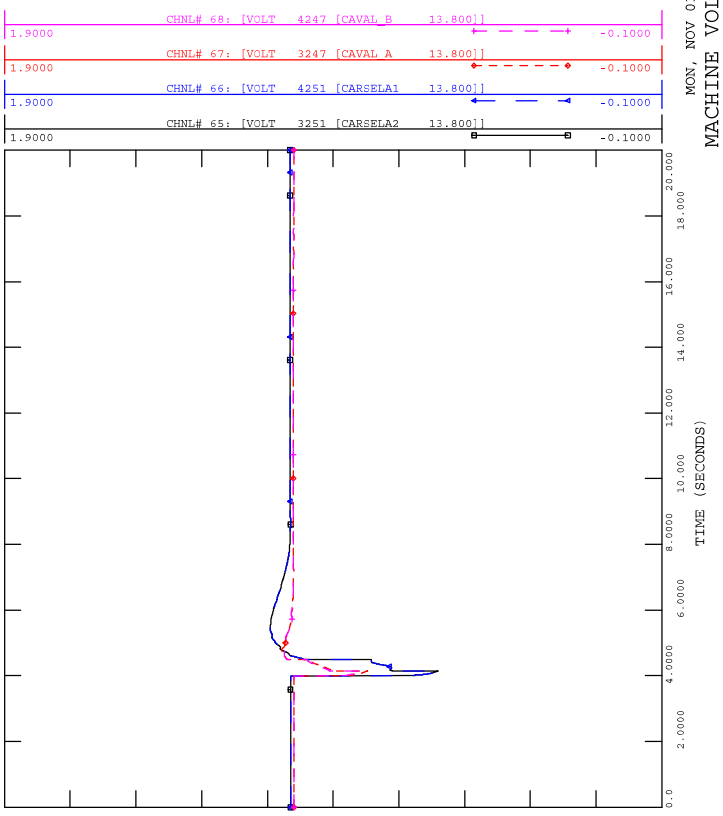
FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (1)

CHNL# 68: [VOLT 4247 [CAVAL_B 13.800]]
CHNL# 67: [VOLT 3247 [CAVAL_A 13.800]]
CHNL# 66: [VOLT 4251 [CARSELA1 13.800]]
CHNL# 65: [VOLT 3251 [CARSELA2 13.800]]

TIME (SECONDS)



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

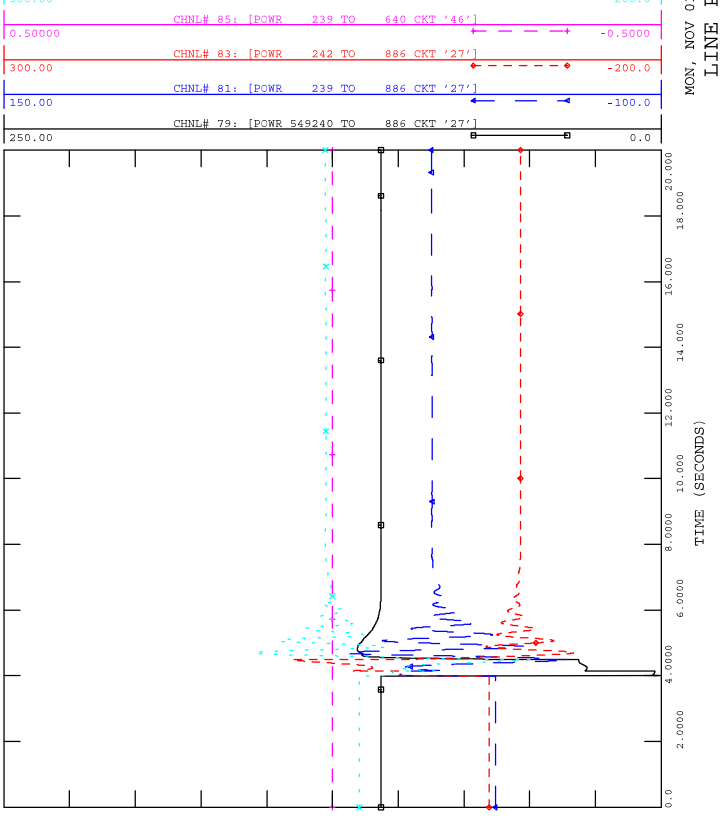
FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

LINE POWER (1)

CHNL# 87: [POWR 242 TO 640 CKT '34']
CHNL# 85: [POWR 239 TO 640 CKT '46']
CHNL# 83: [POWR 242 TO 886 CKT '27']
CHNL# 81: [POWR 239 TO 886 CKT '27']
CHNL# 79: [POWR 549240 TO 886 CKT '27']

TIME (SECONDS)



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

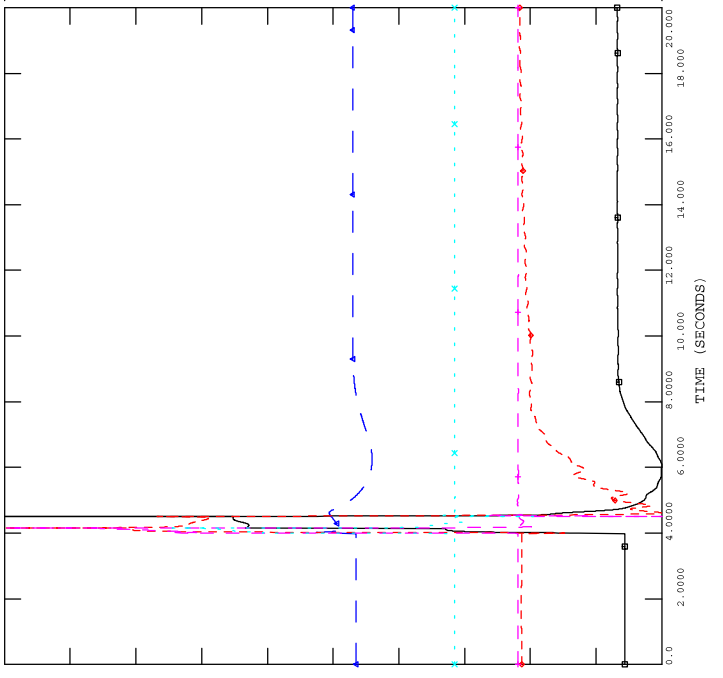
FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

MACHINE VAR (2)

CHNL# 45: [VARS558259[P2030_PV 0.5500]GX]*100
CHNL# 44: [VARS557259[P2029_PV 0.5500]GX]*100
CHNL# 43: [VARS552340[ESSP-1 0.5500]G1]*100
CHNL# 42: [VARS563240[TCE_BESS 0.6900]1]*100
CHNL# 41: [VARS562240[TEC_SOLR 0.6900]1]*100

TIME (SECONDS)



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

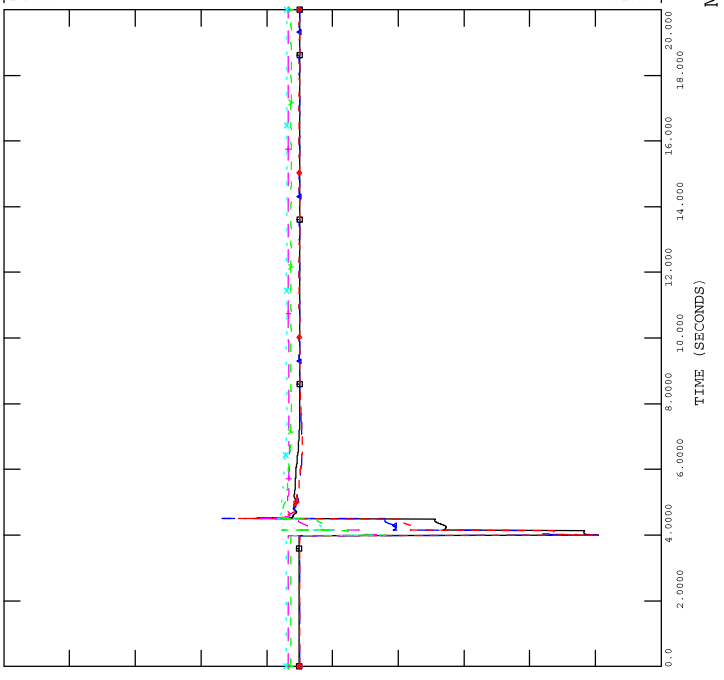
FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (2)

CHNL# 74: [VOLT 558259 [P2030_PV 0.5500]]
CHNL# 73: [VOLT 557259 [P2029_PV 0.5500]]
CHNL# 72: [VOLT 552340 [ESSP-1 0.5500]]
CHNL# 71: [VOLT 563240 [TCE_BESS 0.6900]]
CHNL# 70: [VOLT 562240 [TEC_SOLR 0.6900]]
CHNL# 69: [VOLT 549240 [SADLBK_T 138.00]]

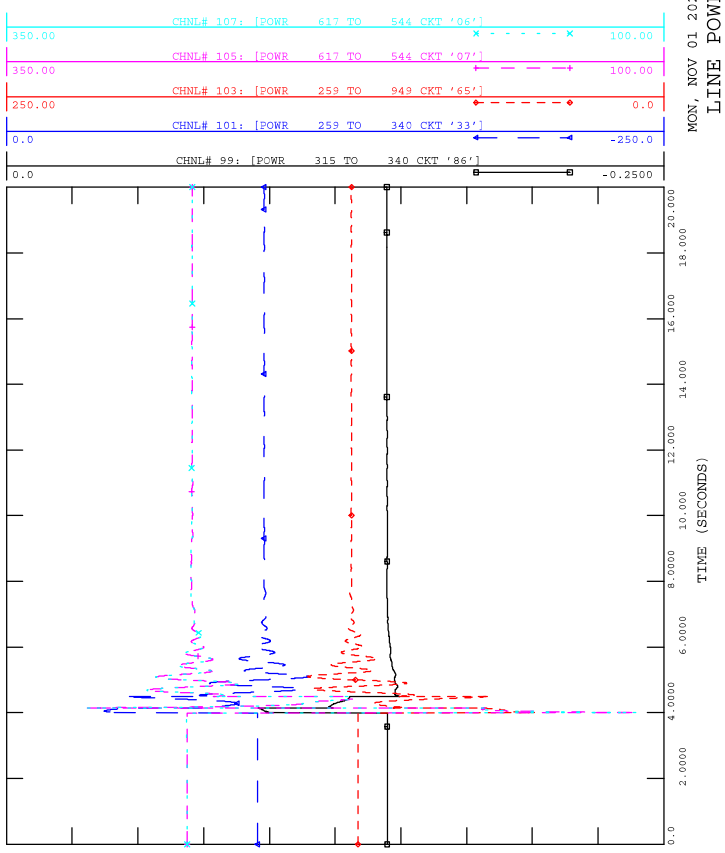
TIME (SECONDS)



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out

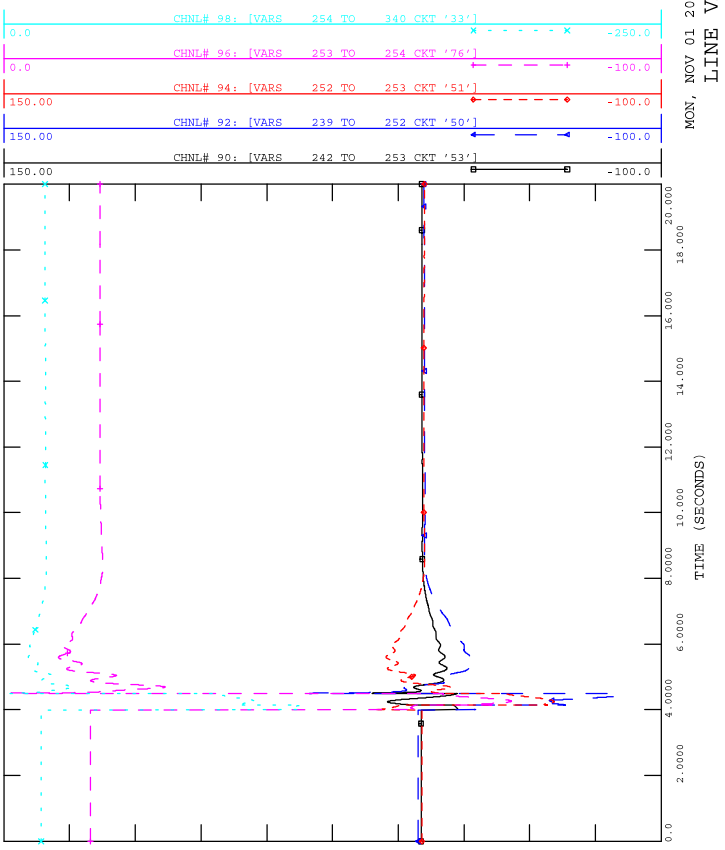
MON, NOV 01 2021 21:04
LINE POWER (3)



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out

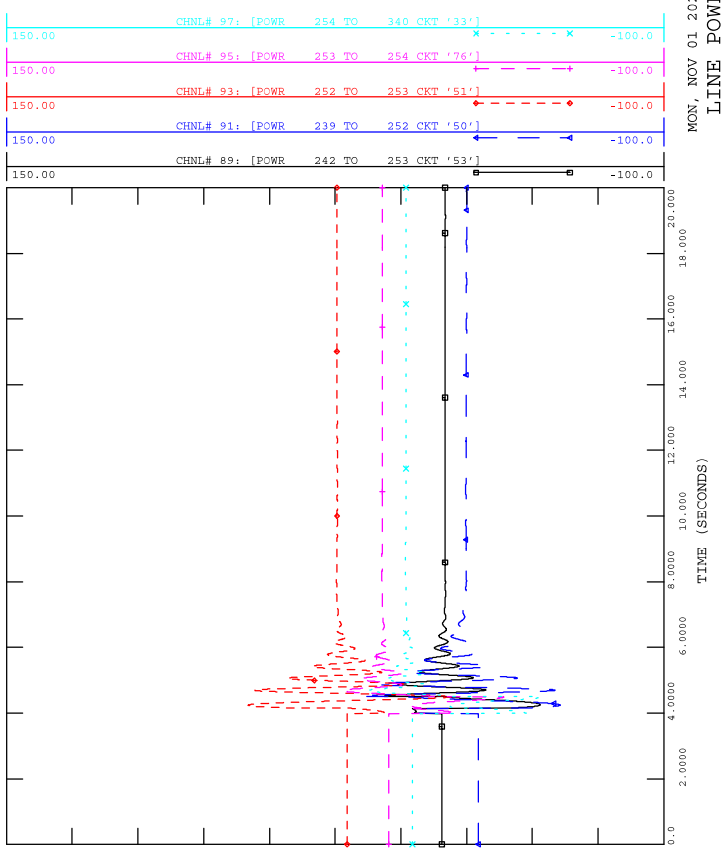
MON, NOV 01 2021 21:04
LINE VAR (2)



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out

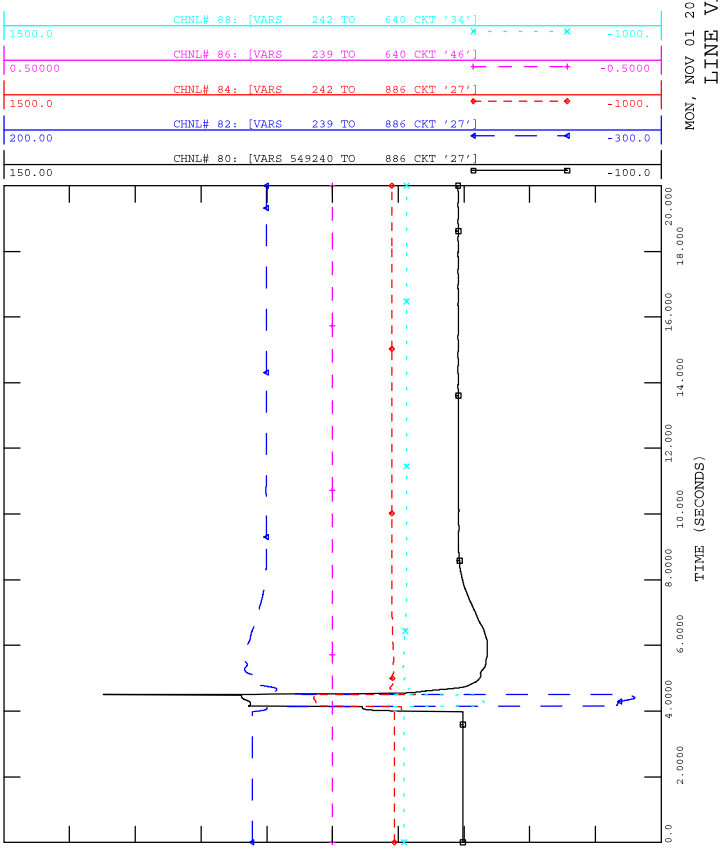
MON, NOV 01 2021 21:04
LINE POWER (2)



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

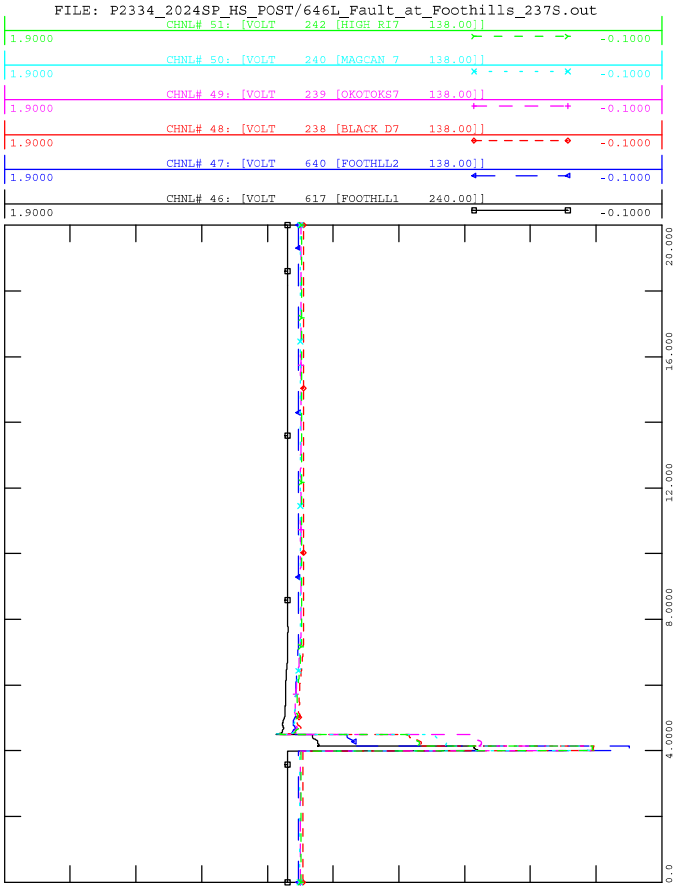
FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04
LINE VAR (1)



P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

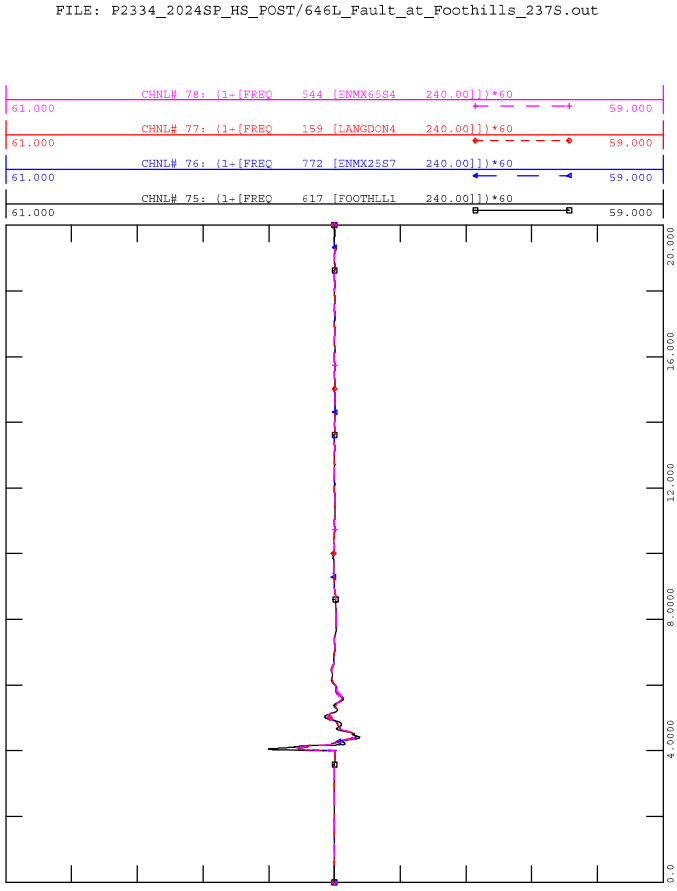
FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

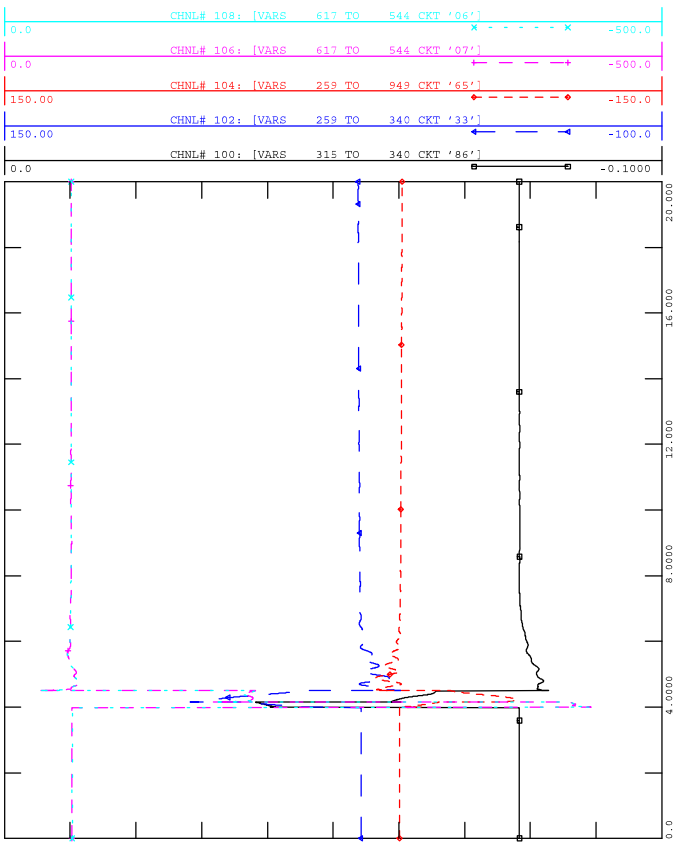
FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
FREQUENCY

P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

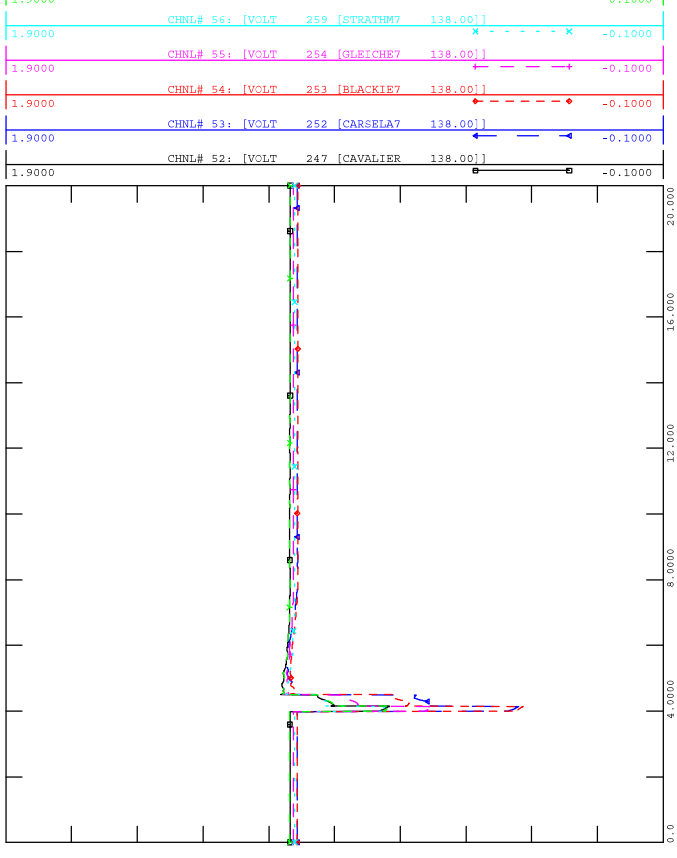
FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
LINE VAR (3)

P2334_2024SP_HS_POST
CATB -646L_FAULT_AT_FOOTHILLS_237S

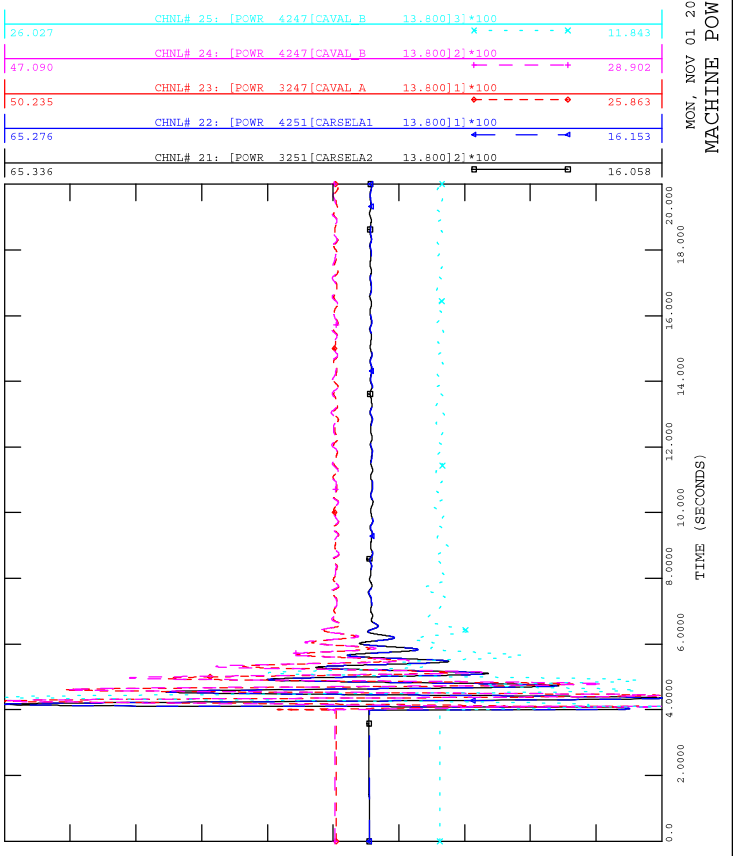
FILE: P2334_2024SP_HS_POST/646L_Fault_at_Foothills_237S.out



MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

P2334_2024SP_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/1106L_Fault_at_Foothills_237S.out



P2334_2024SP_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

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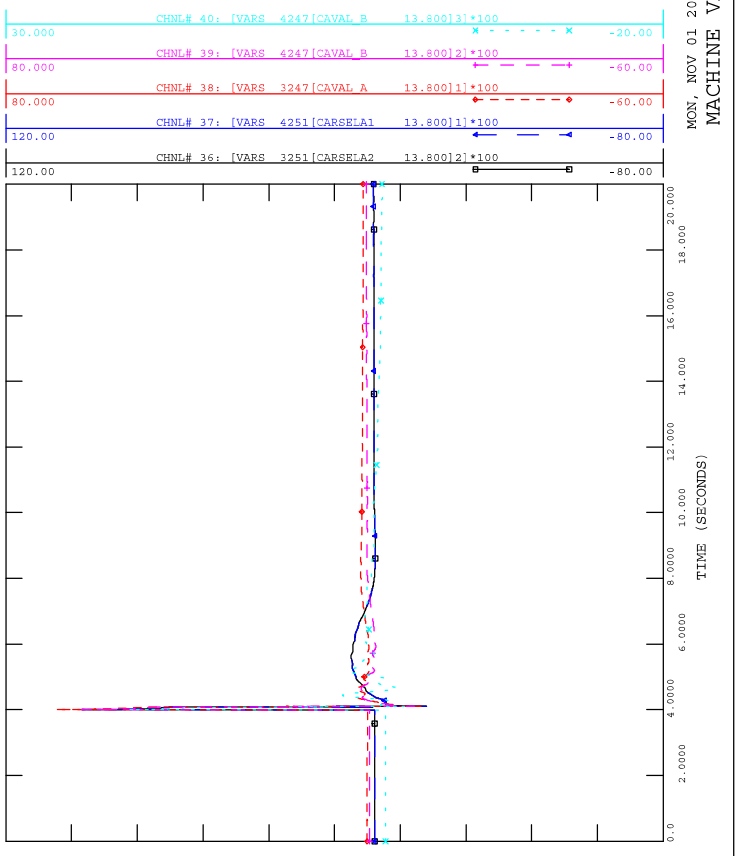

P2334_2024SP_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

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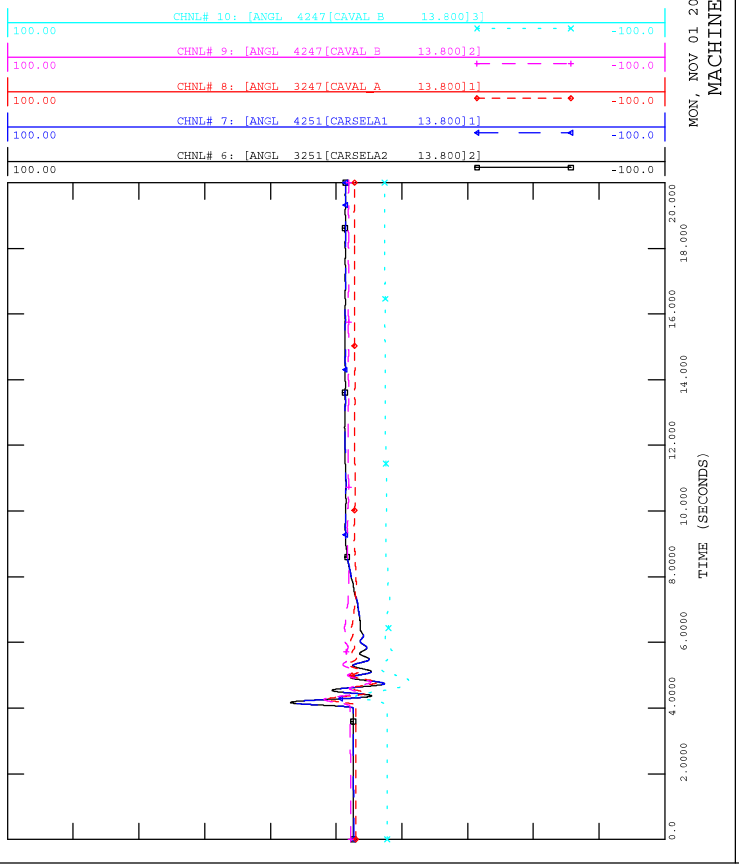
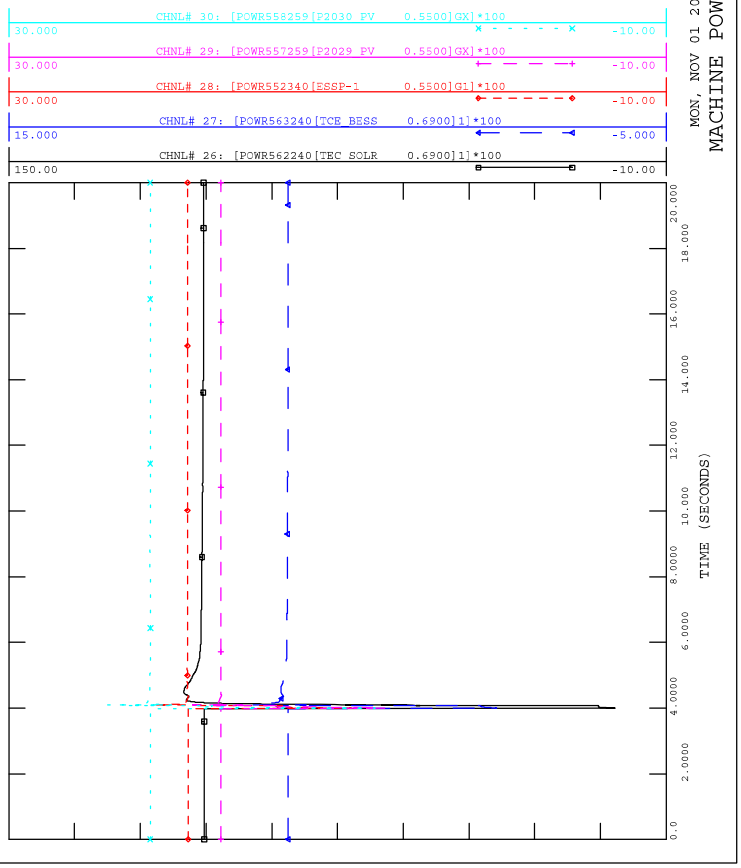


P2334_2024SP_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/1106L_Fault_at_Foothills_237S.out

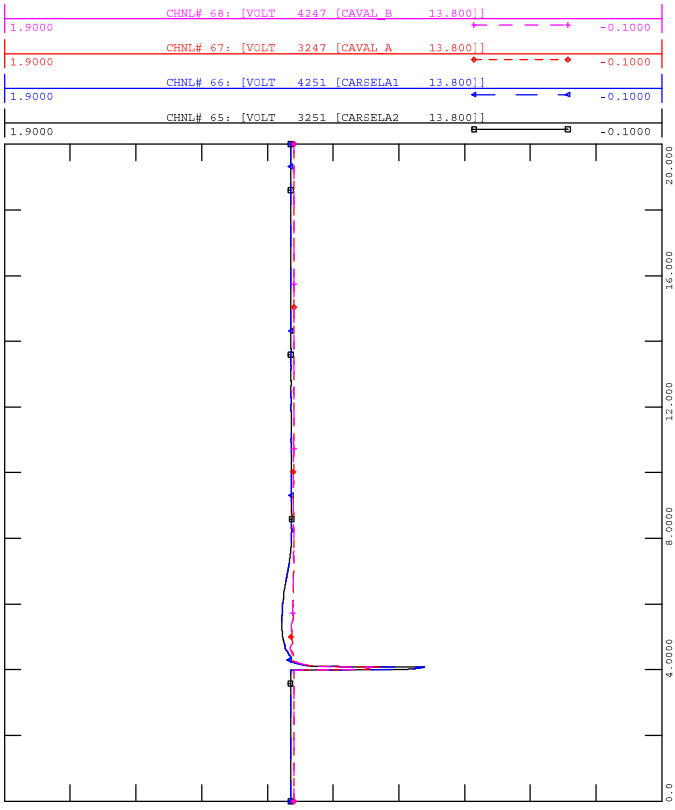


P2334_2024SP_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/1106L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

MACHINE VOLTAGE (1)

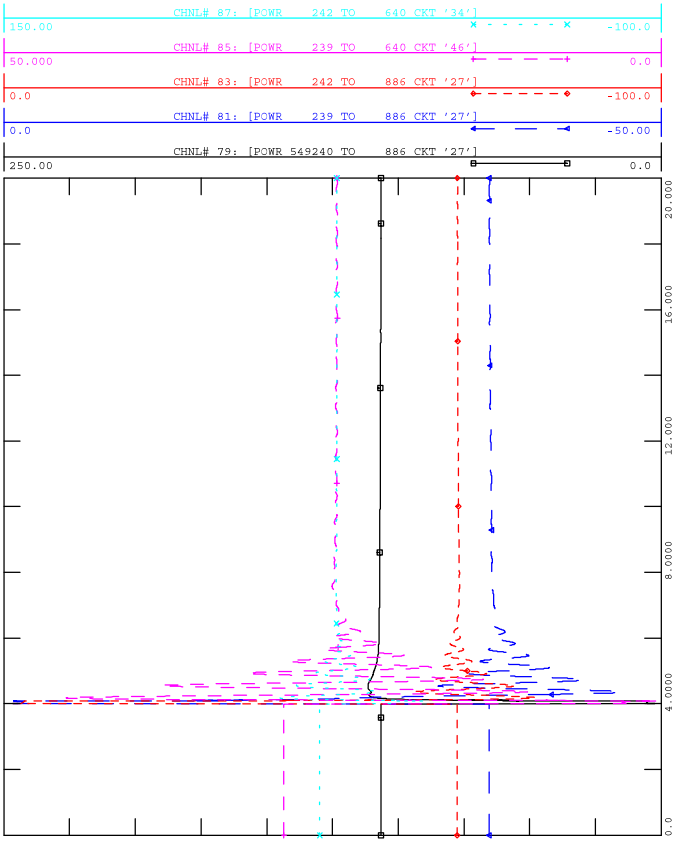


P2334_2024SP_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/1106L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

LINE POWER (1)

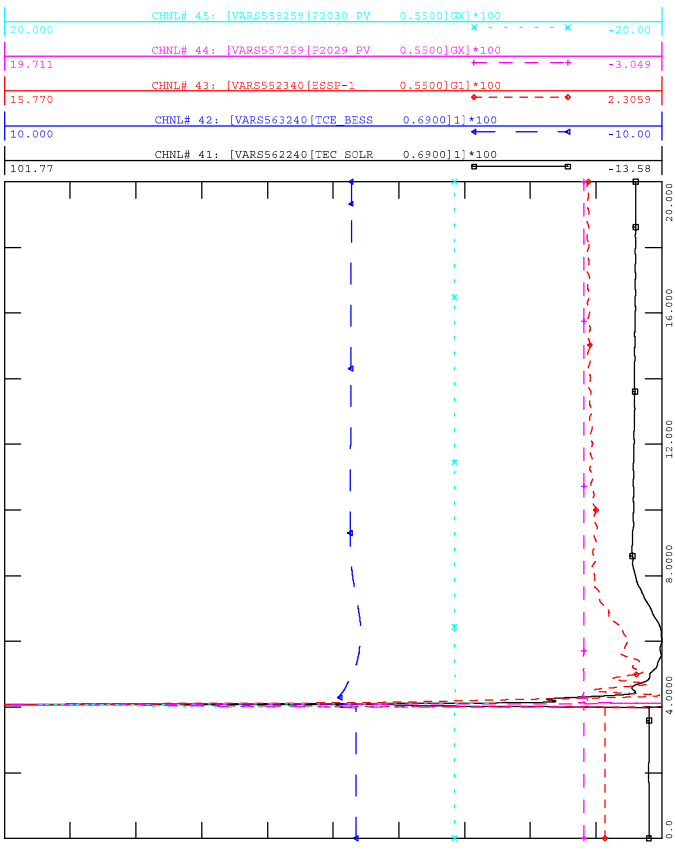


P2334_2024SP_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

FILE: P2334_2024SP_HS_POST/1106L_Fault_at_Foothills_237S.out

MON, NOV 01 2021 21:04

MACHINE VAR (2)



P2334_2024SP_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

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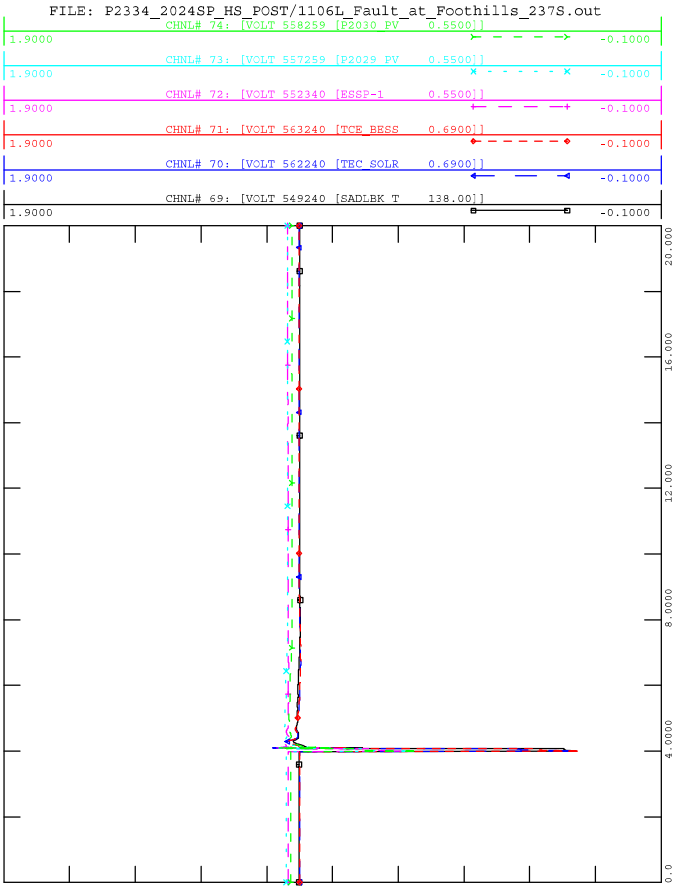
MON, NOV 01 2021 21:04

MACHINE VOLTAGE (2)



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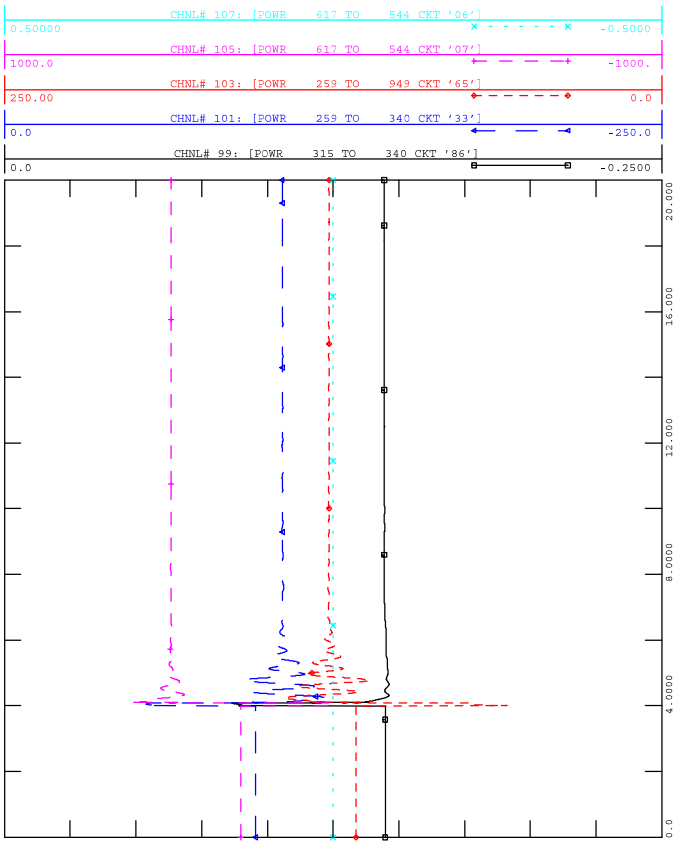
MON, NOV 01 2021 21:04
LINE POWER (3)



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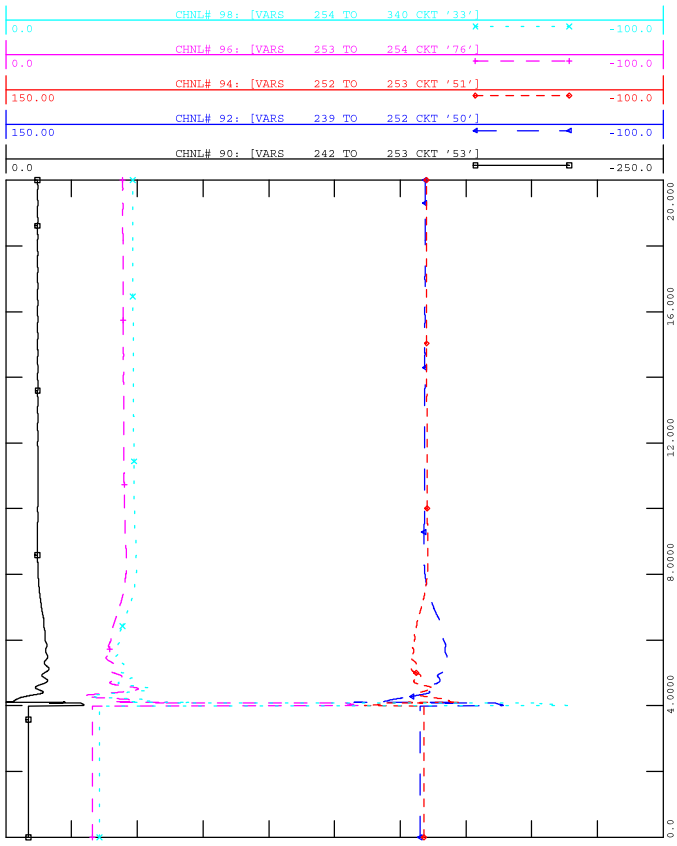

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MON, NOV 01 2021 21:04
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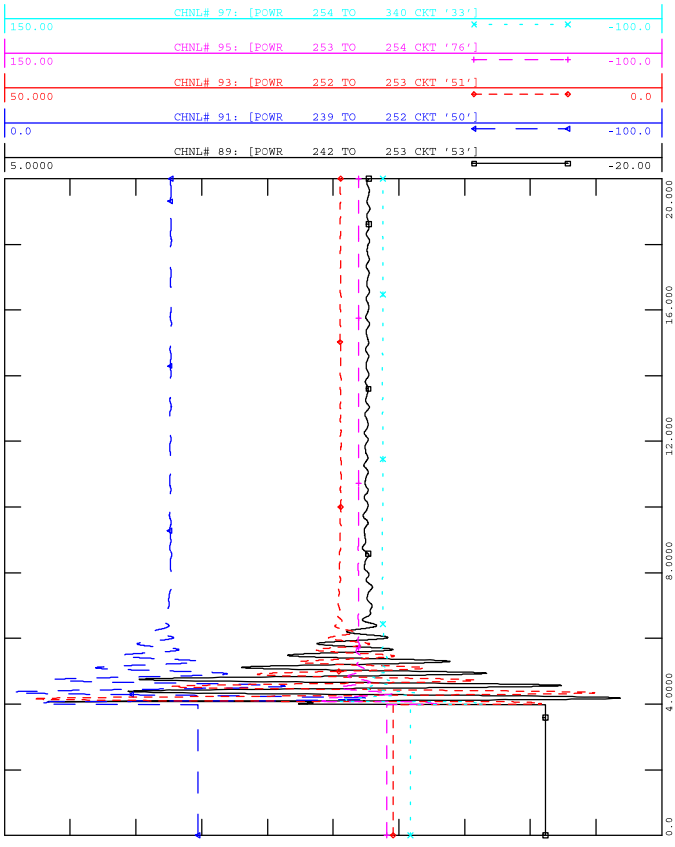

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MON, NOV 01 2021 21:04
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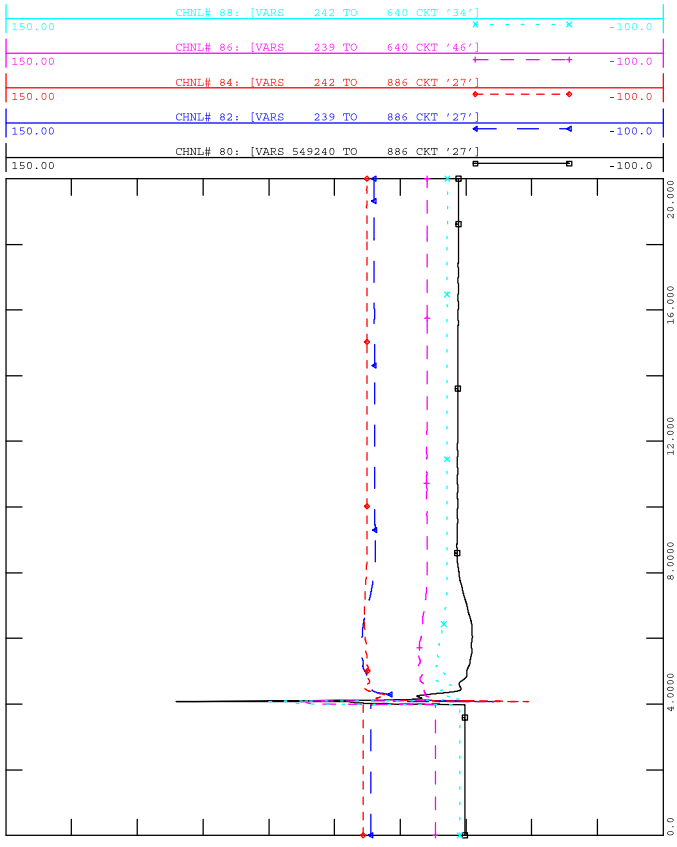

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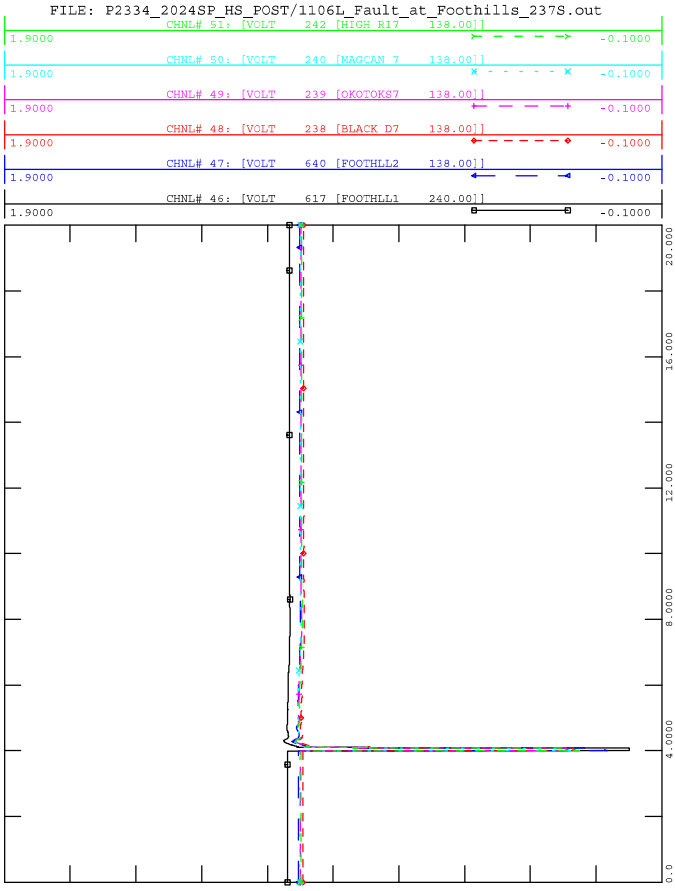

MON, NOV 01 2021 21:04 BUS VOLTAGE (1)

P2334_2024SP_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

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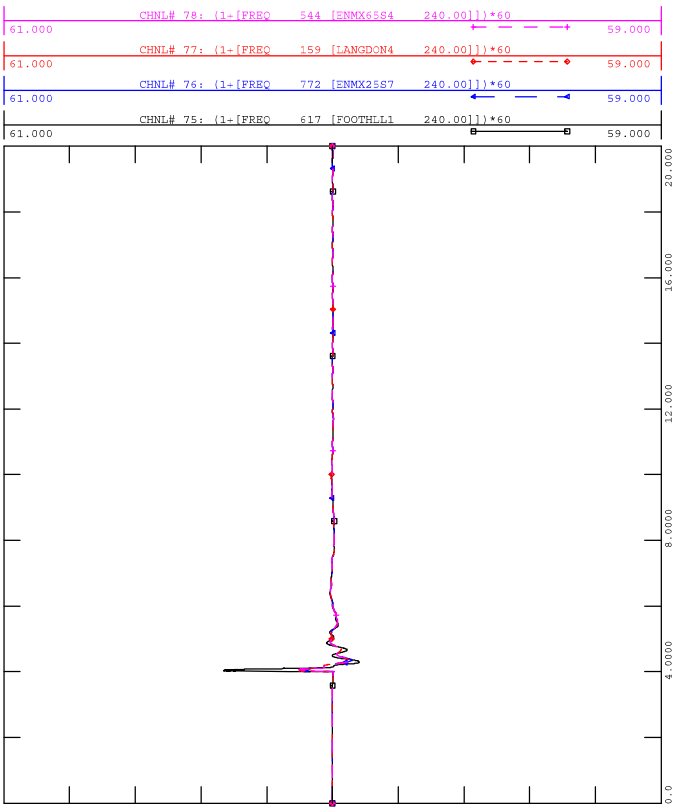

MON, NOV 01 2021 21:04 FREQUENCY

P2334_2024SP_HS_POST
CATB -1106L_FAULT_AT_FOOTHILLS_237S

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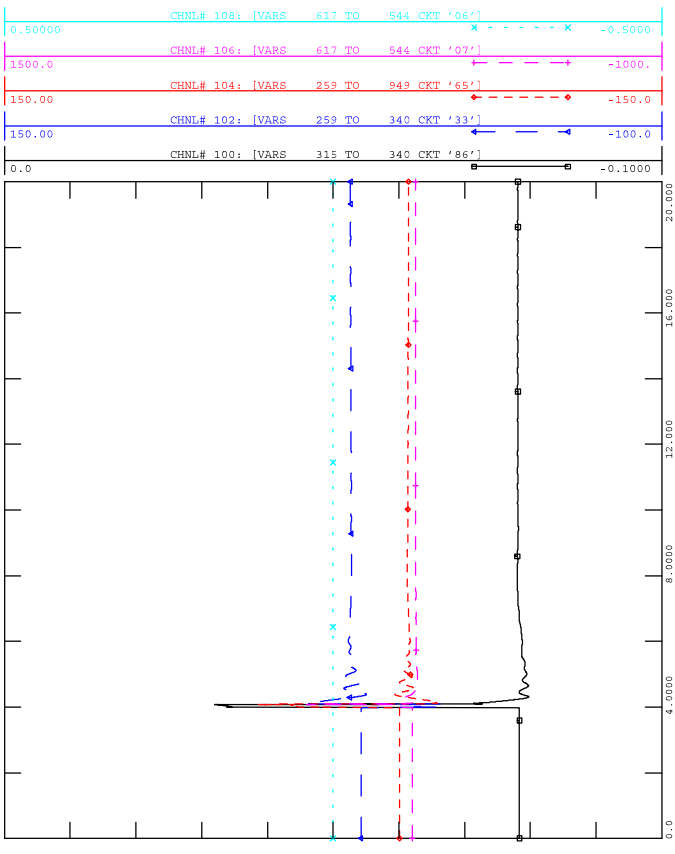

MON, NOV 01 2021 21:04 LINE VAR (3)

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CATB -1106L_FAULT_AT_FOOTHILLS_237S

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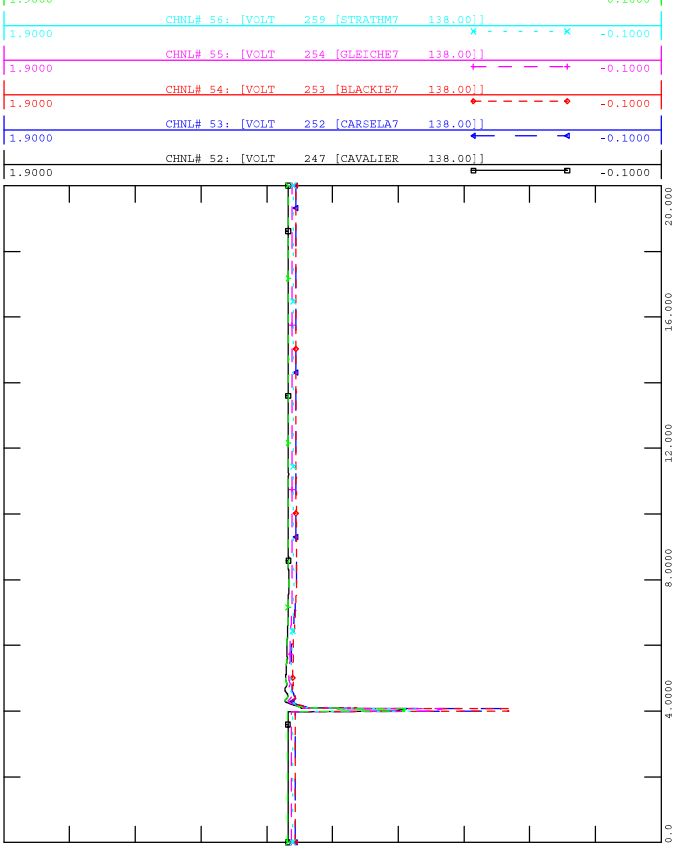

MON, NOV 01 2021 21:04 BUS VOLTAGE (2)

P2334_2024SP_HS_POST
CATB -1106L_FAULT_AT_ENMAX_SS-65

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MON, NOV 01 2021 21:04
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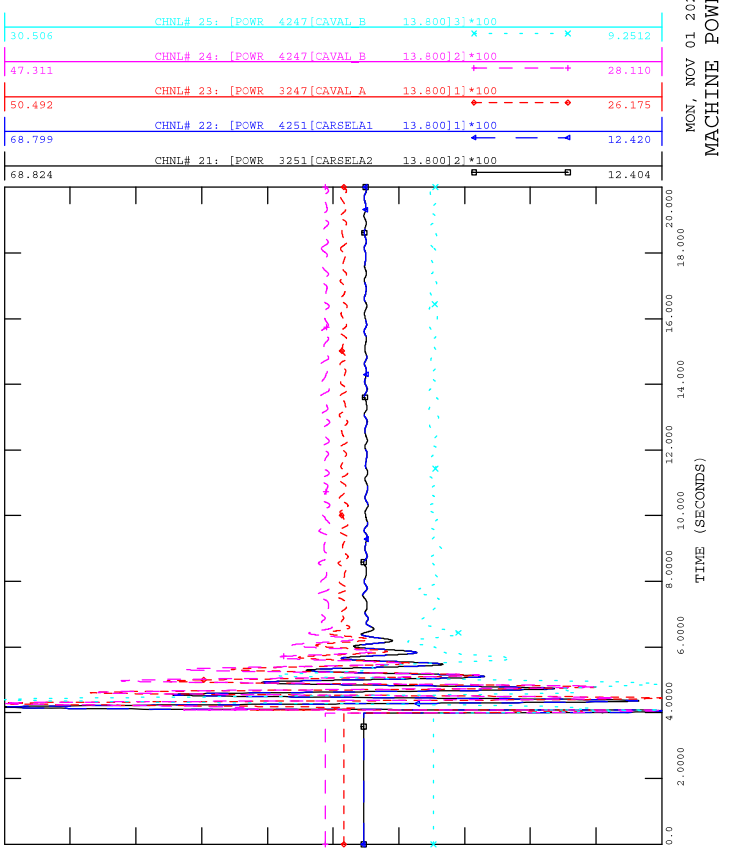

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MON, NOV 01 2021 21:04
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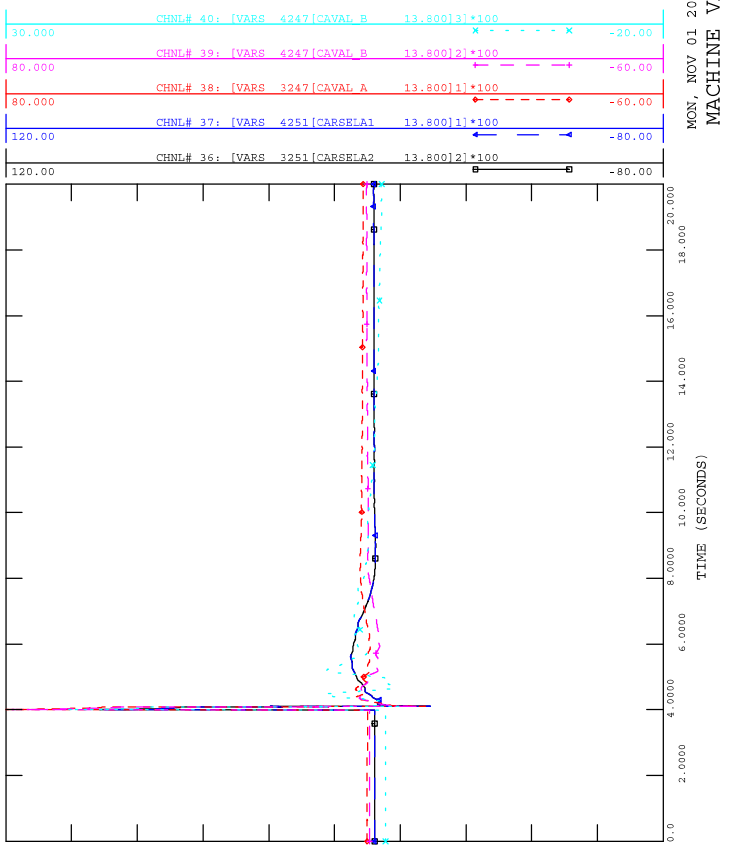

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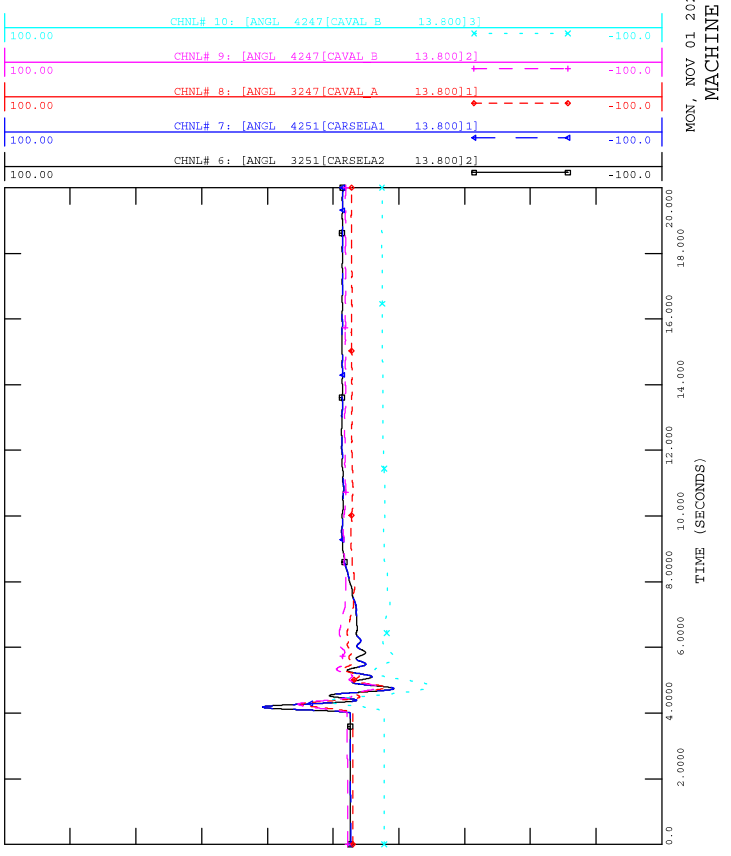
MON, NOV 01 2021 21:04
MACHINE ANGEL



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MON, NOV 01 2021 21:04
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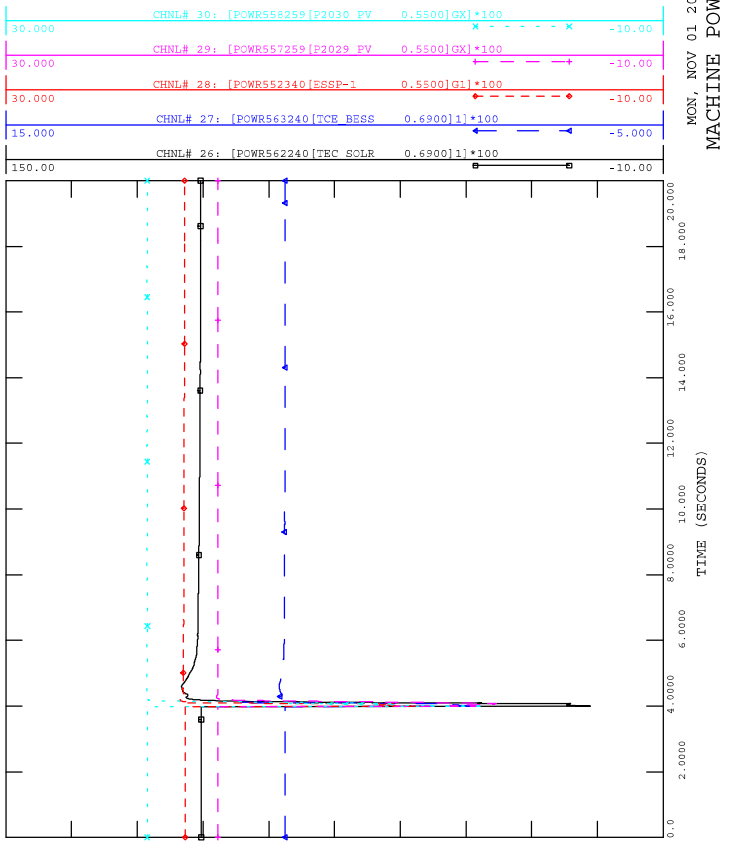

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CATB -1106L_FAULT_AT_ENMAX_SS-65

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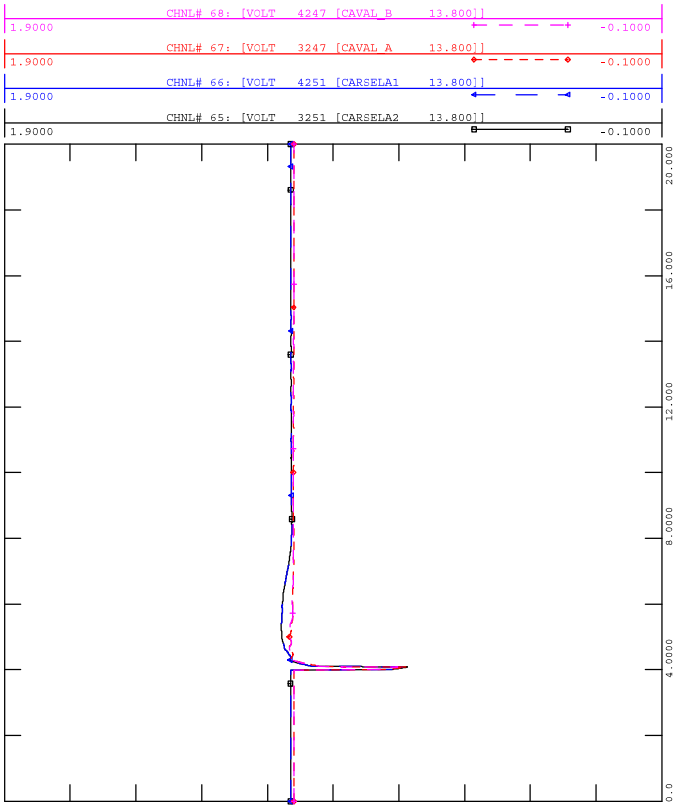
MON, NOV 01 2021 21:04
MACHINE VOLTAGE (1)



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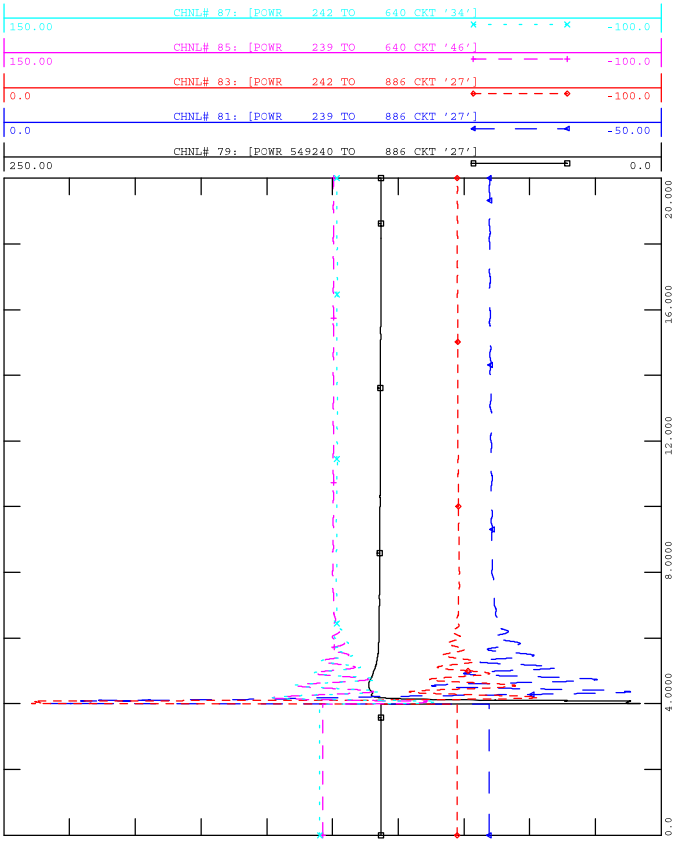
MON, NOV 01 2021 21:04
LINE POWER (1)



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MON, NOV 01 2021 21:04
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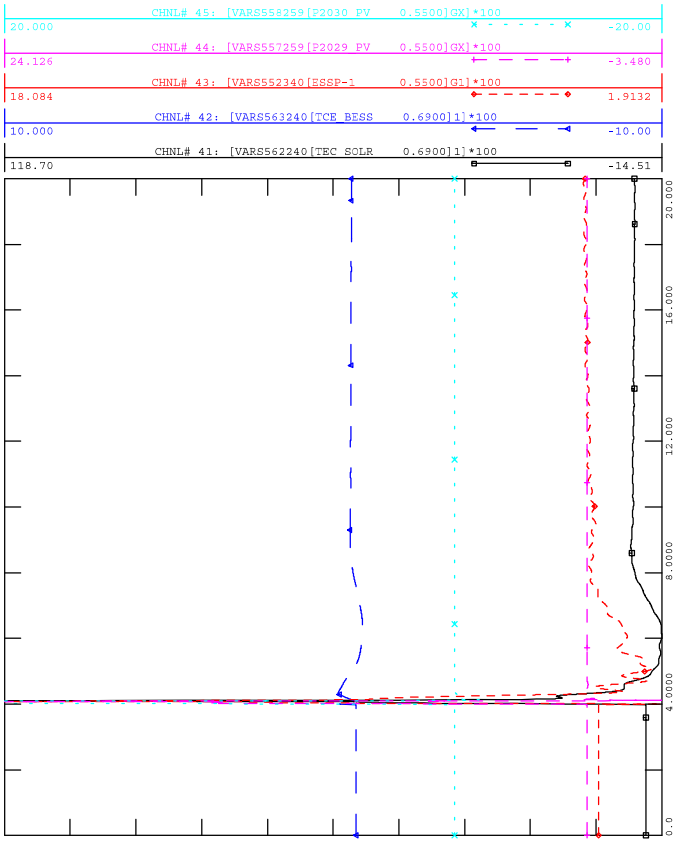

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MON, NOV 01 2021 21:04
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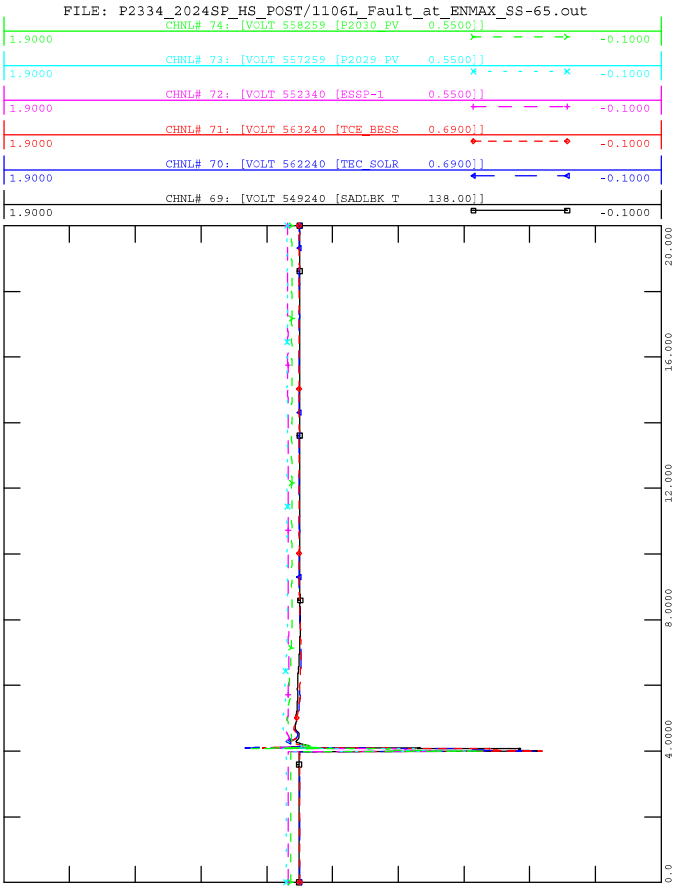

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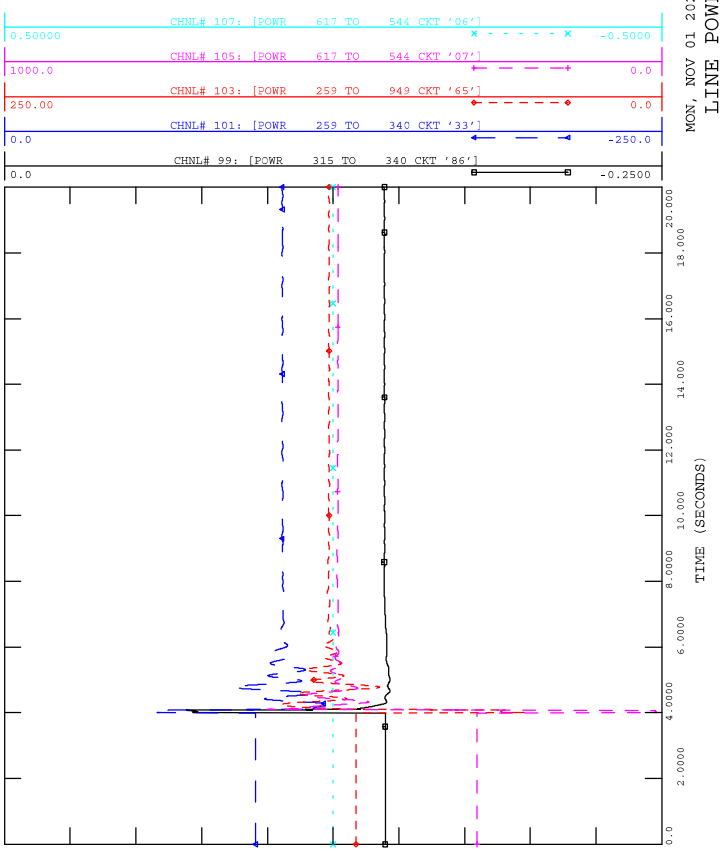

MON, NOV 01 2021 21:04
LINE POWER (3)

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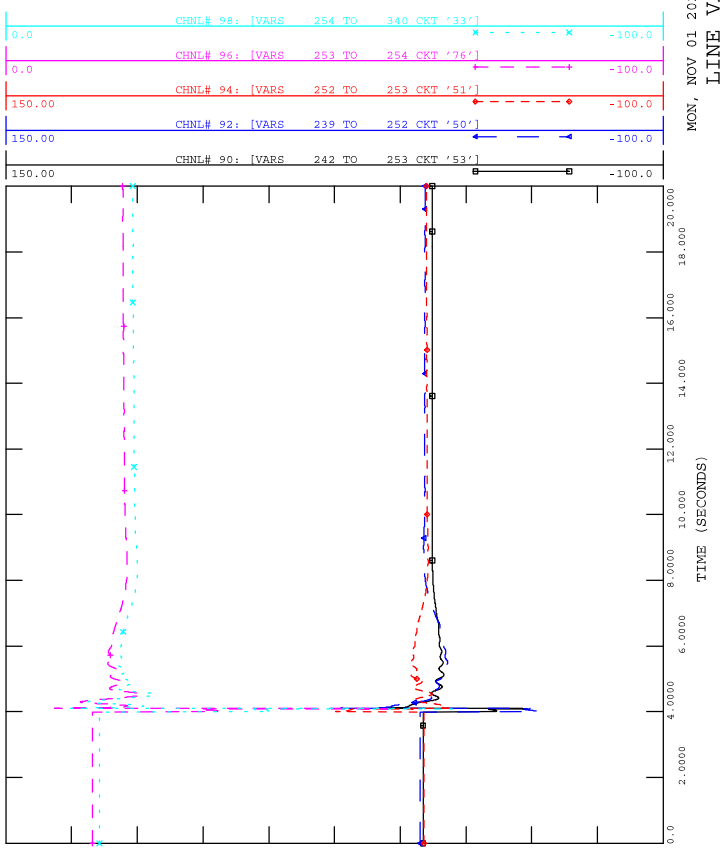

MON, NOV 01 2021 21:04
LINE VAR (2)

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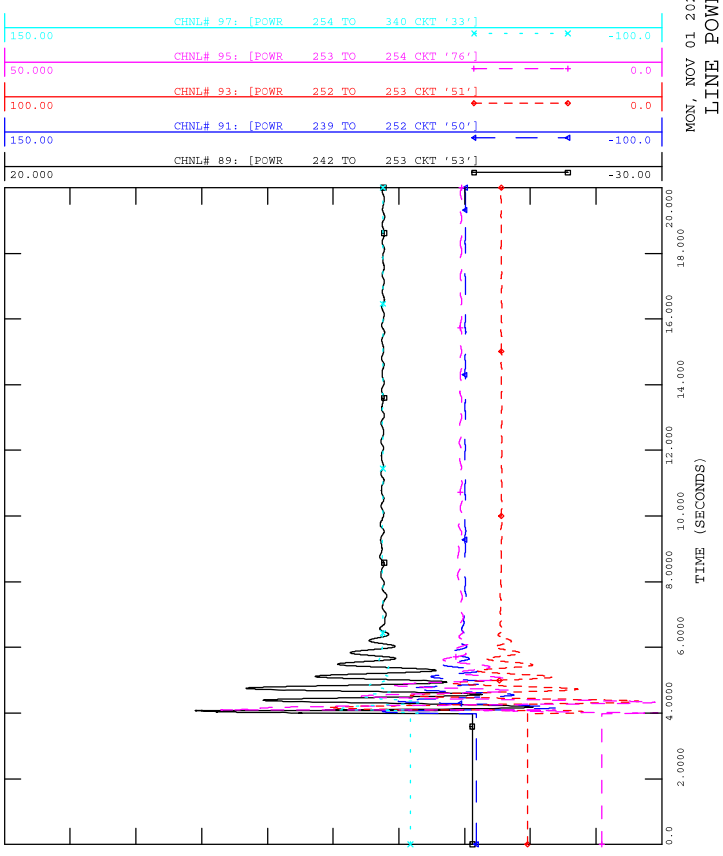

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LINE POWER (2)

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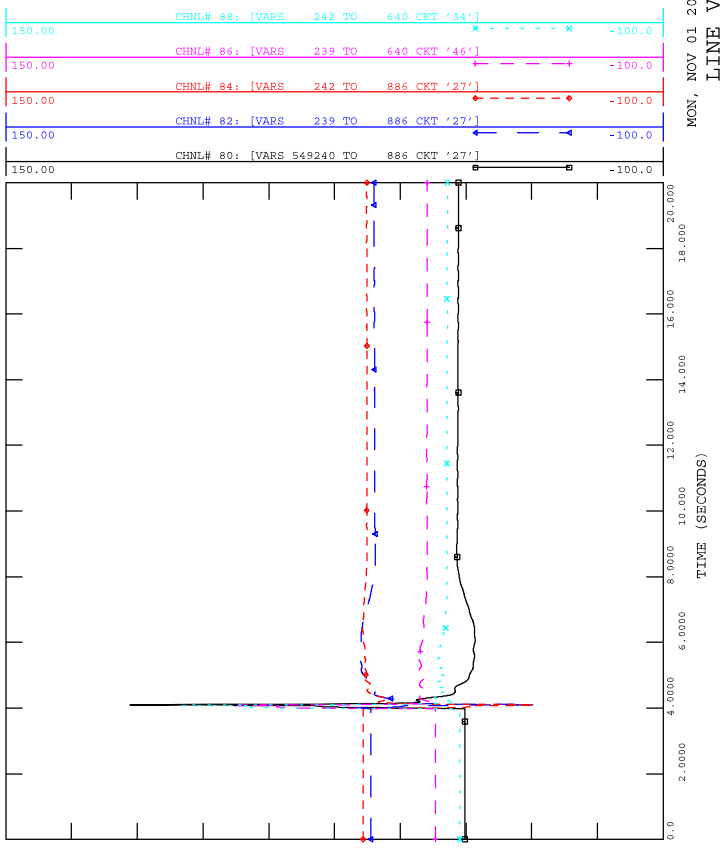

MON, NOV 01 2021 21:04
LINE VAR (1)

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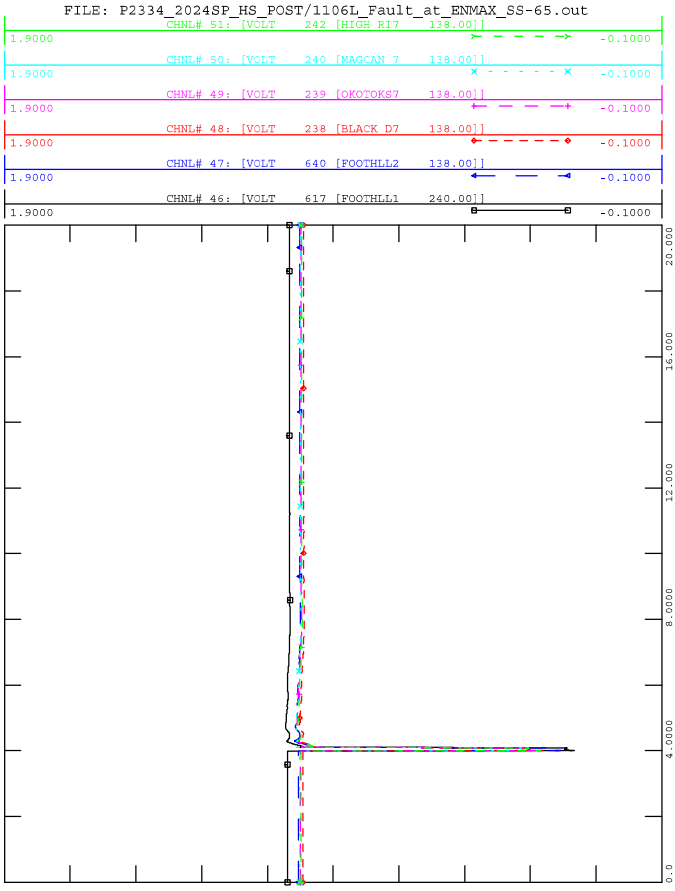

MON, NOV 01 2021 21:04
BUS VOLTAGE (1)

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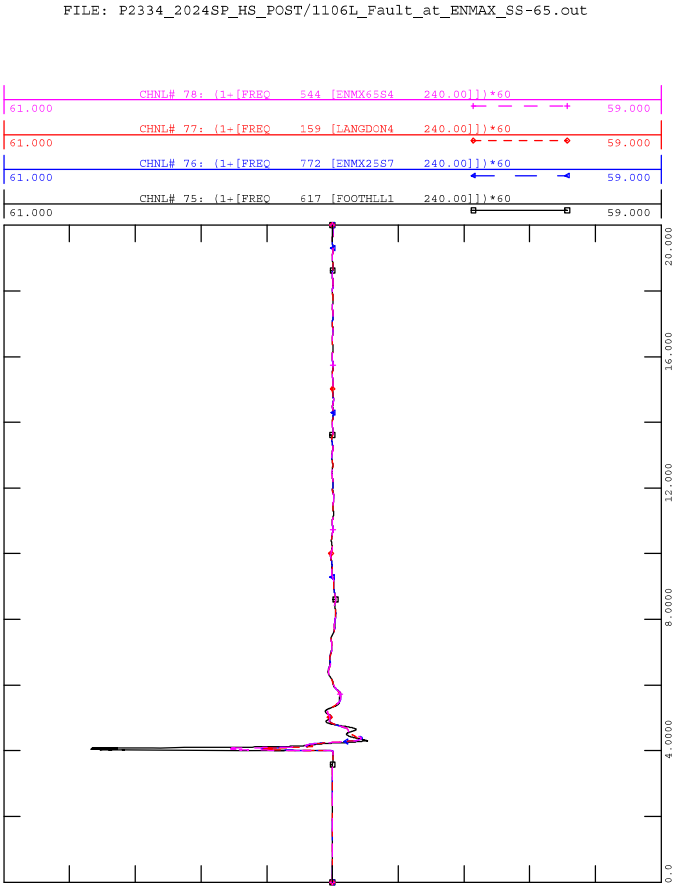

MON, NOV 01 2021 21:04
FREQUENCY

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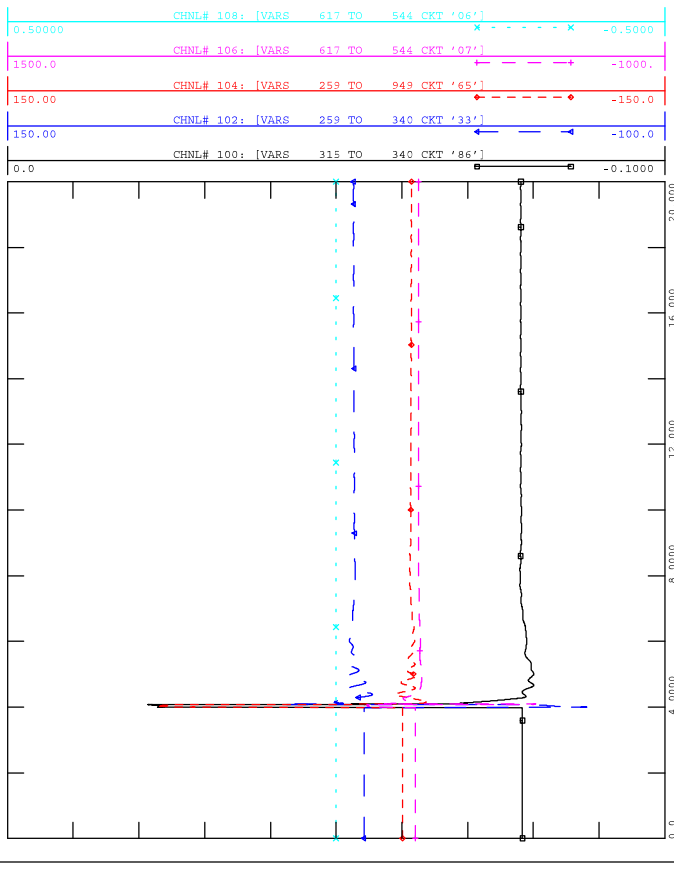

MON, NOV 01 2021 21:04
LINE VAR (3)

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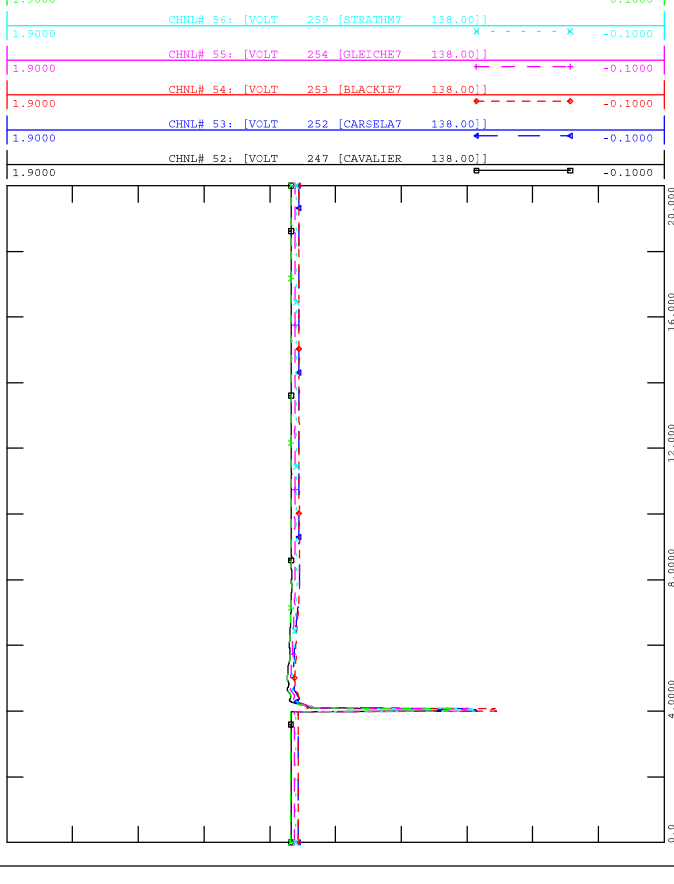


MON, NOV 01 2021 21:04
BUS VOLTAGE (2)

Attachment A5
Dynamic Data and Assumptions

Table A5-1: Solar PV Generic Renewable Energy Generator/Converter Model (REGCAU1)

CONs	Value	Description
J+0	0.02	Tg, Converter time constant (s)
J+1	10	Rrpwr, Low Voltage Power Logic (LVPL) ramp rate limit (pu/s)
J+2	0.9	Brkpt, LVPL characteristic voltage 2 (pu)
J+3	0.5	Zerox, LVPL characteristic voltage 1 (pu)
J+4	1.1	Lvpl1, LVPL gain (pu)
J+5	1.1	Volim, Voltage limit (pu) for high voltage reactive current management
J+6	0.9	Lvpnt1, High voltage point for low voltage active current management (pu)
J+7	0.0	Lvpnt0, Low voltage point for low voltage active current management (pu)
J+8	-1.0	Iolim, Current limit (pu) for high voltage reactive current management (specified as a negative value)
J+9	0.01	Tfltr, Voltage filter time constant for low voltage active current management (s)
J+10	0	Khv, Overvoltage compensation gain used in the high voltage reactive current management
J+11	99	Iqrmax, Upper limit on rate of change for reactive current (pu)
J+12	-99	Iqrmin, Lower limit on rate of change for reactive current (pu)
J+13	1.0	Accel, acceleration factor (0 < Accel < 1)
ICON	**Value**	**Description**
M+0	0	Lvplsw (Low Voltage Power Logic) switch (0: LVPL not present, 1: LVPL present)

Table A5-2: Solar PV Generic Renewable Electrical Control Model (REECAU1)

CONs	Value	Description
J+0	0.9	Vdip (pu), low voltage threshold to activate reactive current injection logic
J+1	1.1	Vup (pu), Voltage above which reactive current injection logic is activated
J+2	0.01	Trv (s), Voltage filter time constant
J+3	-0.1	dbd1 (pu), Voltage error dead band lower threshold (<=0)
J+4	0.05	dbd2 (pu), Voltage error dead band upper threshold (>=0)
J+5	10	Kqv (pu), Reactive current injection gain during over and undervoltage conditions
J+6	1.0	Iqhl (pu), Upper limit on reactive current injection Iqinj
J+7	-1.0	Iqll (pu), Lower limit on reactive current injection Iqinj
J+8	1.0	Vref0 (pu), User defined reference (if 0, model initializes it to initial terminal voltage)
J+9	0.0	Iqfrz (pu), Value at which Iqinj is held for Thld seconds following a voltage dip if Thld > 0
J+10	0.0	Thld (s), Time for which Iqinj is held at Iqfrz after voltage dip returns to zero
J+11	0.0	Thld2 (s) (>=0), Time for which the active current limit (IPMAX) is held at the faulted value after voltage dip returns to zero
J+12	0.01	Tp (s), Filter time constant for electrical power
J+13	0.6	QMax (pu), limit for reactive power regulator
J+14	-0.6	QMin (pu) limit for reactive power regulator
J+15	1.1	VMAX (pu), Max. limit for voltage control

J+16	0.9	VMIN (pu), Min. limit for voltage control
J+17	0.3	Kqp (pu), Reactive power regulator proportional gain
J+18	5.0	Kqi (pu), Reactive power regulator integral gain
J+19	0.5	Kvp (pu), Voltage regulator proportional gain
J+20	0.0	Kvi (pu), Voltage regulator integral gain
J+21	0.0	Vbias (pu), User-defined bias (normally 0)
J+22	0.01	Tiq (s), Time constant on delay s4
J+23	99	dPmax (pu/s) (>0) Power reference max. ramp rate
J+24	-99	dPmin (pu/s) (<0) Power reference min. ramp rate
J+25	1.0	PMAX (pu), Max. power limit
J+26	0.0	PMIN (pu), Min. power limit
J+27	1.0	Imax (pu), Maximum limit on total converter current
J+28	0.01	Tpord (s), Power filter time constant
J+29	0.0	Vq1 (pu), Reactive Power V-I pair, voltage
J+30	0.01	Iq1 (pu), Reactive Power V-I pair, current
J+31	0.2	Vq2 (pu) (Vq2>Vq1), Reactive Power V-I pair, voltage
J+32	1.00	Iq2 (pu) (Iq2>Iq1), Reactive Power V-I pair, current
J+33	0.6	Vq3 (pu) (Vq3>Vq2), Reactive Power V-I pair, voltage
J+34	1.00	Iq3 (pu) (Iq3>Iq2), Reactive Power V-I pair, current
J+35	1.2	Vq4 (pu) (Vq4>Vq3), Reactive Power V-I pair, voltage
J+36	1.00	Iq4 (pu) (Iq4>Iq3), Reactive Power V-I pair, current
J+37	0.0	Vp1 (pu), Real Power V-I pair, voltage
J+38	0.01	Ip1 (pu), Real Power V-I pair, current
J+39	0.20	Vp2 (pu) (Vp2>Vp1), Real Power V-I pair, voltage
J+40	1.0	Ip2 (pu) (Ip2>Ip1), Real Power V-I pair, current
J+41	0.6	Vp3 (pu) (Vp3>Vp2), Real Power V-I pair, voltage
J+42	1.0	Ip3 (pu) (Ip3>Ip2), Real Power V-I pair, current
J+43	1.2	Vp4 (pu) (Vp4>Vp3), Real Power V-I pair, voltage
J+44	1.0	Ip4 (pu) (Ip4>Ip3), Real Power V-I pair, current

ICONs	Value	Description
M+0	0	Bus number for voltage control; local control if 0
M+1	0	PFFLAG (Power factor control flag): 1 if power factor control 0 if Q control (which can be controlled by an external signal)
M+2	1	VFLAG: 1 if Q control, 0 if voltage control
M+3	0	QFLAG: 1 if voltage or Q control, 0 if constant pf or Q control
M+4	0	PFLAG: 1 if active current command has speed dependency 0 for no dependency
M+5	0	PQFLAG, P/Q priority flag for current limit: 0 for Q priority 1 for P priority

Table A5-3: Solar PV Generic Renewable Plant Control Model (REPCAU1)

CONs	Value	Description
J+0	0.05	Tfltr, Voltage or reactive power measurement filter time constant (s)

J+1	2.5	Kp, Reactive power PI control proportional gain (pu)
J+2	10.0	Ki, Reactive power PI control integral gain (pu)
J+3	0.0	Tft, Lead time constant (s)
J+4	0.05	Tfv, Lag time constant (s)
J+5	0.7	Vfrz, Voltage below which State s2 is frozen (pu)
J+6	0	Rc, Line drop compensation resistance (pu)
J+7	0	Xc, Line drop compensation reactance (pu)
J+8	0	Kc, Reactive current compensation gain (pu)
J+9	0.05	emax, upper limit on deadband output (pu)
J+10	-0.05	emin, lower limit on deadband output (pu)
J+11	0	dbd1, lower threshold for reactive power control deadband (<=0)
J+12	0	dbd2, upper threshold for reactive power control deadband (>=0)
J+13	0.60	Qmax, Upper limit on output of V/Q control (pu)
J+14	-0.60	Qmin, Lower limit on output of V/Q control (pu)
J+15	0.5	Kpg, Proportional gain for power control (pu)
J+16	0.25	Kig, Proportional gain for power control (pu)
J+17	0.25	Tp, Real power measurement filter time constant (s)
J+18	-0.0006	fdbd1, Deadband for frequency control, lower threshold (<=0)
J+19	0.0006	Fdbd2, Deadband for frequency control, upper threshold (>=0)
J+20	999	femax, frequency error upper limit (pu)
J+21	-999	femin, frequency error lower limit (pu)
J+22	1	Pmax, upper limit on power reference (pu)
J+23	0	Pmin, lower limit on power reference (pu)
J+24	0.5	Tg, Power Controller lag time constant (s)
J+25	20	Ddn, reciprocal of droop for over-frequency conditions (pu)
J+26	20	Dup, reciprocal droop for under-frequency conditions (pu)
ICONs	**Value**	**Description**
M+0	561240	Bus number for voltage control; local control if 0
M+1	562240	Monitored branch FROM bus number for line drop compensation (if 0 generator power will be used)
M+2	561240	Monitored branch TO bus number for line drop compensation (if 0 generator power will be used)
M+3	'T1'	Branch circuit id for line drop compensation (enter in single quotes) (if 0 generator power will be used)
M+4	1	VCFlag (droop flag): 0: with droop if power factor control 1: with line drop compensation 0 for no dependency
M+5	1	RefFlag (flag for V or Q control): 0: Q control 1: voltage control
M+6	1	Fflag (flag to disable frequency control): 1: Enable control 0: disable

Table A5-4: Battery Storage BESS Generic Renewable Energy Generator/Converter Model (REGCAU1)

CONs	Value	Description
J+0	0.02	Tg, Converter time constant (s)
J+1	10	Rrpwr, Low Voltage Power Logic (LVPL) ramp rate limit (pu/s)
J+2	0.9	Brkpt, LVPL characteristic voltage 2 (pu)
J+3	0.5	Zerox, LVPL characteristic voltage 1 (pu)
J+4	1.1	Lvpl1, LVPL gain (pu)
J+5	1.1	Volim, Voltage limit (pu) for high voltage reactive current management
J+6	0.9	Lvpnt1, High voltage point for low voltage active current management (pu)
J+7	0.0	Lvpnt0, Low voltage point for low voltage active current management (pu)
J+8	-1.0	Iolim, Current limit (pu) for high voltage reactive current management (specified as a negative value)
J+9	0.01	Tfltr, Voltage filter time constant for low voltage active current management (s)
J+10	0	Khv, Overvoltage compensation gain used in the high voltage reactive current management
J+11	99	Iqrmax, Upper limit on rate of change for reactive current (pu)
J+12	-99	Iqrmin, Lower limit on rate of change for reactive current (pu)
J+13	1.0	Accel, acceleration factor (0 < Accel < 1)
ICON	**Value**	**Description**
M+0	0	Lvplsw (Low Voltage Power Logic) switch (0: LVPL not present, 1: LVPL present)

Table A5-5: Battery Storage BESS Generic Renewable Electrical Control Model (REECCU1)

CONs	Value	Description
J+0	0.2	Vdip (pu), low voltage threshold to activate reactive current injection logic
J+1	1.3	Vup (pu), Voltage above which reactive current injection logic is activated
J+2	0.02	Trv (s), Voltage filter time constant
J+3	-0.08	dbd1 (pu), Voltage error dead band lower threshold (<=0)
J+4	0.05	dbd2 (pu), Voltage error dead band upper threshold (>=0)
J+5	10	Kqv (pu), Reactive current injection gain during over and undervoltage conditions
J+6	0.75	Iqhl (pu), Upper limit on reactive current injection Iqinj
J+7	-0.5	Iqll (pu), Lower limit on reactive current injection Iqinj
J+8	1.0	Vref0 (pu), User defined reference (if 0, model initializes it to initial terminal voltage)
J+9	0.01	Tp (s), Filter time constant for electrical power
J+10	0.6	QMax (pu), limit for reactive power regulator
J+11	-0.6	QMin (pu) limit for reactive power regulator
J+12	1.1	VMAX (pu), Max. limit for voltage control
J+13	0.9	VMIN (pu), Min. limit for voltage control
J+14	1.0	Kqp (pu), Reactive power regulator proportional gain
J+15	5.0	Kqi (pu), Reactive power regulator integral gain
J+16	1.0	Kvp (pu), Voltage regulator proportional gain

J+17	3.0	Kvi (pu), Voltage regulator integral gain
J+18	0.3	Tiq (s), Time constant on delay s4
J+19	999	dPmax (pu/s) (>0) Power reference max. ramp rate
J+20	-999	dPmin (pu/s) (<0) Power reference min. ramp rate
J+21	1.0	PMAX (pu), Max. power limit
J+22	-1.0	PMIN (pu), Min. power limit
J+23	1.1	Imax (pu), Maximum limit on total converter current
J+24	0.02	Tpord (s), Power filter time constant
J+25	0.05	Vq1 (pu), Reactive Power V-I pair, voltage
J+26	1.0	Iq1 (pu), Reactive Power V-I pair, current
J+27	0.2	Vq2 (pu) (Vq2>Vq1), Reactive Power V-I pair, voltage
J+28	1.00	Iq2 (pu) (Iq2>Iq1), Reactive Power V-I pair, current
J+29	0.6	Vq3 (pu) (Vq3>Vq2), Reactive Power V-I pair, voltage
J+30	1.00	Iq3 (pu) (Iq3>Iq2), Reactive Power V-I pair, current
J+31	1.2	Vq4 (pu) (Vq4>Vq3), Reactive Power V-I pair, voltage
J+32	1.00	Iq4 (pu) (Iq4>Iq3), Reactive Power V-I pair, current
J+33	0.05	Vp1 (pu), Real Power V-I pair, voltage
J+34	1.0	Ip1 (pu), Real Power V-I pair, current
J+35	0.20	Vp2 (pu) (Vp2>Vp1), Real Power V-I pair, voltage
J+36	1.0	Ip2 (pu) (Ip2>Ip1), Real Power V-I pair, current
J+37	0.6	Vp3 (pu) (Vp3>Vp2), Real Power V-I pair, voltage
J+38	1.0	Ip3 (pu) (Ip3>Ip2), Real Power V-I pair, current
J+39	1.2	Vp4 (pu) (Vp4>Vp3), Real Power V-I pair, voltage
J+40	1.0	Ip4 (pu) (Ip4>Ip3), Real Power V-I pair, current
J+41	1800	T, battery discharge time (s) (>0)
J+42	0.50	SOCini (pu), Initial state of charge
J+43	0.99	SOCmax (pu), Maximum allowable state of charge
J+44	0.01	SOCmin (pu), Minimum allowable state of charge

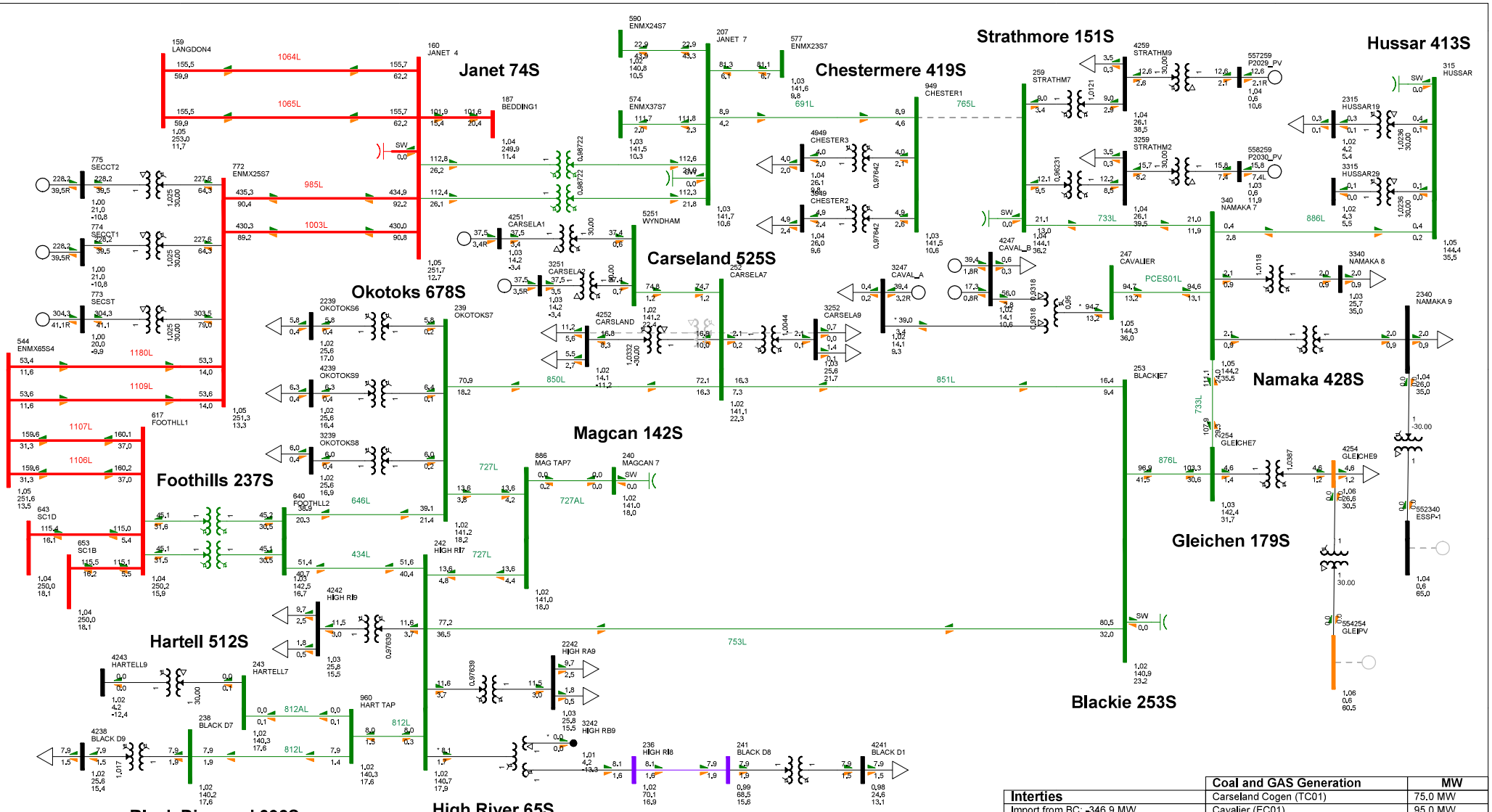
ICONs	Value	Description
M+0	0	Bus number for voltage control; local control if 0
M+1	0	PFFLAG (Power factor control flag): 1 if power factor control 0 if Q control (which can be controlled by an external signal)
M+2	1	VFLAG: 1 if Q control, 0 if voltage control
M+3	0	QFLAG: 1 if voltage or Q control, 0 if constant pf or Q control
M+4	0	PQFLAG, P/Q priority flag for current limit: 0 for Q priority 1 for P priority

Table A5-6: Battery Storage BESS Generic Renewable Plant Control Model (REPCAU1)

CONs	Value	Description
J+0	0.05	Tfltr, Voltage or reactive power measurement filter time constant (s)
J+1	2.5	Kp, Reactive power PI control proportional gain (pu)
J+2	10.0	Ki, Reactive power PI control integral gain (pu)

J+3	0.0	Tft, Lead time constant (s)
J+4	0.05	Tfv, Lag time constant (s)
J+5	0.7	Vfrz, Voltage below which State s2 is frozen (pu)
J+6	0	Rc, Line drop compensation resistance (pu)
J+7	0	Xc, Line drop compensation reactance (pu)
J+8	0	Kc, Reactive current compensation gain (pu)
J+9	0.05	emax, upper limit on deadband output (pu)
J+10	-0.05	emin, lower limit on deadband output (pu)
J+11	0	dbd1, lower threshold for reactive power control deadband (<=0)
J+12	0	dbd2, upper threshold for reactive power control deadband (>=0)
J+13	0.60	Qmax, Upper limit on output of V/Q control (pu)
J+14	-0.60	Qmin, Lower limit on output of V/Q control (pu)
J+15	0.5	Kpg, Proportional gain for power control (pu)
J+16	0.25	Kig, Proportional gain for power control (pu)
J+17	0.25	Tp, Real power measurement filter time constant (s)
J+18	-0.0006	fdbd1, Deadband for frequency control, lower threshold (<=0)
J+19	0.0006	Fdbd2, Deadband for frequency control, upper threshold (>=0)
J+20	999	femax, frequency error upper limit (pu)
J+21	-999	femin, frequency error lower limit (pu)
J+22	1	Pmax, upper limit on power reference (pu)
J+23	0	Pmin, lower limit on power reference (pu)
J+24	0.5	Tg, Power Controller lag time constant (s)
J+25	20	Ddn, reciprocal of droop for over-frequency conditions (pu)
J+26	20	Dup, reciprocal droop for under-frequency conditions (pu)
ICONs	**Value**	**Description**
M+0	561240	Bus number for voltage control; local control if 0
M+1	563240	Monitored branch FROM bus number for line drop compensation (if 0 generator power will be used)
M+2	561240	Monitored branch TO bus number for line drop compensation (if 0 generator power will be used)
M+3	'T2'	Branch circuit id for line drop compensation (enter in single quotes) (if 0 generator power will be used)
M+4	1	VCFlag (droop flag): 0: with droop if power factor control 1: with line drop compensation 0 for no dependency
M+5	1	RefFlag (flag for V or Q control): 0: Q control 1: voltage control
M+6	1	Fflag (flag to disable frequency control): 1: Enable control 0: disable

Attachment A6
Post-Mitigation Power Flow Diagrams



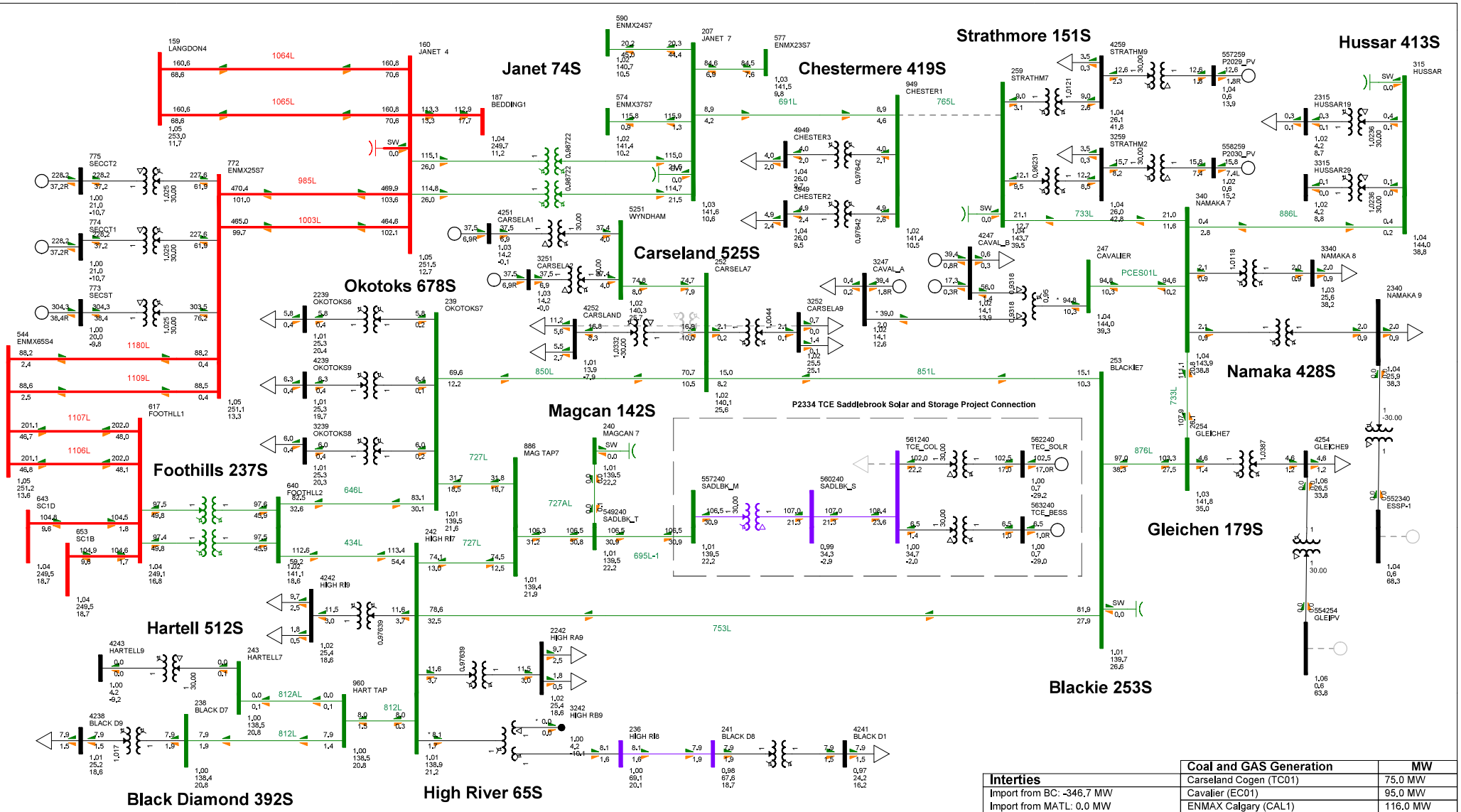
Interties	Coal and GAS Generation	MW
Import from BC: -346.9 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A6-1: P2334_2024SL_PRE_SENS
CATEGORY B - 765L (STRATHMORE 151S - CHESTERMERE 419S) W/RAS
FRI, NOV 19 2021 19:59

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



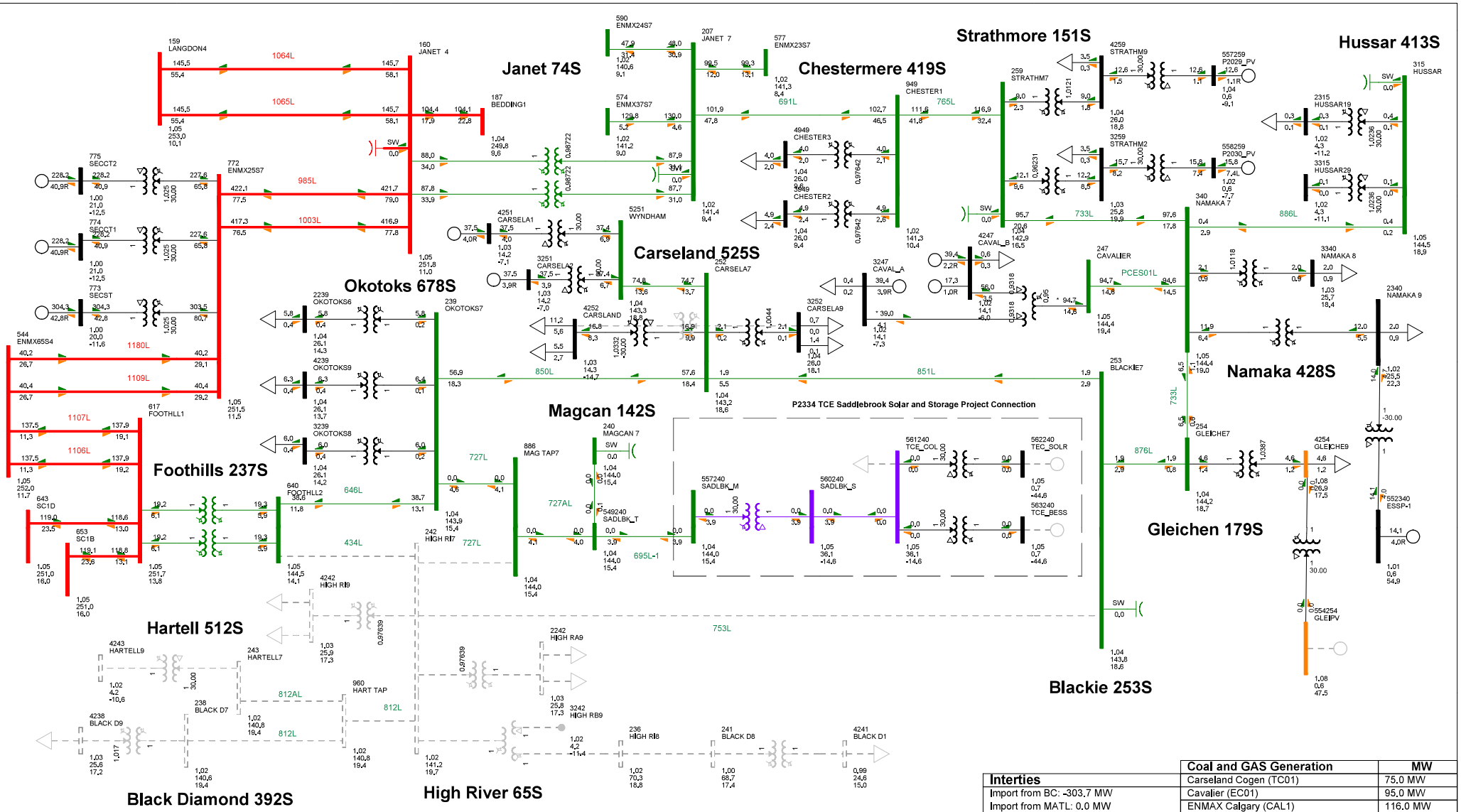
Interties	Coal and GAS Generation	MW
Import from BC: -346.7 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A6-2: P2334_2024SL_POST_SENS
CATEGORY B - 765L (STRATHMORE 151S - CHESTERMERE 419S) W/RAS
FRI, NOV 19 2021 20:00

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



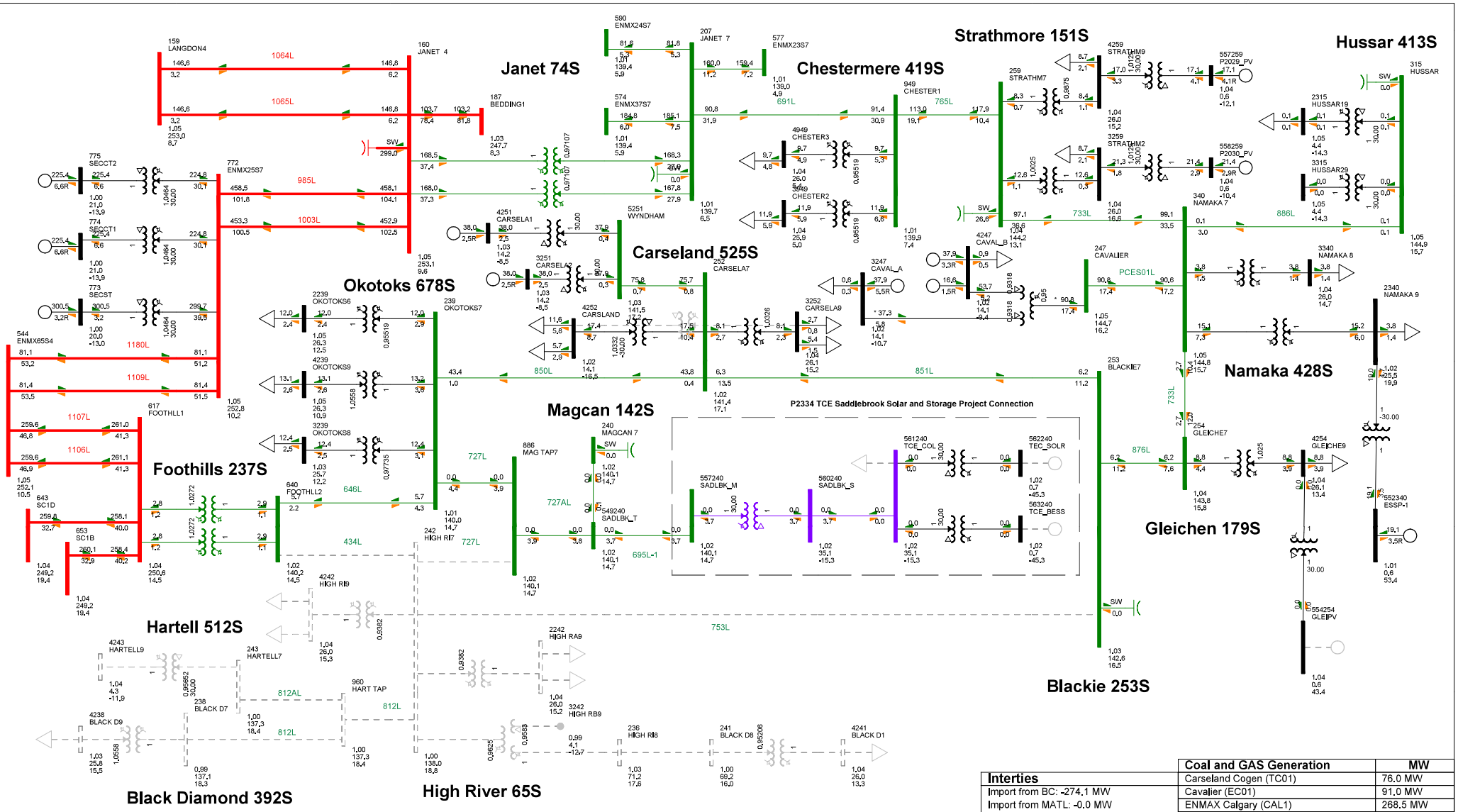
Interties	Coal and GAS Generation	MW
Import from BC: -303.7 MW	Carseland Cogen (TC01)	75.0 MW
Import from MATL: 0.0 MW	Cavalier (EC01)	95.0 MW
Import from SK: -0.1 MW	ENMAX Calgary (CAL1)	116.0 MW
	Shepard (EGC1)	760.7 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A6-3: P2334_2024SL_POST_SENS
CATEGORY B - 65S HIGH RIVER T1 W/RAS
FRI, NOV 19 2021 20:00

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000



Interties	
Import from BC: -274.1 MW	
Import from MATL: -0.0 MW	
Import from SK: -0.1 MW	

Coal and GAS Generation	MW
Carseland Cogen (TC01)	76.0 MW
Cavalier (EC01)	91.0 MW
ENMAX Calgary (CAL1)	268.5 MW
Shepard (EGC1)	751.3 MW

TCE Saddlebrook Solar Storage

AESO Project Number: P2334

FIGURE A6-4: P2334_2024SP_POST_SENS
CATEGORY B - 65S HIGH RIVER T1 W/RAS
FRI, NOV 19 2021 20:01

Bus - Voltage (kV/pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A 1.100OV 0.900UV
kV: >0.000<=69.000<=138.000<=240.000<=500.000>500.000

Attachment A7
Constraint Effective Factors Table

Table A7-1: Constraint Effective Factors for Scenario 3

Scenario and Case Name	Contingency (System Element Lost)	Details of Violation(Violation Observed On)	Generating Facility Name and Unit Number									
			Cavalier (EC01) (Bus 3247 ID: 1)	Cavalier (EC01) (Bus 4247 ID: 2)	Cavalier (EC01) (Bus 4247 ID: 3)	Carseland Cogen (TC01) (Bus 4251 ID: 1)	Carseland Cogen (TC01) (Bus 3251 ID: 2)	P1932 (Bus 552340 ID: G1)	P2009 (Bus 557259 ID: GX)	P2030 (Bus 558259 ID: GX)	P2334 (Bus 562240 ID: 1)	P2334 (Bus 563240 ID: 1)
Scenario3: 2024 SL HS Post-Project	65S High River T1	765L (Strathmore 151S - Chestermere 419S)	75%	75%	75%	28%	28%	75%	83%	83%	12%	13%
	765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)	95%	95%	95%	-1%	-1%	95%	95%	94%	-1%	-1%
	678S Okotoks T1	765L (Strathmore 151S - Chestermere 419S)	70%	70%	70%	31%	31%	70%	80%	80%	11%	11%
	65S High River T1	691L (Chestermere 419S - Janet 74S)	75%	75%	75%	28%	28%	75%	83%	83%	12%	13%
	733L (Gleichen 179S - Namaka 428S)	765L (Strathmore 151S - Chestermere 419S)	100%	100%	100%	0%	0%	99%	101%	101%	0%	0%
	179S Gleichen T1	765L (Strathmore 151S - Chestermere 419S)	100%	100%	100%	0%	0%	99%	101%	101%	0%	0%
	646L (Okotoks 678S - Foothills 237S)	727L (High River 65S - JCT. 727AL)	9%	9%	9%	51%	51%	9%	7%	6%	87%	88%
	434L (Foothills 237S - High River 65S)	765L (Strathmore 151S - Chestermere 419S)	70%	70%	70%	24%	24%	70%	80%	80%	17%	17%
	765L (Strathmore 151S - Chestermere 419S)	733L (Gleichen 179S - Namaka 428S)	99%	99%	99%	0%	0%	98%	98%	98%	0%	0%
	753L (High River 65S - Blackie 253S)	765L (Strathmore 151S - Chestermere 419S)	74%	74%	74%	25%	25%	74%	83%	83%	8%	8%
	850L (Carseland 525S - Okotoks 678S)	765L (Strathmore 151S - Chestermere 419S)	70%	70%	70%	30%	30%	69%	79%	79%	9%	9%

Table A7-2: Constraint Effective Factors for Scenario 4

Scenario and Case Name	Contingency (System Element Lost)	Details of Violation(Violation Observed On)	Generating Facility Name and Unit Number									
			Cavalier (EC01) (Bus 3247 ID: 1)	Cavalier (EC01) (Bus 4247 ID: 2)	Cavalier (EC01) (Bus 4247 ID: 3)	Carseland Cogen (TC01) (Bus 4251 ID: 1)	Carseland Cogen (TC01) (Bus 3251 ID: 2)	P1932 (Bus 552340 ID: G1)	P2009 (Bus 557259 ID: GX)	P2030 (Bus 558259 ID: GX)	P2334 (Bus 562240 ID: 1)	P2334 (Bus 563240 ID: 1)
Scenario4: 2024 SP HS Post-Project	65S High River T1	765L (Strathmore 151S - Chestermere 419S)	75%	75%	75%	28%	28%	75%	85%	84%	12%	12%
	678S Okotoks T1	765L (Strathmore 151S - Chestermere 419S)	71%	70%	70%	31%	31%	70%	81%	81%	11%	11%
	1106L (Foothills 237S - ENMAX No. 65 Substation)	765L (Strathmore 151S - Chestermere 419S)	68%	68%	68%	18%	18%	67%	79%	79%	11%	11%
	1107L (Foothills 237S - ENMAX No. 65 Substation)	765L (Strathmore 151S - Chestermere 419S)	68%	68%	68%	18%	18%	67%	79%	79%	11%	11%

Table A7-3: Constraint Effective Factors for Scenario 8

Scenario and Case Name	Contingency (System Element Lost)	Details of Violation(Violation Observed On)	Generating Facility Name and Unit Number										
			Cavalier (EC01) (Bus 3247 ID: 1)	Cavalier (EC01) (Bus 4247 ID: 2)	Cavalier (EC01) (Bus 4247 ID: 3)	Carseland Cogen (TC01) (Bus 4251 ID: 1)	Carseland Cogen (TC01) (Bus 3251 ID: 2)	P1932 (Bus 552340 ID: G1)	P2009 (Bus 557259 ID: GX)	P2030 (Bus 558259 ID: GX)	P2334 (Bus 562240 ID: 1)	P2334 (Bus 563240 ID: 1)	P1984 (Bus 554254 ID: G1)
Scenario 8: 2024 SL HS Post-Project sensitivity	765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)	94%	94%	94%	-1%	-1%	94%	94%	94%	-1%	-1%	97%
	65S High River T1	765L (Strathmore 151S - Chestermere 419S)	75%	75%	75%	28%	28%	75%	83%	83%	12%	13%	64%
	678S Okotoks T1	765L (Strathmore 151S - Chestermere 419S)	70%	70%	70%	31%	31%	70%	80%	80%	11%	11%	58%
	65S High River T1	691L (Chestermere 419S - Janet 74S)	75%	75%	75%	28%	28%	75%	83%	83%	12%	13%	64%
	691L (Chestermere 419S - Janet 74S)	876L (Blackie 253S - Gleichen 179S)	32%	32%	32%	-18%	-18%	32%	23%	23%	-10%	-10%	45%
	876L (Blackie 253S - Gleichen 179S)	765L (Strathmore 151S - Chestermere 419S)	99%	99%	99%	0%	0%	99%	101%	101%	0%	0%	98%
	434L (Foothills 237S - High River 65S)	765L (Strathmore 151S - Chestermere 419S)	70%	70%	70%	24%	24%	70%	80%	80%	17%	17%	58%
	753L (High River 65S - Blackie 253S)	765L (Strathmore 151S - Chestermere 419S)	74%	74%	74%	25%	25%	73%	82%	83%	8%	8%	63%
	850L (Carseland 525S - Okotoks 678S)	765L (Strathmore 151S - Chestermere 419S)	70%	70%	70%	30%	30%	69%	79%	79%	9%	9%	57%
	1106L (Foothills 237S - ENMAX No. 65 Substation)	765L (Strathmore 151S - Chestermere 419S)	67%	67%	67%	19%	19%	67%	78%	78%	11%	11%	54%
	1107L (Foothills 237S - ENMAX No. 65 Substation)	765L (Strathmore 151S - Chestermere 419S)	67%	67%	67%	19%	19%	67%	78%	78%	11%	11%	54%
	678S Okotoks T1	691L (Chestermere 419S - Janet 74S)	70%	70%	70%	31%	31%	70%	80%	80%	11%	11%	58%
	646L (Okotoks 678S - Foothills 237S)	727L (High River 65S - JCT. 727AL)	9%	9%	9%	51%	51%	9%	6%	6%	87%	88%	13%
	646L (Okotoks 678S - Foothills 237S)	765L (Strathmore 151S - Chestermere 419S)	68%	68%	68%	21%	21%	68%	78%	78%	13%	13%	55%
	179S Gleichen T1	765L (Strathmore 151S - Chestermere 419S)	100%	100%	100%	0%	0%	99%	101%	101%	0%	0%	0%
	733L (Gleichen 179S - Namaka 428S)	765L (Strathmore 151S - Chestermere 419S)	100%	100%	100%	0%	0%	99%	101%	101%	0%	0%	0%
	765L (Strathmore 151S - Chestermere 419S)	733L (Gleichen 179S - Namaka 428S)	99%	99%	99%	0%	0%	99%	99%	98%	0%	0%	0%
	Foothills 237S T1	765L (Strathmore 151S - Chestermere 419S)	68%	68%	68%	20%	20%	68%	78%	78%	12%	12%	55%
	Foothills 237S T2	765L (Strathmore 151S - Chestermere 419S)	68%	68%	68%	20%	20%	68%	78%	78%	12%	12%	55%
	876L (Blackie 253S - Gleichen 179S)	691L (Chestermere 419S - Janet 74S)	99%	99%	99%	0%	0%	99%	101%	101%	0%	0%	98%
	434L (Foothills 237S - High River 65S)	691L (Chestermere 419S - Janet 74S)	70%	70%	70%	24%	24%	70%	80%	80%	17%	17%	58%
	753L (High River 65S - Blackie 253S)	691L (Chestermere 419S - Janet 74S)	74%	74%	74%	25%	25%	73%	82%	83%	8%	8%	63%
	850L (Carseland 525S - Okotoks 678S)	691L (Chestermere 419S - Janet 74S)	70%	70%	70%	30%	30%	69%	79%	79%	9%	9%	57%

Table A7-4: Constraint Effective Factors for Scenario 9

Scenario and Case Name	Contingency (System Element Lost)	Details of Violation(Violation Observed On)	Generating Facility Name and Unit Number										
			Cavalier (EC01) (Bus 3247 ID: 1)	Cavalier (EC01) (Bus 4247 ID: 2)	Cavalier (EC01) (Bus 4247 ID: 3)	Carseland Cogen (TC01) (Bus 4251 ID: 1)	Carseland Cogen (TC01) (Bus 3251 ID: 2)	P1932 (Bus 552340 ID: G1)	P2009 (Bus 557259 ID: GX)	P2030 (Bus 558259 ID: GX)	P2334 (Bus 562240 ID: 1)	P2334 (Bus 563240 ID: 1)	P1984 (Bus 554254 ID: G1)
Scenario 9: 2024 SP HS Post-Project sensitivity	65S High River T1	765L (Strathmore 151S - Chestermere 419S)	75%	75%	75%	28%	28%	74%	85%	84%	12%	12%	64%
	678S Okotoks T1	765L (Strathmore 151S - Chestermere 419S)	70%	70%	70%	30%	30%	70%	81%	81%	11%	11%	57%
	765L (Strathmore 151S - Chestermere 419S)	876L (Blackie 253S - Gleichen 179S)	95%	95%	95%	0%	0%	94%	95%	94%	0%	0%	97%
	1106L (Foothills 237S - ENMAX No. 65 Substation)	765L (Strathmore 151S - Chestermere 419S)	68%	68%	68%	18%	18%	67%	79%	79%	11%	11%	54%
	1107L (Foothills 237S - ENMAX No. 65 Substation)	765L (Strathmore 151S - Chestermere 419S)	68%	68%	68%	18%	18%	67%	79%	79%	11%	11%	54%
	850L (Carseland 525S - Okotoks 678S)	765L (Strathmore 151S - Chestermere 419S)	70%	70%	70%	29%	29%	69%	81%	80%	8%	9%	57%
	753L (High River 65S - Blackie 253S)	765L (Strathmore 151S - Chestermere 419S)	74%	74%	74%	25%	25%	73%	84%	83%	8%	8%	62%
	434L (Foothills 237S - High River 65S)	765L (Strathmore 151S - Chestermere 419S)	70%	70%	70%	23%	23%	70%	81%	81%	17%	17%	57%
	646L (Okotoks 678S - Foothills 237S)	765L (Strathmore 151S - Chestermere 419S)	68%	68%	68%	21%	21%	68%	80%	79%	13%	13%	55%
	65S High River T1	733L (Namaka 428S - Strathmore 151S)	76%	76%	76%	29%	29%	76%	-15%	-15%	13%	13%	65%
	Namaka 428S T2	765L (Strathmore 151S - Chestermere 419S)	67%	67%	67%	17%	17%	66%	79%	78%	9%	10%	53%