

Information Document

Keephills Eilerslie Genesee Area Transmission Constraint Management

ID #2013-004R



Information Documents are not authoritative. Information Documents are for information purposes only and are intended to provide guidance. In the event of any discrepancy between an Information Document and any Authoritative Document(s)¹ in effect, the Authoritative Document(s) governs.

1 Purpose

This Information Document relates to the following Authoritative Document:

- Section 302.1 of the ISO rules, *Real Time Transmission Constraint Management* (“Section 302.1”).

The purpose of this Information Document is to provide additional information regarding the unique operating characteristics and resulting constraint conditions and limits on the Keephills Eilerslie Genesee Cutplane² of the Alberta interconnected electric system.

Section 302.1 sets out the general transmission constraint management protocol steps the AESO uses to manage transmission constraints in real time on the Alberta interconnected electric system. These steps are referenced in Table 1 of this Information Document as they are applied to the Keephills Eilerslie Genesee area.

2 General

The Keephills Eilerslie Genesee Cutplane measures the flows across the Keephills 240/138 kV transformer and the transmission lines connecting the Keephills and Genesee substations to the Alberta interconnected electric system.

The AESO has established the Keephills Eilerslie Genesee Cutplane operating limits. The map attached as Appendix 3 of this Information Document illustrates this cutplane. To ensure the safe and reliable operation of the Alberta interconnected electric system, the AESO has developed policies and procedures to manage Keephills Eilerslie Genesee Cutplane transmission constraints.

Appendix 1 lists the effective generation units for managing transmission constraints in the Keephills Eilerslie Genesee area. Appendix 2 provides a detailed geographical map of the Keephills Eilerslie Genesee area indicating bulk transmission lines and substations. Appendix 3 provides a schematic of the Keephills Eilerslie Genesee Cutplane, including the pool assets effective in managing a transmission constraint.

3. Constraint Conditions and Limits

3.1 Non-Studied Constraints and Limits

For system conditions that have not been pre-studied, the AESO uses energy management system tools and dynamic stability tools to assess unstudied system operating limits in real time.

3.2 Studied Constraints and Limits

¹ “Authoritative Documents” is the general name given by the AESO to categories of documents made by the AESO under the authority of the *Electric Utilities Act* and regulations, and that contain binding legal requirements for either market participants or the AESO, or both. AESO Authoritative Documents include: the ISO rules, the Alberta reliability standards, and the ISO tariff.

² A cutplane is a common term used in engineering studies and is a theoretical boundary or plane crossing two or more bulk transmission lines or electrical paths. The cumulative power flow across the cutplane is measured and can be utilized to determine flow limits that approximate conditions that would allow safe, reliable operation of the Alberta interconnected electric system.

Constraints Under System Normal Conditions or When One Element is Out of Service

The Keephills Eilerslie Genesee Cutplane thermal limits that exist in the summer and winter seasons, during system normal conditions and under certain transmission facility statuses, are provided in Appendix 4.

Based on studies which considered power flow, voltage, and transient stability, the system is capable of reliably transferring all anticipated flow across the Keephills Eilerslie Genesee Cutplane under system normal conditions.

Constraints With Bus Reconfiguration

For system conditions under forced or planned outages, the studies identified that an N-1 outage of 1209L or 1202L transmission lines would have the greatest impact on the Keephills Eilerslie Genesee System operating limit. The following bus reconfiguration procedures may be used in the event of an outage to any of these lines:

- In the event that 1209L is out of service, 12L41 and 12L44 will be taken out of service. Due to transient stability limits shown in Appendix 5 the bus at substation 320P Keephills may be reconfigured to isolate Keephills 3 in preparation for the unexpected loss of 1202L. The system will be operated in accordance with Appendix 6 in this circumstance.
- In the event that 1202L is out of service and transient stability limits shown in Appendix 5 are at risk of being exceeded, the bus at substation E330P Genesee may be reconfigured to isolate Genesee 3 in preparation for the unexpected loss 1209L. The system will be operated in accordance with Appendix 6 in this circumstance.

Constraints Without Bus Reconfiguration The Keephills Eilerslie Genesee Cutplane transient stability limits without bus reconfiguration are included in Appendix 5.

Constraint Information to Prepare for Genesee islanding

If the next contingency can cause Genesee islanding, the AESO may curtail Genesee generation in preparation.

Constraints Information during the Most Severe Single Contingency

In the Keephills Eilerslie Genesee area, if the Genesee generation pool assets are connected to the Alberta interconnected electric system by a single radial feed, then the combined MW output of the Genesee generation pool assets, consisting of the net-to-grid energy and dispatches issued for operating reserve for GN1, GN2, and GN3, becomes the Alberta interconnected electric system's most severe single contingency.

The AESO has determined the maximum allowable most severe single contingency for the combined output of the Genesee generation pool assets through engineering studies. The maximum allowable combined output of the Genesee generation under these conditions is equal to the lesser of 1,000 MW or intertie total transfer capability minus 65 plus dispatched contingency reserve. When the Genesee pool assets become the most severe single contingency, the AESO adjusts the intertie import available transmission capability to ensure the safe and reliable operation of the Alberta interconnected electric system. The import available transfer capability of the combined Alberta-British Columbia and Alberta-Montana interconnection when the Genesee pool assets become the most severe single contingency is determined as follows:

1. If the Genesee total generation exceeds or is equal to the maximum allowable most severe single contingency for the combined output of the Genesee generation pool assets, then the available transfer capability is set at 0.
2. If the Genesee total generation is less than the maximum allowable most severe single contingency for the combined output of the Genesee generation pool assets, then the intertie

available transfer capability is set at the maximum allowable contingency minus the anticipated Genesee total generation.

4 Application of Transmission Constraint Management Procedures

The AESO manages transmission constraints in all areas of Alberta in accordance with the provisions of Section 302.1. However, not all of those provisions are effective for the Keephills Ellerslie Genesee Cutplane due to certain operating conditions that exist in the area. This Information Document describes the application of the general provisions of Section 302.1 to the Keephills Ellerslie Genesee Cutplane, and the additional clarifying steps required to effectively manage transmission constraints in that area.

The protocol steps which are effective in managing transmission constraints are outlined in Table 1 below.

**Table 1 – Transmission Constraint Management
 Sequential Procedures for Keephills Ellerslie Genesee Cutplane**

Section 302.1, subsection 2(1) protocol steps	Is the procedure applicable to the Keephills Ellerslie Genesee cutplane?
(a) Determine effective pool assets	Yes
(b) Ensure maximum capability not exceeded	Yes
(c) Curtail effective downstream constraint side export service and upstream constraint side import service	No
(d) Curtail effective demand opportunity service on the downstream constraint side	No
(e)(i) Issue a dispatch for effective contracted transmission must-run	No
(e)(ii) Issue a directive for effective non-contracted transmission must-run	No
(f) Curtail effective pool assets in reverse energy market merit order followed by pro-rata curtailment	Yes
(g) Curtail effective loads with bids in reverse energy market merit order followed by pro-rata load curtailment	No

Applicable Protocol Steps

The first step in managing a transmission constraint is to identify those pool assets, both generating units and loads, effective in mitigating the transmission constraint. A list of the generating pool assets that are effective in managing constraints are identified in Appendix 1.

Step (a) in Table 1

The effective pool assets are as shown in Appendix 1.

Step (b) in Table 1

Curtailing effective generation pool assets to their maximum capability as per step (b) is an effective step in managing Keephills Eilerslie Genesee area transmission constraints.

Step (c) in Table 1

There are no interties in the Keephills Eilerslie Genesee area and curtailing import and export flows elsewhere on the system is not effective in managing a transmission constraint.

Step (d) in Table 1

Curtailing effective demand opportunity service on the downstream constraint side is not effective in managing Keephills Eilerslie Genesee area constraints because there is no demand opportunity service in the area.

Step (e) in Table 1

With respect to steps (e)(i) and (ii), there are no transmission must-run contracts in the Keephills Eilerslie Genesee area and using transmission must-run is not effective in managing a transmission constraint in this area.

Step (f) in Table 1

Curtailing effective pool assets using reverse energy market merit order followed by pro-rata curtailment is effective in managing Keephills Eilerslie Genesee area transmission constraints.

Step (g) in Table 1

Downstream load curtailment is not effective in managing Keephills Eilerslie Genesee area transmission constraints, as curtailing downstream load does not directly lessen the flow across the cutplane and available downstream generation pool assets can reasonably supply that load.

5 Project Updates

As necessary, the AESO intends to provide information in this section about projects underway in the Keephills Eilerslie Genesee area that are known to have an impact on the information contained in this Information Document.

6 Appendices

[Appendix 1 – Effective Pool Assets](#)

[Appendix 2 – Geographical Map of the Keephills Eilerslie Genesee Area](#)

[Appendix 3 – Single Line Drawing Showing Keephills Eilerslie Genesee Cutplane](#)

[Appendix 4 – Keephills Eilerslie Genesee Cutplane Thermal Limit](#)

[Appendix 5 – Keephills Eilerslie Genesee Cutplane Transient Stability Limits Without Bus Reconfiguration](#)

[Appendix 6 – Keephills Eilerslie Genesee Cutplane Transient Stability Limits With Bus Reconfiguration](#)

Information Document

Keephills Eilerslie Genesee Area Transmission Constraint Management

ID #2013-004R



Revision History

Posting Date	Description of Changes
2023-04-03	Amended Section 3 to to update studied constraints with and without bus configuration and add Genesee islanding preparation. Revised map in Appendix 3 and updated thermal limits in Appendix 4 to reflect . Updated transient limits in Appendix 5 and Appendix 6. Administrative updates.
2018-05-03	Revised map in Appendix 3 and updated thermal limits in Appendix 4 to reflect the 1045L Tap entering into service.
2016-09-29	Revised maps in Appendices 2 and 3 and updated thermal limits in Appendix 4 to reflect transmission line 1043L in the Edmonton area entering into service.
2016-04-14	Administrative updates. Section 3.2 amended to communicate the bus reconfiguration process if either the 1202L transmission line or the 1209L transmission line is out of service and transient stability limits shown in Appendix 5 are at risk of being exceeded. Revised Appendix 5 and added Appendix 6 based on updated studies.
2015-12-10	Section 3.2 amended to reflect studied constraints and limits with WATL in service, Appendix 2 and 3 revised and Appendix 4 replaced with new Appendices 4 and 5 which include information on cutplane limits.
2015-02-19	Appendix 4 amended to include changes to cutplane limits.
2014-10-02	Appendix 4 amended to remove Keephills T6 contingency from the 500 kV KEG Outages Table and Appendix 3 amended to include a new single line diagram.
2014-07-17	Section 5 amended to remove temporary cutplane operating limits and Appendix 4 amended to reflect changes to cutplane operating limits.
2014-03-13	Amended to include temporary cutplane operating limit changes in section 5 due to the Edmonton Region 240 kV Line Upgrades.
2014-02-27	Initial Release

Appendix 1 – Effective Pool Assets

The effective pool assets for the Keephills Eilerslie Genesee cutplane, listed alphabetically by their pool IDs, are:

GN1

GN2

GN3

KH2

KH3

Information Document

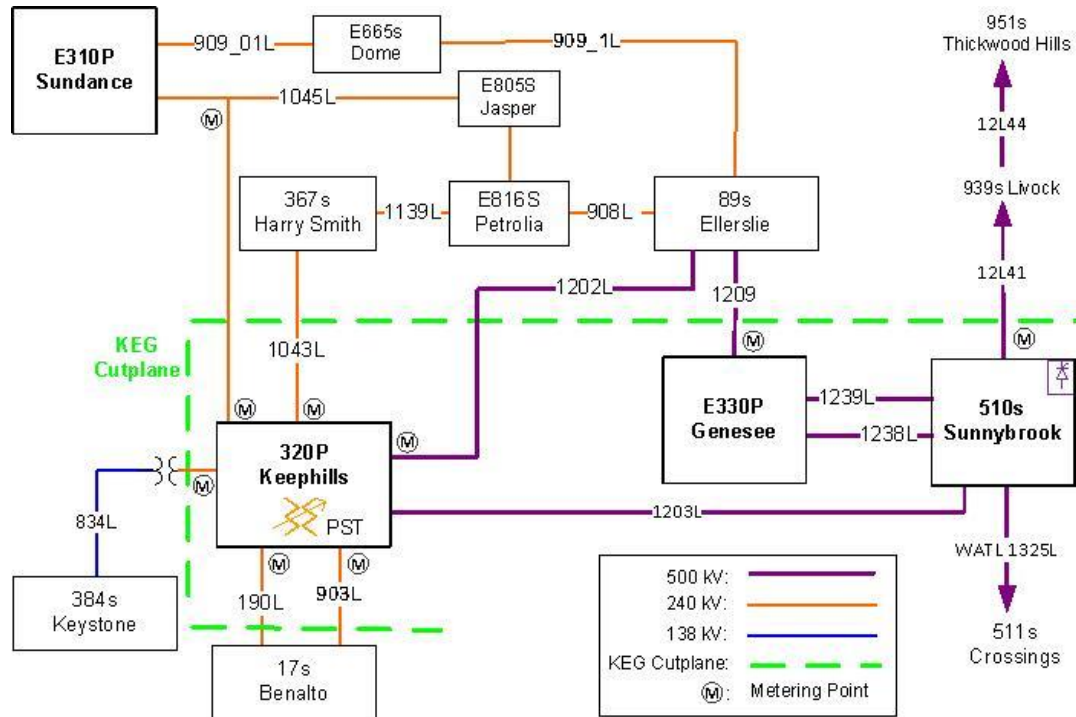
Keephills Ellerslie Genesee Area Transmission

Constraint Management

ID #2013-004R



Appendix 3 – Single Line Drawing Showing Keephills Ellerslie Genesee Cutplane



Appendix 4 – Keephills Ellerslie Genesee Cutplane Thermal Limit

If real time contingency analysis allows a higher cutplane limit for the contingencies listed in the tables below, the AESO operates to the higher limit.

Outage		Summer (MW)	Winter (MW)
		KEG _{AC}	KEG _{AC}
System Normal (N-0)	None	N/A ¹	N/A ¹
N-1	12L41	N/A ¹	N/A ¹
	1202L	1000	1700
	1209L	600 ²	1300 ²
	Ellerslie T1	2100	2700
	Ellerslie T2	2100	2700
	1043L	2520 ³	2650 ³
	1045L(Tap)	N/A ⁴	N/A ⁴

Note:

1. Maximum KEG generation reached before a limit was established.
2. 12L44 out of service.
3. The cutplane limit is based on the system after open breaker at Bellamy.

Information Document

Keephills Eilerslie Genesee Area Transmission Constraint Management

ID #2013-004R



Appendix 5 – Keephills Eilerslie Genesee Cutplane Transient Stability Limits Without Bus Reconfiguration

Condition	Outage	WATL (North to South) (MW)	KEG Total Net to Grid Output ³
System Normal (N-0)	None	N/A ²	N/A ²
N-1	1209L or 1202L out of service	0	1856
		100	1896
		200	1936
		300	1976
		400	2016
		500	2056
		600	2096
		700	2136
		800	2176
		900	2216
		1000	2256
1100 ⁴	2296		

Notes:

1. For a 1209L outage remove 12L41 and 12L44 from service. For a 1202L outage 12L41 and 12L44 can remain in service.
2. Maximum KEG generation reached before a limit was established.
3. KEG Total Net to Grid Output can be calculated as $=2256 - ((1000 - \text{WATL } P_{DC}) \times 0.4)$.
4. This power order availability may be affected by ambient temperature and availability of the cooling systems.

Information Document

Keephills Eilerslie Genesee Area Transmission

Constraint Management

ID #2013-004R



Appendix 6 – Keephills Eilerslie Genesee Cutplane Transient Stability Limits With Bus Reconfiguration

Transient Stability Limits are **not** to be exceeded.

Condition	Outage	WATL (North to South) (MW)	Remaining 5 Generator KEG Total Net to Grid output ⁴
System Normal (N-0)	None	N/A ²	N/A ²
N-1	1209L out of service	0	1612
		100	1652
		200	1692
		300	1732
		400	1772
		500	1812
		600	1852
		700	1892
		800	1932
		900	1972
		1000	2012
		1100 ⁵	2052

Notes:

- 12L41 and 12L44 out of service with bus reconfiguration.
- Maximum KEG generation reached before a limit was established.
- This table is based on a minimum operating voltage of 530 kV at Keephills and Genesee and all units terminal voltage are higher than 1 per unit value at Keephills plant and Genesee plant.
- KEG Total Net to Grid Output can be calculated as = $2012 - ((1000 - \text{WATL } P_{DC}) \times 0.4)$.
- This power order availability may be affected by ambient temperature and availability of the cooling systems.