

# 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)<sup>1</sup> 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 cutplane 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 is defined as the flows across the Keephills 240/138 kV transformer and all transmission lines connecting the Keephills and Genesee substations to the Alberta interconnected electric system. To ensure the safe and reliable operation of the Alberta interconnected electric system, the AESO has established operating limits for the Keephills Eilerslie Genesee cutplane, and has developed policies and procedures to manage Keephills Eilerslie Genesee cutplane transmission constraints.

The AESO has provided a geographical map of the Keephills Eilerslie Genesee area indicating bulk transmission lines in Appendix 2 of this Information Document. The AESO has also provided a schematic of the Keephills Eilerslie Genesee cutplane, including the pool assets effective in managing a transmission constraint, in Appendix 3 of this Information Document.

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.

## 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

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

The Keephills Eilerslie Genesee cutplane thermal limits, corresponding to summer and winter seasons, system normal conditions and certain transmission facility statuses, are provided in Appendix 4.

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<sup>1</sup> “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.

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Based on studies which considered power flow, voltage, and transient stability, no voltage or transient stability limits have been identified under normal system conditions. The system is capable of reliably transferring all anticipated flow across the Keephills Ellerslie Genesee and North-South cutplanes under system normal conditions.

For system conditions under forced or planned outages, the studies identified that an N-1 outage of either the 1209L transmission line or the 1202L transmission line would have the greatest impact on the Keephills Ellerslie Genesee System Operating Limit. The following bus reconfiguration procedures will be used in the event of an outage of one of these lines:

- In the event that 1209L is out of service and transient stability limits shown in Appendix 5 are at risk of being exceeded, the bus at substation 320P Keephills will be reconfigured to disconnect Keephills 3 from the Alberta interconnected electric system for next loss of 1202L and the system will be operated in accordance with Appendix 6.
- 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 E330 Genesee will be reconfigured to disconnect Genesee 3 from the Alberta interconnected electric system for next loss of 1209L and the system will be operated in accordance with Appendix 6.

Keephills Ellerslie Genesee cutplane transient stability limits without bus reconfiguration and with bus reconfiguration are included in Appendices 5 and 6, respectively.

#### ***Constraints information during the Most Severe Single Contingency***

In the Keephills Ellerslie 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 inertia total transfer capability minus 65 plus dispatched contingency reserve. When the Genesee pool assets become the most severe single contingency, the AESO adjusts the inertia 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 inertia import 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, due to certain unique operating conditions that exist in that area, not all of those provisions are effective on the Keephills Ellerslie Genesee cutplane. Because of those unique

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operating conditions, this Information Document represents the application of the general provisions of Section 302.1 to the Keephills Eilerslie Genesee cutplane, and provides additional clarifying steps as 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 Eilerslie Genesee Cutplane**

Section 302.1, subsection 2(1) protocol steps	Is the procedure applicable to the Keephills Eilerslie 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.

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Step (d) in Table 1

Curtailling effective demand opportunity service on the downstream constraint side is not effective in managing Keephills Ellerslie 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 Ellerslie Genesee area and using transmission must-run is not effective in managing a transmission constraint in this area.

Step (f) in Table 1

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

Step (g) in Table 1

Downstream load curtailment is not effective in managing Keephills Ellerslie 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 Ellerslie 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 Ellerslie Genesee Area*

*Appendix 3 – Single Line Drawing Showing Keephills Ellerslie Genesee Cutplane*

*Appendix 4 – Keephills Ellerslie Genesee Cutplane Thermal Limit*

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

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

## Revision History

Posting Date	Description of Changes
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.

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	Administrative updates.
2016-04-14	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

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## **Appendix 1 – Effective Pool Assets**

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

**GN1**

**GN2**

**GN3**

**KH1**

**KH2**

**KH3**





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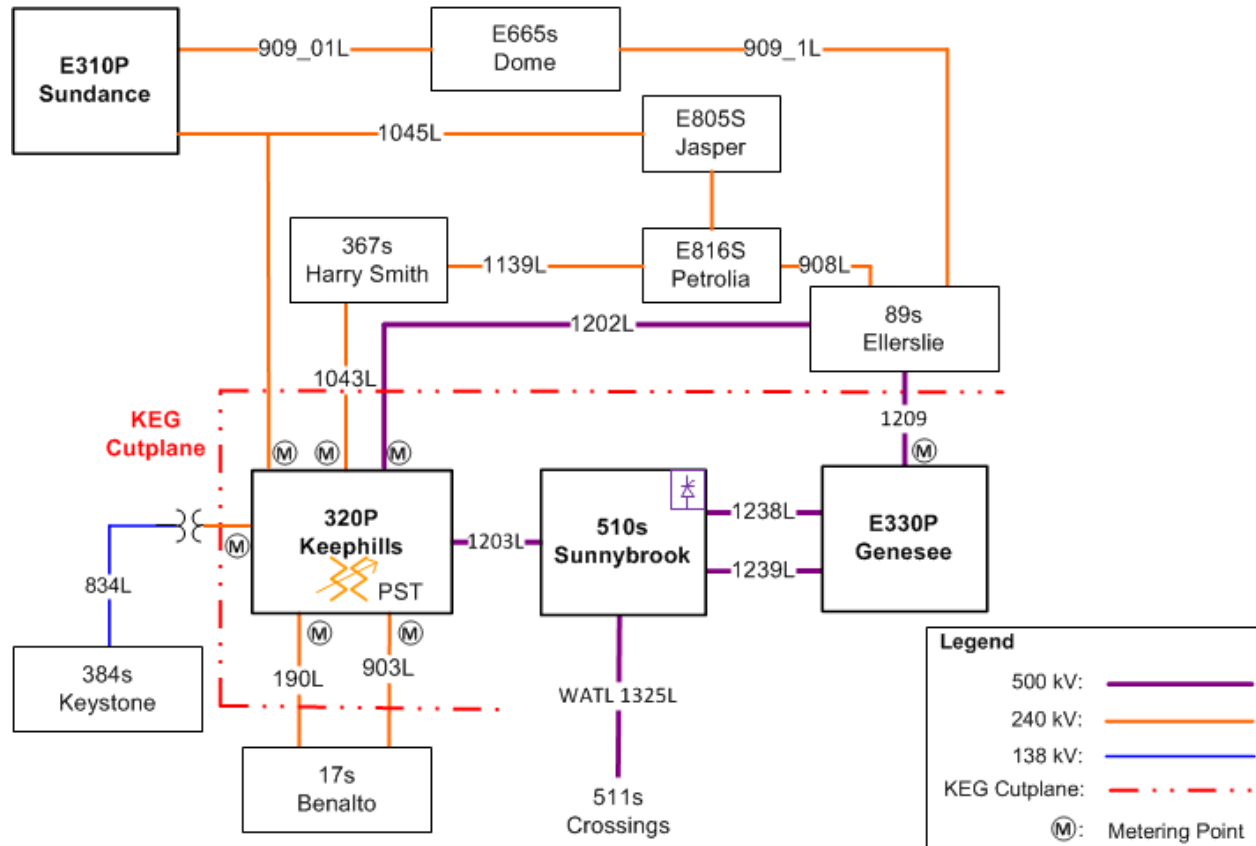
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### Appendix 3 – Single Line Drawing Showing Keephills Eilerslie Genesee Cutplane





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#### Appendix 4 – Keephills Eilerslie 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 <sub>AC</sub>	KEG <sub>AC</sub> + WATL	KEG <sub>AC</sub>	KEG <sub>AC</sub> + WATL
<b>System Normal (N-0)</b>	None	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>
<b>N-1</b>	1202L	1270	2270	1270	2270
	1209L	1270	2270	1270	2270
	Ellerslie T1	2580	N/A <sup>1</sup>	2700	N/A <sup>1</sup>
	Ellerslie T2	2580	N/A <sup>1</sup>	2700	N/A <sup>1</sup>
	190L	2780	N/A <sup>1</sup>	2910	N/A <sup>1</sup>
	903L	2780	N/A <sup>1</sup>	2910	N/A <sup>1</sup>
	1043L	2600	N/A <sup>1</sup>	2690	N/A <sup>1</sup>
	1045L(Tap)	2780	N/A <sup>1</sup>	2910	N/A <sup>1</sup>

**Note:**

1. Maximum Keephills Eilerslie Genesee generation reached before a limit was established.

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

Outage	Contingency	WATL (North to South) (MW)	KEG Total Net to Grid Output
N-0	None	N/A <sup>1</sup>	N/A <sup>1</sup>
N-1	1209L or 1202L	0	1856
		100	1896
		200	1936
		300	1976
		400	2016
		500	2056
		600	2096
		700	2136
		800	2176
		900	2216
		1000	2256

**Note:**

1. Maximum Keephills Ellerslie Genesee generation reached before a limit was established.

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

Condition	Outage	WATL (North to South) (MW)	Remaining 5 Generator KEG Total Net to Grid output <sup>1</sup>
System Normal (N-0)	None	N/A	N/A
N-1	Either 1209L or 1202L 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

**Note:**

- Does not include the Keephills Ellerslie Genesee area generator which would be disconnected for next loss of either 1202L or 1209L (depending on whether the initial event was loss of 1209L or 1202L, as described in section 3.2) after 500kv bus reconfiguration.