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Burnaby, BC
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March 2, 2026

[REDACTED]

via email: [REDACTED]

RE: [REDACTED] (CRS) - TG2 AVR Replacement Project - Queue #8 Interconnection System Impact Study Report

Dear [REDACTED]

Enclosed is the Interconnection System Impact Study for the proposed Interconnection Request (IR), queue #8 - RE: [REDACTED] (CRS) - TG2 AVR Replacement Project, project submitted under Attachment M-1: Standard Generator Interconnection Procedures (SGIP) including Standard Generator Interconnection Agreement (SGIA) of the Open Access Transmission Tariff (OATT).

Open Access Transmission Tariff

The OATT defines Network Upgrades as additions, modifications, and upgrades to BC Hydro's Transmission System required at or beyond the Point of Interconnection (POI) to accommodate the interconnection of the Generating Facility to BC Hydro's Transmission System. Pursuant to the OATT, BC Hydro will design, procure, construct, install, and own the Network Upgrades. While BC Hydro will pay the costs for the Network Upgrades, the Interconnection Customer provides security for such costs.

Interconnection Study Costs

The Interconnection Customer is responsible for paying the full cost of all Interconnection Studies in cash. Interconnection Study costs vary depending on the scope, complexity, and other factors such as whether any scope is shared with another Interconnection Customer (not applicable to this Interconnection System Impact Study). The deposit amounts specified in the OATT are not proxy Interconnection Study costs. If actual Interconnection Study costs exceed the deposit amount, the Interconnection Customer must pay the remaining balance in cash.

Technical Interconnection Requirements

As part of our commitment to maintaining a reliable and responsive grid, BC Hydro maintains its Technical Interconnection Requirements (TIR) documentation, including the 60 kV to 500 kV TIR for Power Generators. You will be required to meet the TIR as your project will be connecting to the BC Hydro Transmission system. BC Hydro looks forward to working closely with you so that you can meet the TIR and can assist with any technical questions you may have. For more details on the TIR, please refer to:

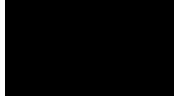
<https://app.bchydro.com/content/dam/BCHydro/customer-portal/documents/transmission/tgi/60kv-500kv-TIR-for-power-generators.pdf>

Network Upgrades, Cost Estimate, and Schedule

Based on the Interconnection System Impact Study, there are no identified transmission Network Upgrades required to facilitate this Interconnection Request. Therefore, no Network Upgrade cost estimate or construction schedule have been provided.

If you have any questions, please contact the Transmission Generator Interconnections team at transmission.generators@bchydro.com.

Sincerely,



Interconnections Manager, Transmission Generator Interconnections

BC Hydro

Encl.: Queue #8_ [REDACTED] (CRS) - TG2 AVR Replacement Project_System Impact Study.pdf

[REDACTED] (CRS) - TG2 AVR Replacement Project

Interconnection System Impact Study

BC Hydro EGBC Permit to Practice No: 1002449

[REDACTED]

Prepared for:

[REDACTED]

Prepared by:

[REDACTED]

[REDACTED]
Specialist Engineer, Interconnection
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Reviewed by:

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Manager, Interconnection Planning

Accepted by:

[REDACTED]

[REDACTED]
Manager, Transmission Planning

100-APR-00012
2025 Dec 11

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Subheader: Interconnection System Impact Study
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Prepared for: [REDACTED]
Prepared by: [REDACTED]
Title: Specialist Engineer, Interconnection Planning
Reviewed by: [REDACTED]
Title: Manager, Interconnection Planning

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Revision	Date	Description
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Appendix B	Power Flow Study Results
Appendix C	Transient Stability Study Results

Acronyms

The following are acronyms used in this report.

BCH	British Columbia Hydro and Power Authority
COD	Commercial Operation Date
CRS	██████████ Substation
DTT	Direct Transfer Trip
ERIS	Energy Resource Interconnection Service
FVO	Fraser Valley Office
HS	Heavy Summer
HW	Heavy Winter
IC	Interconnection Customer
ISD	In-Service Date
LS	Light Summer
MPO	Maximum Power Outputs
NERC	North American Electric Reliability Corporation
NRIS	Network Resource Interconnection Service
OOS	Out of Service
PODR	Point of Delivery Reference
POI	Point of Interconnection
POM	Point of Metering
PPIS	Power Parameter Information System
RAS	Remedial Action Scheme
SCC	System Control Centre
SIS	System Impact Study
SKU	Skookumchuck Substation
TIR	BC Hydro 60 kV to 500 kV Technical Interconnection requirements for Power Generators
WECC	Western Electricity Coordinating Council

Executive Summary

██████████, the Interconnection Customer (IC), proposes to replace the Automatic Voltage Regulator (AVR) of generator TG2 at ██████████ Substation (CRS). The project's Commercial Operation Date (COD) is July 17, 2022. The IC's data submission was completed on Sep 28, 2022 with the updated PSS settings. The proposed Point of Interconnection (POI) is in BC Hydro's 60 kV Skookumchuck substation (SKU).

CRS has two existing generating units - a 13.2 kV 54 MVA generator (TG2) capable of exporting a maximum 28 MW power into the BC Hydro system and a 13.2 kV, 18.75 MVA standby generating unit (TG1).

The SIS has identified the following conclusions and requirements:

1. The system performance with the CRS TG2 AVR replacement project is acceptable under system normal and applicable contingent conditions. No transmission element upgrade is identified in this SIS.
2. The study did not identify any dynamic performance concern, such as rotor angle instability, transient voltage violation or undamped oscillations, as a result of AVR replacement for the generator of CRS TG2.
3. The ceiling voltage capabilities provided by the excitation system with the new AVR is 1.7 times rated field voltage which are below the threshold specified in the BC Hydro Technical Interconnection Requirement (TIR). It should be reminded when or if the exciter is replaced in future, the BC Hydro TIR requirements should be followed.

The above conclusions are made based on the IC's input data and study assumptions listed in Section 4, which represents the best available information for the study.

1 Introduction

, the Interconnection Customer (IC), proposes to replace the Automatic Voltage Regulator (AVR) of generator TG2 at Substation (CRS). The project's Commercial Operation Date (COD) is July 17, 2022. The IC's data submission was completed on Sep 28, 2022 with the updated PSS settings.

The key information of the project reviewed in this SIS is summarized in Table 1-1 below.

Table 1-1: Summary of Project Information

Project Name	(CRS) - TG2 AVR Replacement Project	
Interconnection Customer		
Point of Interconnection	Skookumchuck Substation (SKU)	
IC Proposed COD	July 17, 2022	
Type of Interconnection Service	NRIS ☒	ERIS ☐
Maximum Power Injection (MW)	28 (Summer)	28 (Winter)
Number of Generator Units	1	
Plant Fuel	Wood Waste	

CRS is a customer owned and operated substation which has two existing generating units, a generator (TG2) capable of exporting power into the BC Hydro system and a standby generating unit (TG1) with no revenue metering directly connected. The standby unit TG1 is only operational when TG2 is out of service and cannot be used to export power into BC Hydro system. CRS is connected to BC Hydro owned Skookumchuck substation (SKU) on 60L270 via a 3.2 km customer owned line.

The transmission line 60L270 supplies Invermere Substation (INV) from Kimberly Substation (KBY). A 230 kV transmission line 2L258 is operated in parallel with 60L270 to supply to INV from Cranbrook substation (CBK). INV supplies the upper Columbia Valley loads via transmission lines 60L271 and 2L259. The generating facilities installed at CRS provide support to the area voltage and loads.

CRS and the adjunct transmission system is illustrated in Figure 1-1 below.

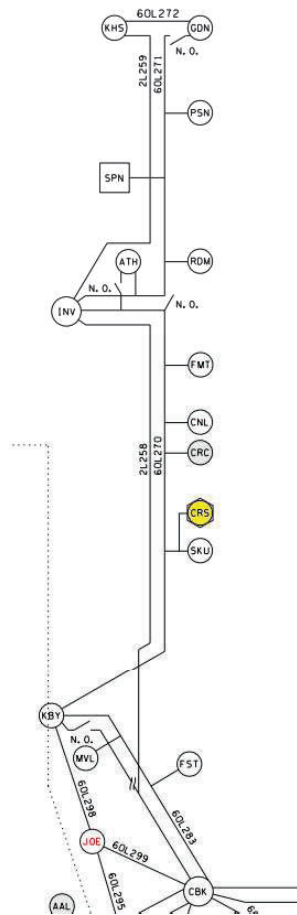


Figure 1-1: CRS and Adjacent Transmission System

2 Purpose of Study

The purpose of this System Impact Study (SIS) is to assess the impact to the BC Hydro transmission system of interconnecting the proposed Customer's facility, in accordance with the relevant BCH Open Access Transmission Tariff (OATT).

This study aims to identify transmission constraints and determine system reinforcement options, including the implementation of a Remedial Action Scheme (RAS) for generation shedding or generation runback, to ensure adequate performance and the reliable operation of the BC Hydro transmission system.

The SIS is performed in accordance with the North American Electric Reliability Corporation (NERC) reliability standards, Western Electricity Coordinating Council (WECC) performance criterion, and BC Hydro transmission planning requirements, specifically:

- NERC standards: FAC-002-3, TPL-001-4;
- WECC Performance Criterion: TPL-001-WECC-CRT-4;
- BC Hydro's 60 kV to 500 kV Technical Interconnection Requirements for Power Generators per NERC Standard FAC-001-3; and
- BC Hydro's Transmission Asset Planning FAC-002-3 Study Guide.

3 Scopes of Study

This study investigates potential thermal overloading, voltage performance and stability constraints of the transmission system as a result of the proposed interconnection and identifies the requirements of the Network Upgrades in the BC Hydro transmission system to accommodate the IC's proposed interconnection.

This study is based on available information provided by the IC. Further studies or a study update may be required when additional data from the IC is available or key study assumptions are updated.

This study does not address the possible impact of the proposed interconnection on the adjacent systems that are neighboring with the BCH system. BC Hydro coordinates and cooperates with the neighboring systems per FAC-002-3 for them to assess the potential impact on the adjacent systems when needed.

4 Assumptions and Conditions

This SIS is performed based on the information in the IC's interconnection data form submitted before and on September 28, 2022.

The study assumptions and conditions used in the study cases include the forecasted load levels, generation resource plans, and facility ratings, etc. for the selected study years as appropriate.

Appendix A shows the exciter and stabilizer model for CRS TG2 after being upgraded. The generator model remains unchanged with a few parameters updated. The turbine-governor model was not submitted and thus not included.

5 System Studies and Results

5.1 Steady-State Power Flow Study

The project upgrades CRS TG2 excitation system with the generation capacity unchanged. It is expected that there is no incremental load flow impact on the transmission system. Power flow analysis under system normal and selected contingencies were performed to evaluate whether CRS TG2 AVR Replacement Project would cause any adverse impact in the nearby area.

It has been concluded that with CRS TG2 AVR Replacement Project, there is no overloading or unacceptable steady-state voltage profiles in the transmission system under selected contingency conditions.

Appendix B contains the key results of power flow studies.

5.2 Transient Stability Study

Transient stability studies have been performed using the 2022 heavy winter and 2023 light summer base cases to assess the impact from CRS TG2 AVR Replacement Project on the transmission network, in accordance with the TPL-001-WECC-CRT- 4 Performance Criteria.

No transient instability has been observed based on the studied scenarios and contingencies. Appendix C shows a summary of the transient stability study results for 2023 light summer load conditions with CRS TG2 AVR Replacement Project.

The adequacy of the new excitation system has been reviewed against the BC Hydro technical interconnection requirement (TIR), and a shortfall in the exciter ceiling voltage capabilities was found.

According to the TIR, the exciter ceiling voltage shall be at least three times the generator's rated field voltage. The review shows the CRS TG2 excitation ceiling voltage is around 1.7 times rated field voltage which is less than 3.0 times required by BC Hydro TIR. It should be reminded when or if the exciter is replaced in future, the BC Hydro TIR requirements should be followed.

5.3 Protection and Control

No Protection and Control work is required in the transmission system for this project.

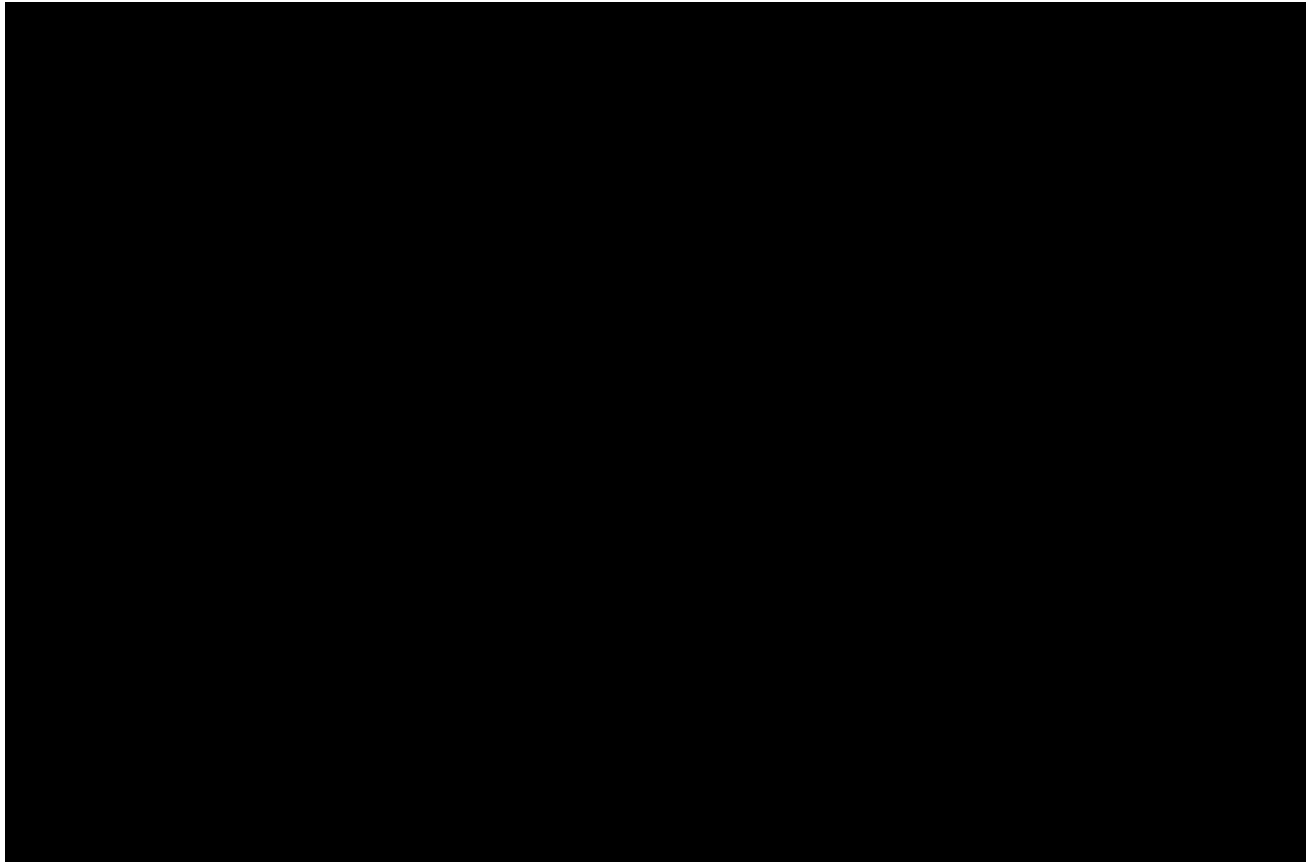
6 Conclusions

This System Impact Study has identified the following conclusions:

1. The system performance with the CRS TG2 AVR replacement project is acceptable under system normal and applicable contingent conditions. No transmission element upgrade is identified in this SIS.
2. The study did not identify any dynamic performance concern, such as rotor angle instability, transient voltage violation or undamped oscillations, as a result of AVR replacement for the generator of CRS TG2.
3. The ceiling voltage capabilities provided by the excitation system with the new AVR is 1.7 times rated field voltage which are below the threshold specified in the BC Hydro Technical Interconnection Requirement (TIR). It should be reminded when or if the exciter is replaced in future, the BC Hydro TIR requirements should be followed.

Appendix A

IC Provided Power Flow and Dynamic Models and Data



Appendix B

Power Flow Study Results

The key results of power flow studies for the study scenarios are shown in the table below.

Table B-1: Summary of Power Flow and Voltage Performance Results with CRS 28 MW Injection

System Condition	Circuit Flow (MW)						Bus Voltage (p.u.)	
	60L270 at INV 66	60L270 at KBY 66	2L258 at CBK 230	2L258 at INV 230	60L271 at INV 66	2L259 at INV 230	INV 66 kV	KBY 66 kV
2022 Heavy Winter								
P0: System Normal	-3.55	-7.45	78.4	-77.42	53.51	20.5	1.05	1.03
P1: Contingency 60L271 (INV-PSN)	1.3	-12.62	28.97	28.65	-	20.5	1.06	1.03
P1: Contingency 2L258* (CBK-INV)	-6.85	-4.14	-	-	-	-	0.96	1.03
2023 Light Summer								
P0: System Normal	-6.51	-14.19	8.82	-8.71	13.39	0.18	1.05	1.03
P1: Contingency 60L271 (INV-PSN)	-5.11	-15.56	-3.17	3.29	-	0.18	1.06	1.03
P1: Contingency 2L258* (CBK-INV)	-1.64	-18.95	-	-	-	-	0.98	1.01

Note *: Transfer trips are initiated to trip 2L259 and 60L271 following 2L258 contingency.

Appendix C

Transient Stability Study Results

A summary of the transient stability studies for 2023LS load conditions is provided in the table below.

Table C-1: Transient Stability Study Results (2023LS Scenario)

Case	Contingency	3- Φ Fault Location	IC's Injection (MW)	Clearing Time (Cycles)		CRS Stability Performance
				Near End	Far End	Acceptable? (Yes or No)
1	Outage of 2L258 (followed by the tripping of 2L259 and 60L271)	INV 230	28	INV 6	CBK 7	Yes
2	Outage of 60L271	INV 60	28	INV 10	GDN 250	Yes
3	Outage of 60L271	RDM 60	28	INV 30	GDN 250	Yes