



Interconnection Facilities Study Report Request # GI-2014-7

42 MW Increase to Hydro Pumping Generating Facility
Cabin Creek 230 kV Station, Colorado

Public Service Company of Colorado
Transmission Planning
September 1, 2015

A. Executive Summary

This Interconnection Facilities Study Report summarizes the analysis performed by Public Service Company of Colorado (PSCo), designated as GI-2014-7, to specify and estimate the cost of the siting, engineering, equipment procurement, and construction needed to interconnect the 42 MW increase to the existing hydro pumping generation located at Cabin Creek Substation in Clear Creek County, Colorado. The generation expansion will result in a total output to PSCo's Cabin Creek 230 kV bus of 366 MW. The requested commercial in-service date is February 11, 2019 for Unit A (183 MW Gross Maximum Capacity) and February 17, 2020 for Unit B (183 MW Gross Maximum Capacity).

The GI-2014-7 Feasibility Study conducted power flow and short circuit analysis. The Feasibility Study found no network facilities would be needed to ensure that the capacity increase can be reliably served. The System Impact Study conducted transient stability analysis and found undamped system oscillations resulting from a double circuit tower line outage. However, the customer provided upgraded dynamic models for the automatic voltage regulator (AVR) and power system stabilizer (PSS) which successfully removed the oscillation concerns. The customer assured PSCo that these upgrades to the generating unit's control systems will be included in the design specifications for GI-2014-7. Therefore the System Impact Study found that no network facilities would be required. Hence, the studies found the proposed 42 MW expanded generation facility may interconnect as a Network Resource and no network facilities or network upgrades for delivery would be needed to ensure that the capacity increase can be reliably served.

The total estimated cost of the recommended system improvements to interconnect the project is **\$0.0 million** and has no Customer-Funded Interconnection Facilities, PSCo-Funded Network Upgrades, or PSCo Network Upgrades for Delivery.

The Cabin Creek and surrounding transmission system is shown in Figure 1 below. A one-line diagram of the existing Cabin Creek Substation is shown in the Appendix in Figure 2.

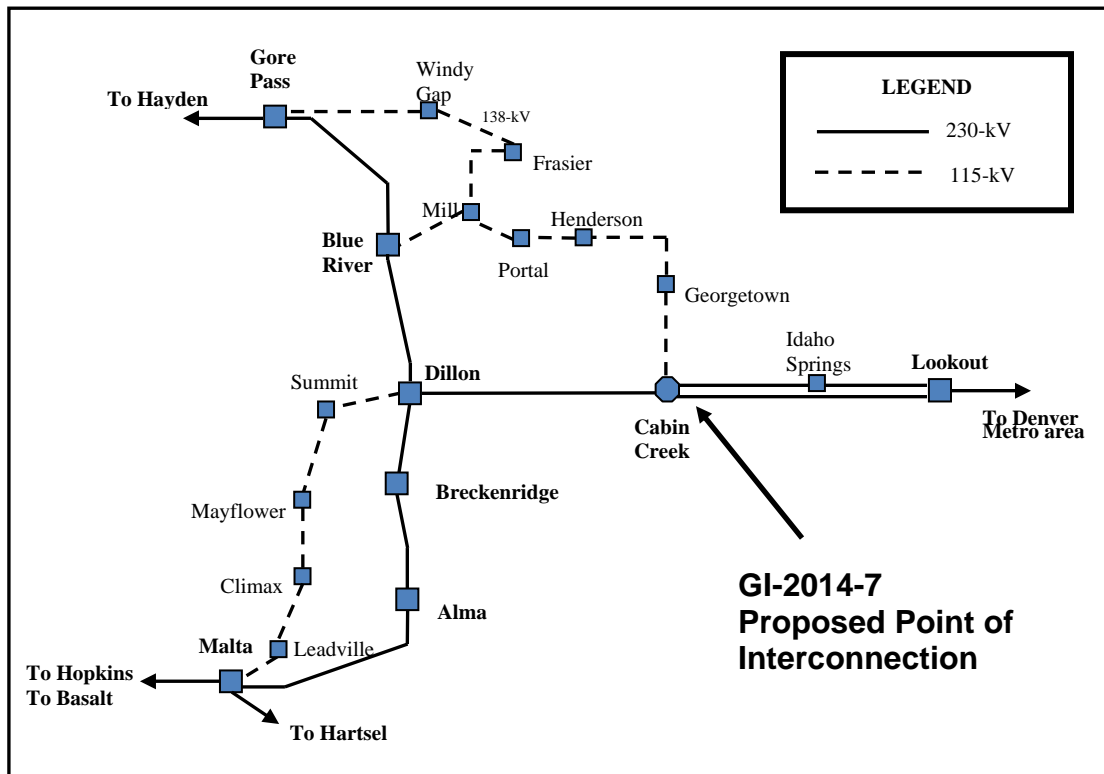


Figure 1 Cabin Creek Station and Surrounding Transmission System

B. Introduction

Public Service Company of Colorado (PSCO) received an interconnection request for a 42 MW capacity increase of the existing Cabin Creek pumping hydro generating facility on July 31, 2014 that was assigned GI-2014-7 as the queue number. GI-2014-7 will result in the Gross Maximum Capacity (GMC) of Cabin Creek generating facility to increase from 324 MW to 366 MW. Since GI-2014-7 is a generating capacity uprate request, the point of interconnection (POI) will remain unchanged at the 230 kV bus in PSCO’s Cabin Creek 230/115 kV transmission substation. The existing customer-owned 230 kV transmission lines will also interconnect GI-2014-7 to the POI. The in-service date (ISD) requested for GI-2014-7 generating facility is February 11, 2019 for Unit A (183 MW GMC) and February 17, 2020 for Unit B (183 MW GMC), and the request is studied as a Network Resource Interconnection Service.

C. Generation Interconnection Facilities Description

PSCO’s requirements for interconnection can be found in the Interconnection Guidelines for Transmission Interconnected Producer-Owned Generation Greater than 20 MW – Version 6.0, found on the Xcel Energy website. Xcel Energy requires the



Interconnection Generation Provider to construct the Interconnection Facilities in compliance with this document. The guidelines describe the technical and protection requirements for connecting new generation to the Xcel Energy Operating Company Transmission system and also requires that the Interconnection Generation Provider be in compliance with all applicable criteria, guidelines, standards, requirements, regulations, and procedures issued by the North American Electric Reliability Council, Public Utility Commission or their successor organizations.

D. Cost Estimates and Assumptions

Network Upgrades are not required to increase Cabin Creek generating facility’s output by 42 MW (resulting in 366 MW GMC). The existing Interconnection Facilities at the Cabin Creek POI are adequate to accommodate 460 Amps from each of the (uprated) 183 MW units. Therefore, total estimated cost to interconnect GI-2014-7 is **\$0**.

Table 5: PSCo Owned; Customer Funded Transmission Provider Interconnection Facilities

Element	Description	Cost Est. (Millions)
	N/A	

Table 6: PSCo Owned; PSCo Funded Interconnection Network Facilities

Element	Description	Cost Est. (Millions)
	N/A	

Table 7: PSCo Network Upgrades for Delivery

Element	Description	Cost Est. (Millions)
	N/A	

Appendix

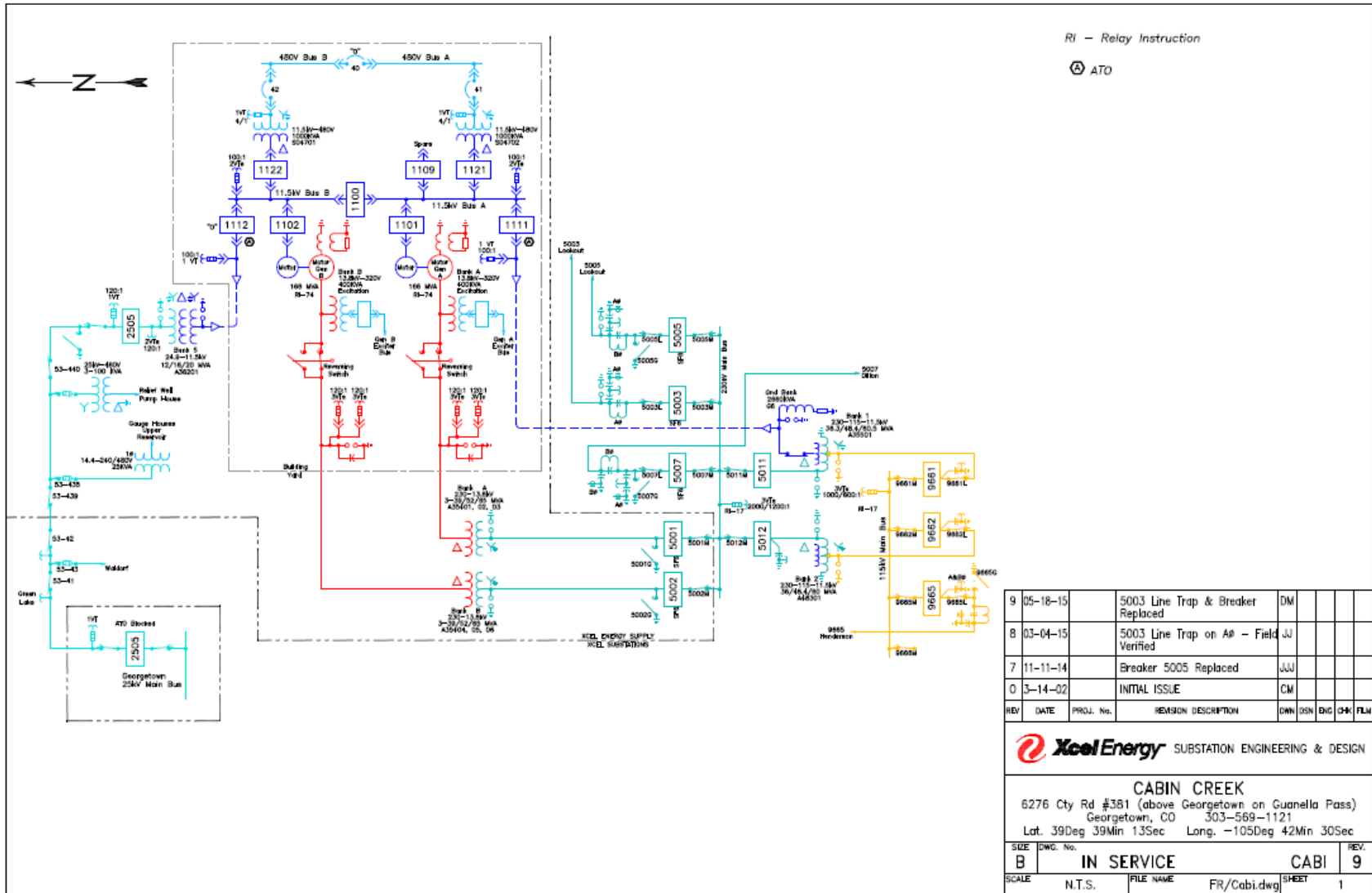


Figure 2: Existing Cabin Creek Substation Diagram