Appendix D

June 1, 2017 Spokane River Hydroelectric Project Qualifying Upgrades Report

Avista Corporation

Introduction

This appendix provides details about the calculation of qualifying renewable energy output from incremental hydroelectric upgrades on the Company's Spokane River Hydroelectric Project. The Spokane River Project includes six hydroelectric projects located on the Spokane River. The plants operate under a FERC license through 2059.

Under certain circumstances, incremental electricity produced as a result of efficiency improvements completed after March 31, 1999 may qualify as an eligible renewable resource for purposes of compliance with Washington's Energy Independence Act, RCW 19.285.030(10)(b). Three methodologies may be used to calculate the amount of incremental generation associated with efficiency improvements. All of the acceptable methodologies consider the state of the hydroelectric project in question without the incremental improvements, then with the incremental improvements, and the resulting difference between the generation before and after the incremental improvements constitutes the amount of generation applicable to the Company's goals under the Energy Independence Act.

The accepted methodologies for calculating incremental hydroelectric generation under Docket UE-110523 include:

1. "Annual calculation using hydroelectric model and actual inflows or generation;"
2. "One-time calculation of renewable electricity percentage using an historical period of inflow or generation;" or

3. “One-time calculation of renewable electricity using an historical period of inflow or generation.”

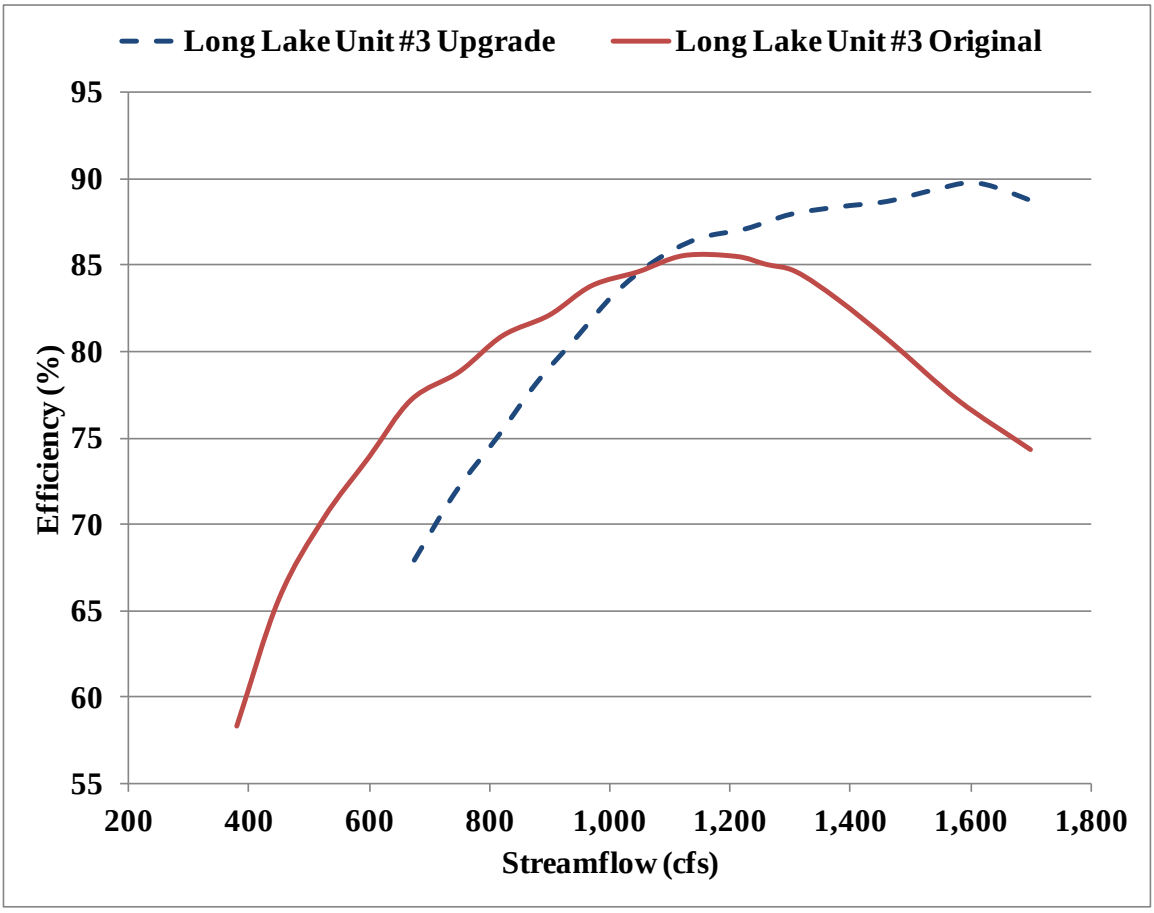
Avista utilizes the third method using historical inflows from 2002 through 2011. This method entails the use of historical inflow or generation based on a minimum of five years or up to the available inflow record of generation. The qualifying amount of renewable energy output for the before and after incremental improvement states are calculated with a hydroelectric model. The megawatt-hour value difference between the two states is used for the future years are the amount of available renewable energy. The Company modeled the two states using Avista’s Hydro Optimization Package (Hydro Model). The Hydro Model used for the studies in this appendix is the same model that the Company uses to optimize its system operations for short- and long-term planning, budgeting, hydro project market valuation studies, supporting hydroelectric upgrade option studies, and in general rate case submissions (Docket No. 110876 for the Spokane River Hydroelectric Model). The Hydro Model is a mixed-integer linear programming-based system emulating the operation of the Company’s projects. It was developed in support of system operations, financial forecasting, and hydro upgrade efforts. Operating on an hourly time-step, it accurately represents individual turbine and reservoir operations. The model maintains all license constraints, such as minimum flows and elevation limits, in all periods.

Long Lake Unit #3 Upgrade

The Company completed an upgrade of the Long Lake Project Unit #3 in October 1999. This project consisted of the replacement of the turbine runner. Following the upgrade, the Company realized a 4.9 MW increase in capacity, from 17.5 MW to 22.4 MW. The Hydro

Model study for Long Lake Unit #3 resulted in 14,197 MWh of annual qualifying renewable energy. Illustration 1 shows the original and upgraded turbine curves for Long Lake Unit #3. The upgraded turbine produces energy more efficiently at the higher streamflow conditions where this unit typically operates.

Illustration 1: Long Lake Unit #3 Turbine Curves

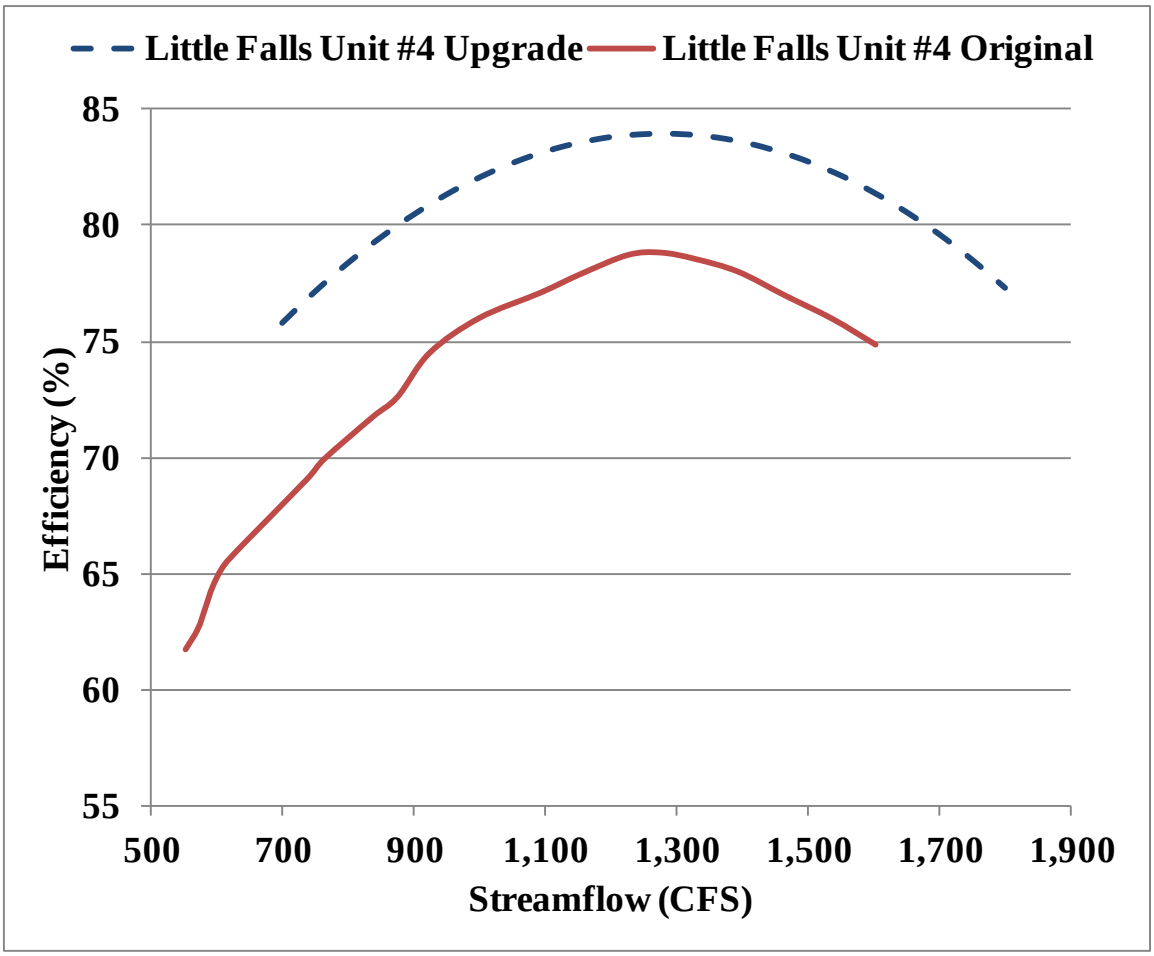


Little Falls Unit #4 Upgrade

The Company completed an upgrade project in November 2001 for the Little Falls Unit #4, which included a new turbine runner upgrade. The Hydro Model study for Little Falls Unit #4 resulted in 4,862 MWh of annual qualifying renewable energy. Illustration 2 shows the turbines curves for Unit #4 before and after the project upgrade. The upgraded turbine

produces energy more efficiently at the higher streamflow conditions where this unit typically operates.

Illustration 2: Little Falls Unit #4 Turbine Curves

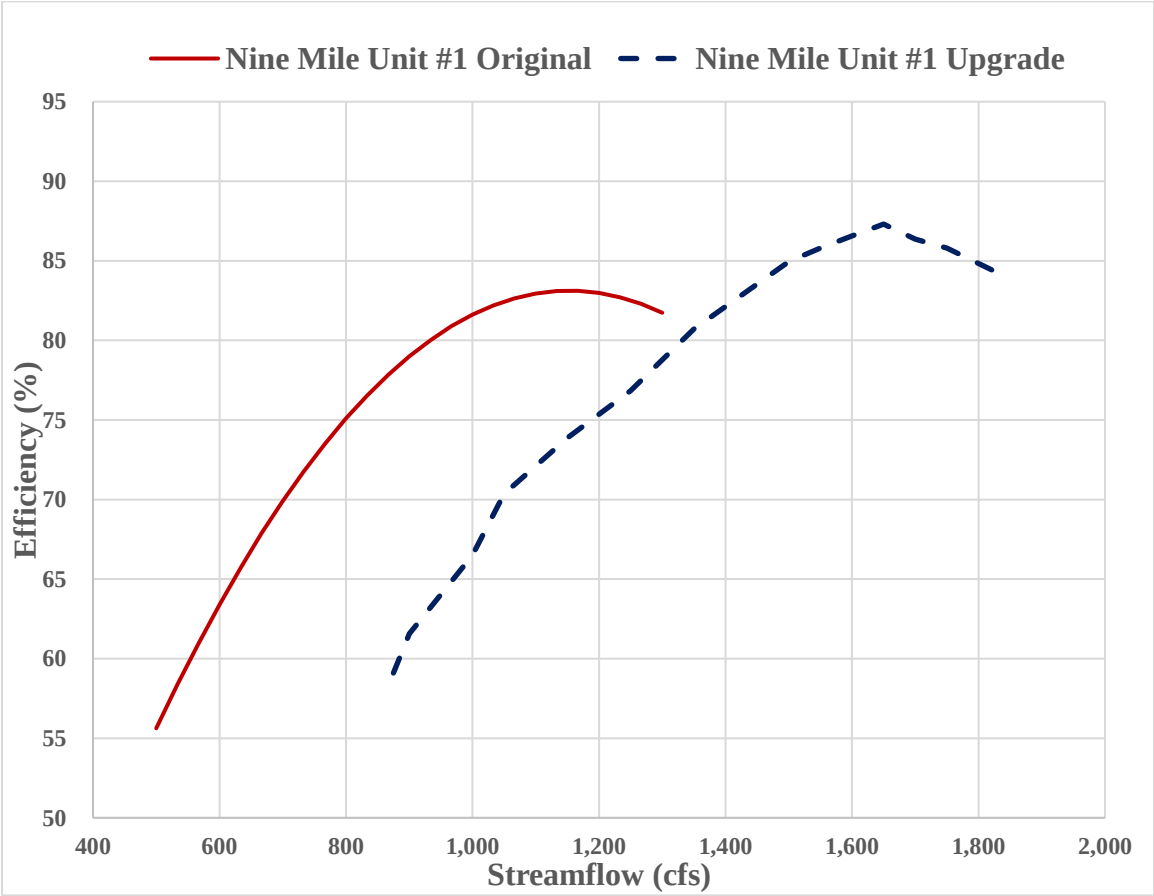


Nine Mile Unit #1 Upgrade

The Company's major redevelopment of the Nine Mile Hydroelectric Project included the replacement of Nine Mile Unit #1 with a new 8 MW unit that went into service in July 2016. Following the upgrade, the Company realized an increase in capacity. The Hydro Model study for Nine Mile Unit #1 resulted in 8,804 MWh of annual qualifying renewable energy. Illustration 3 shows the original and upgraded turbine curves for Nine Mile Unit

#1. The upgraded turbine produces energy more efficiently at the higher streamflow conditions where this unit typically operates.

Illustration 3: Nine Mile Unit #1 Turbine Curves

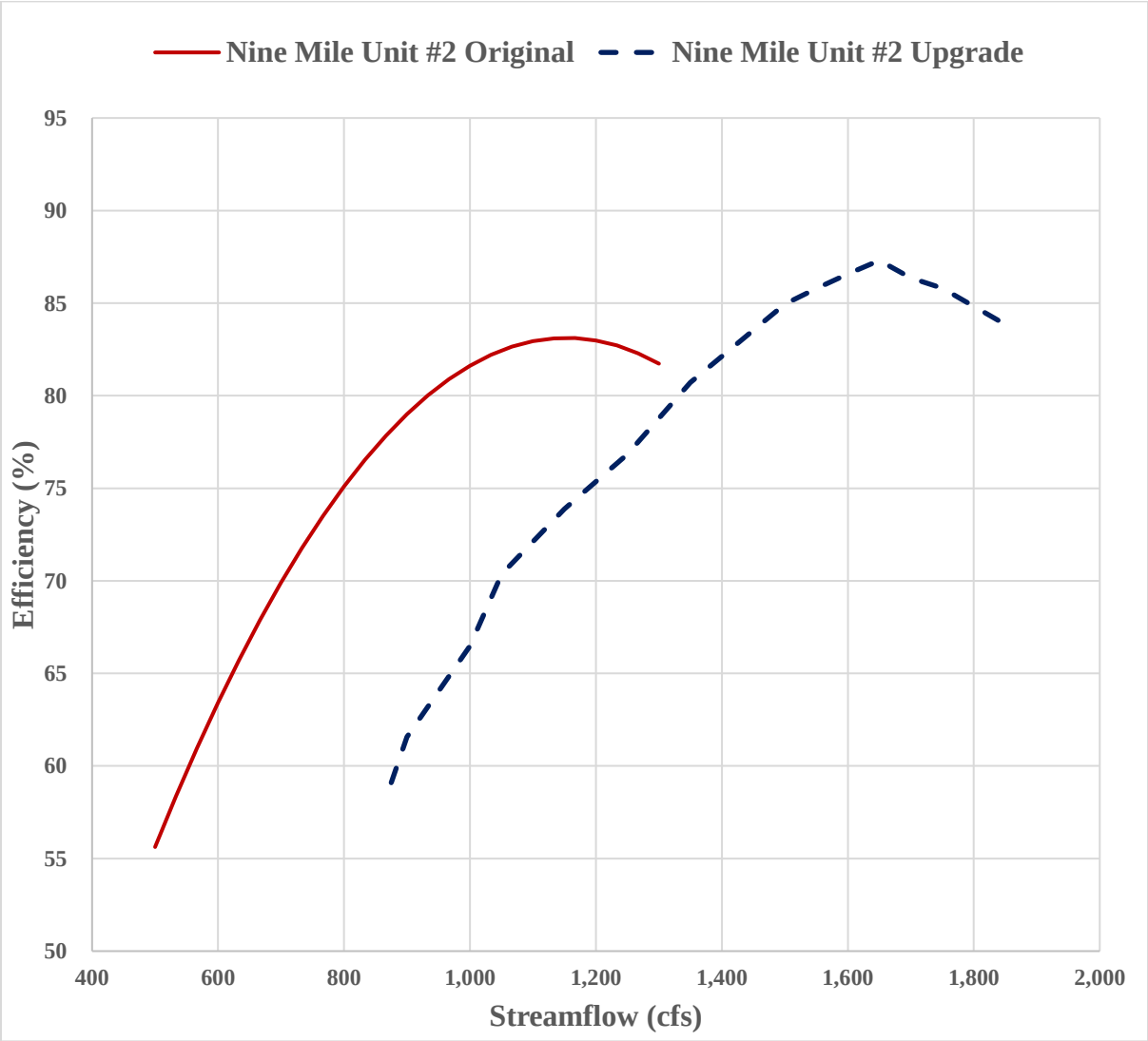


Nine Mile Unit #2 Upgrade

The Company's major redevelopment of the Nine Mile Hydroelectric Project included the replacement of Nine Mile Unit #2 with a new 8 MW unit that went into service in July 2016. Following the upgrade, the Company realized an increase in capacity. The Hydro Model study for Nine Mile Unit #2 resulted in 13,146 MWh of annual qualifying renewable energy. Illustration 4 shows the original and upgraded turbine curves for Nine Mile Unit

#2. The upgraded turbine produces energy more efficiently at the higher streamflow conditions where this unit typically operates.

Illustration 4: Nine Mile Unit #2 Turbine Curves



Summary of Spokane River Upgrades

Table 1 summarizes the annual incremental energy amounts as determined by the Hydro Model for 2002 through 2011. The 10-year average of the annual incremental energy from

each of the hydroelectric upgrades is used as the qualifying amount of renewable energy from each project. The supporting documentation for Table 1 is in the confidential work papers for this filing.

Table 1: Spokane River Annual Incremental Energy from Qualified Upgrades

Incremental MWh				
Year	**Long Lake #3 Upgrade**	**Little Falls #4 Upgrade**	**Nine Mile #1 Upgrade**	**Nine Mile #2 Upgrade**
2002	17,232	4,847	11,690	13,819
2003	12,516	3,869	7,146	11,085
2004	12,904	5,681	8,314	12,647
2005	12,302	4,323	5,893	10,630
2006	19,105	5,949	10,801	20,209
2007	13,474	5,106	8,474	11,799
2008	12,320	4,784	7,364	11,459
2009	13,080	4,816	10,035	11,932
2010	10,462	4,197	5,614	11,200
2011	18,579	5,048	12,705	16,682
Average	**14,197**	**4,862**	**8,804**	**13,146**