

## **Appendix D**

# **Spokane River Hydroelectric Project Qualifying Upgraded 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 hydro electricity 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 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 has decided to utilize 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 as 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).

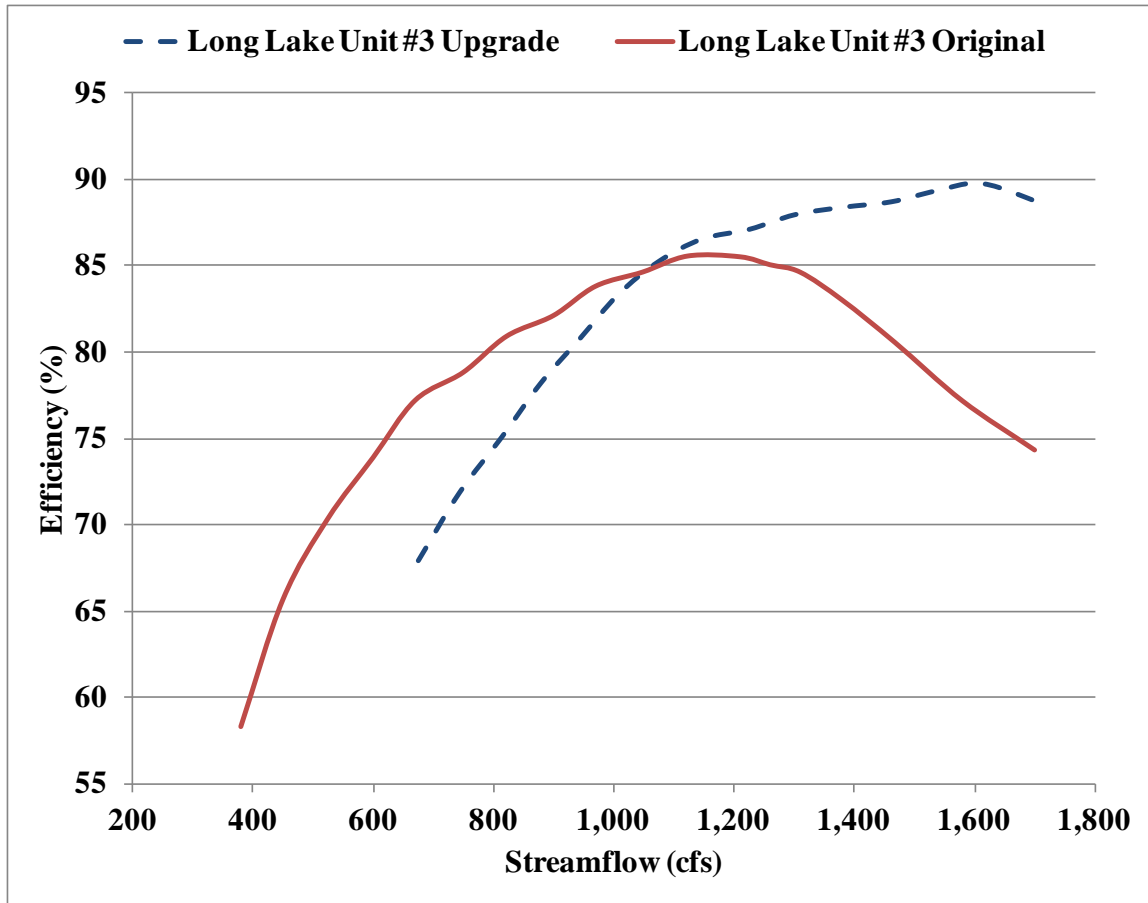
The Hydro Model is a mixed-integer linear programming-based system emulating the operation of the Company's projects. It was developed in support of system operations, financial forecasting, and hydro upgrade efforts. Operating on an hourly time-step, they accurately represent individual turbine and 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**

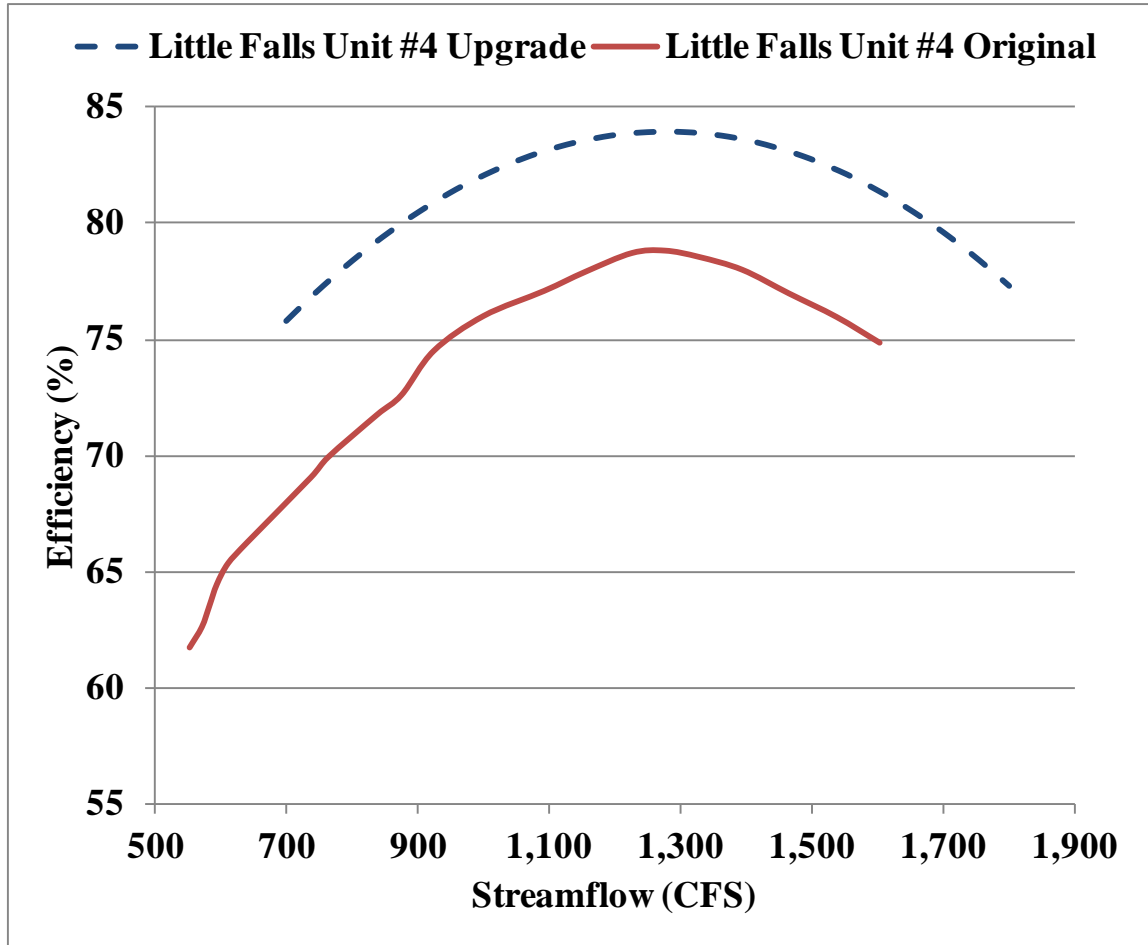


**Little Falls Unit #4 Upgrade**

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**



### 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**

<b>Incremental MWh</b>		
<b>Year</b>	<b>Long Lake #3 Upgrade</b>	<b>Little Falls #4 Upgrade</b>
<b>2002</b>	17,232	4,847
<b>2003</b>	12,516	3,869
<b>2004</b>	12,904	5,681
<b>2005</b>	12,302	4,323
<b>2006</b>	19,105	5,949
<b>2007</b>	13,474	5,106
<b>2008</b>	12,320	4,784
<b>2009</b>	13,080	4,816
<b>2010</b>	10,462	4,197
<b>2011</b>	18,579	5,048
<b>Average</b>	<b>14,197</b>	<b>4,862</b>