PARR-FAIRFIELD OPERATIONS MODELING SYSTEM

Addendum 2

PARR HYDROELECTRIC PROJECT

FERC NO. 1894

Prepared for:

South Carolina Electric & Gas Company
Columbia, South Carolina

Prepared by:

Kleinschmidt

Lexington, South Carolina
www.KleinschmidtGroup.com

May 2016

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1.0 INTRODUCTION

In support of the ongoing studies and relicensing efforts for the Parr Hydroelectric Project, a model of the project's hydrology and hydraulics was created to assess the ability to change operations, and determine the potential effects of changes in project operations. The details of the methods used to create the model are summarized in "Parr-Fairfield Operations Modeling System," Kleinschmidt, December 2014, and in Addendum 1, April 2015. In support of modeling the historic and future load conditions under existing license conditions, load datasets were added to the model. This Addendum 2 describes those additions, as well as modifications to the model made since the initial report and Addendum 1.

2.0 INFLOW DATASET UPDATE

The original model inflow data set spanned the years 1981 through 2013. The estimated inflows to Parr Reservoir were based on the results of a regression analysis of the three nearest upstream gages as compared to the flows at the Alston gage, as described in “Inflow Dataset Development: Statistical Methodology,” Kleinschmidt, August 2014. Because of the ongoing USGS data collection, the inflow dataset has been extended to incorporate the hydrologic period through the end of 2015 (calendar year).

3.0 BASE MODEL STRUCTURE

The model structure was developed with the ability to 1) simulate the full range of operations as allowed by the current license and project's physical constraints, and 2) accurately simulate the power generation for Parr and Fairfield. In order to accurately simulate the power quantities, the model requires an accurate assessment of the gross head differential at each plant, as well as the net head losses and overall generation efficiency.

As described in Addendum 1, the model includes input features to control the minimum flow release from Parr and a consumptive use by the VC Summer Nuclear plant. There were also constraints that went into effect during high inflows to Parr reservoir, which limited the maximum reservoir level and the flow component from Fairfield generation.

4.0 SCENARIO MODELS

The most significant change to the overall reservoir modeling system is the addition of power generation target data. The base model structure was programmed to generate power with the only limitation being the amount of volume in the reservoirs. The base model utilized the full volume of Fairfield, to the extent possible. The primary limitation in the scenario model was during dry periods, which was caused by the slow depletion of system storage due to evaporation and minimum flow requirements.

Accompanying the development of the scenario model was the processing of the generation and load data for the Fairfield pumped storage development. There are currently two load data input sets, one representing the historic scenario and the other the future scenario. The historic scenario incorporates actual hourly generation data from the period January 1, 2000 through the end of 2015. This data set was used to develop a data set for the full 1983-2015 period by duplication. The 2000-2015 data set was copied into the period 1984 to 1999, and the years 1981 to 1983 were copies of 2013-2015.

The future scenario incorporates simulated generation and load data for the year 2030, subsequent to the addition of two nuclear generator units. This data set was copied 35 times to fill in the 35 year period associated with the inflow dataset. The leap year days were filled in with a copy of the February 28 data. The simulated dataset was vetted to ensure the capacity of the facility to accommodate individual cycles of generation and pumping.

5.0 SUMMARY

The historic and future scenarios have been tested, and can simulate the 35-year period of record. During the evaluation of proposed license alternatives, simulations can incorporate proposed changes to operational constraints. Comparison of those simulated results may then be compared with the baseline historic and future scenarios.

A graphic representation of the historic and future load demands and upper reservoir fluctuations for two selected periods of the year are provided below.

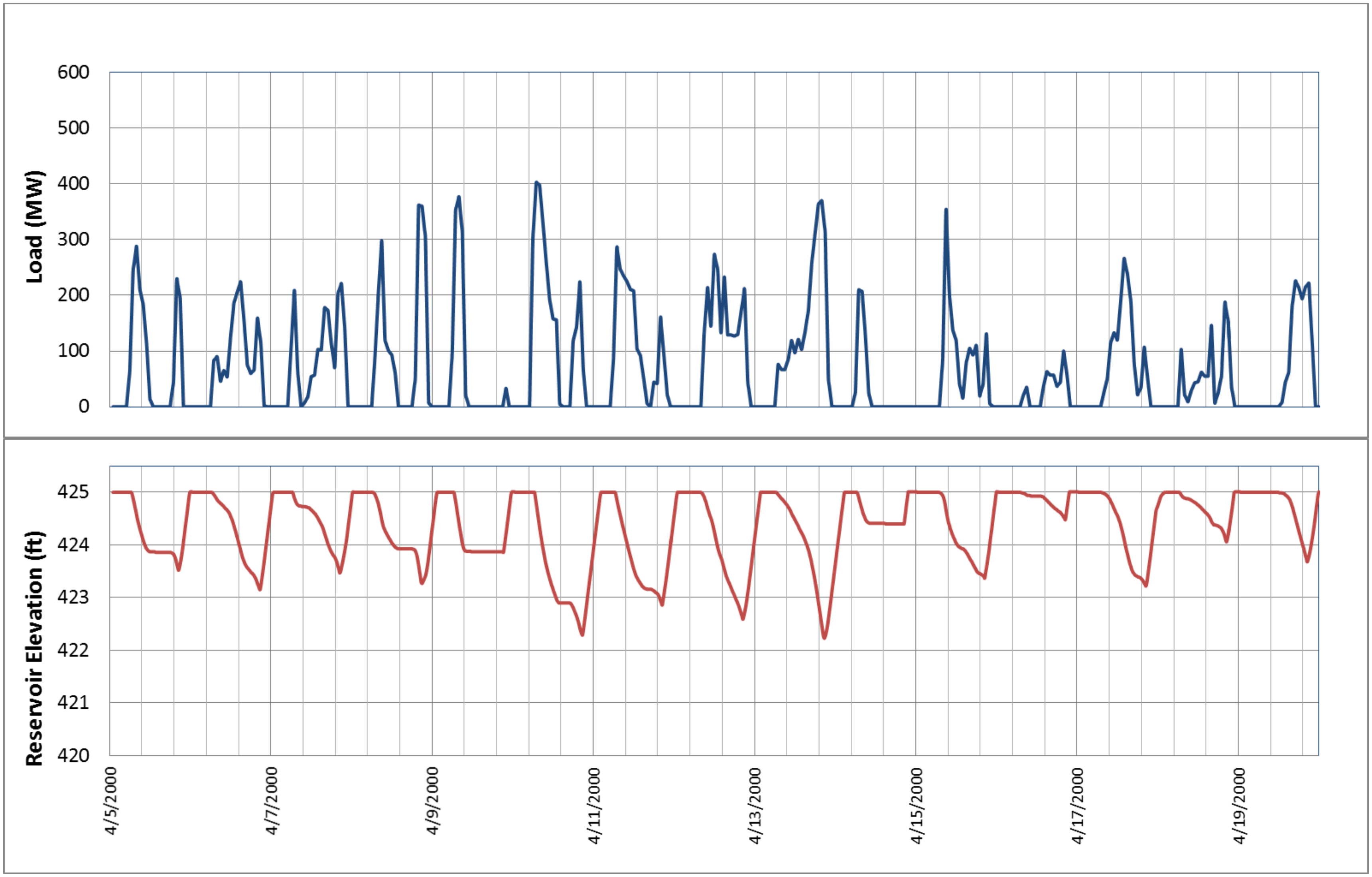

FIGURE 5-1 FAIRFIELD HISTORIC SPRING LOADS AND LAKE MONTICELLO STAGE

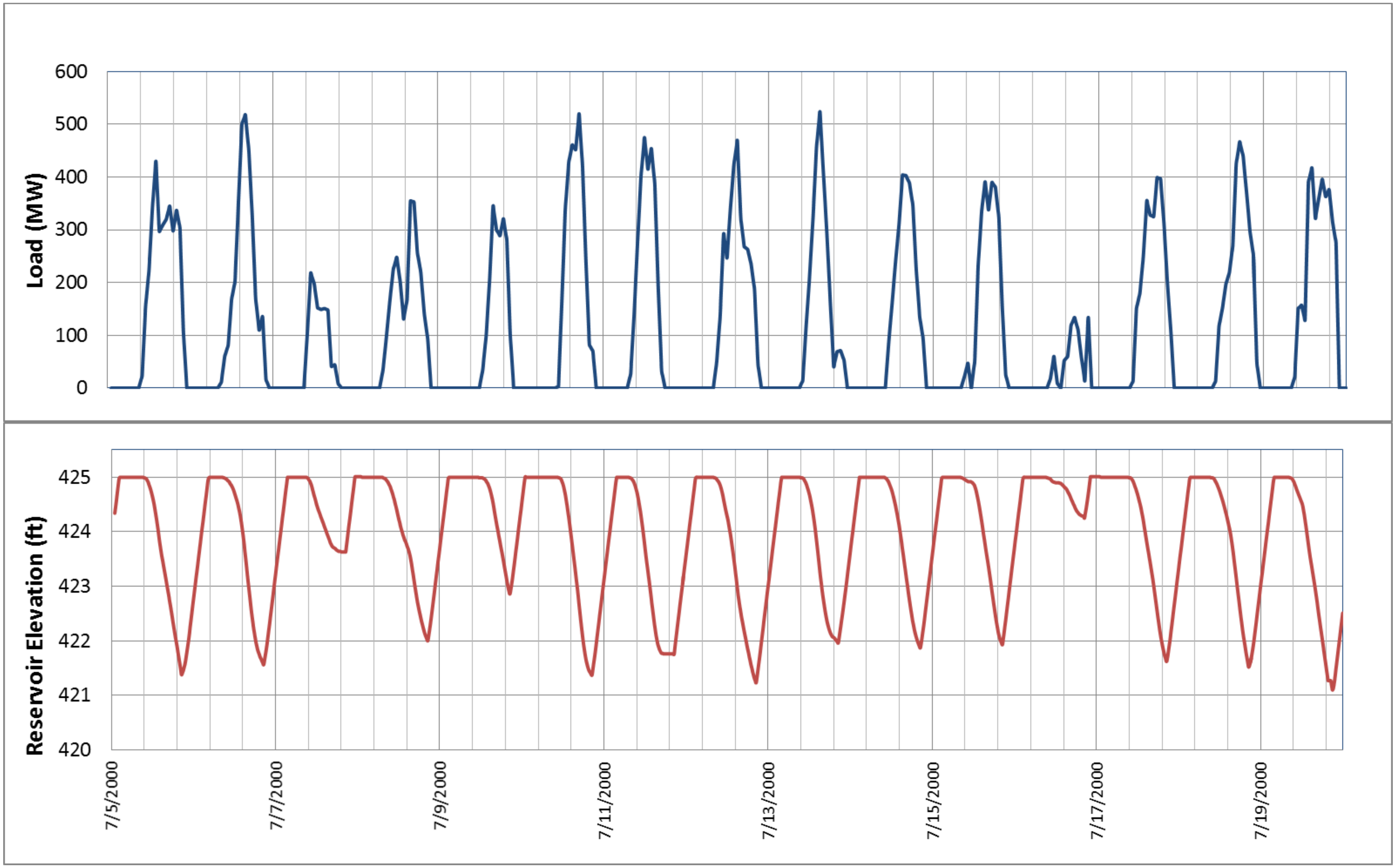

FIGURE 5-2 FAIRFIELD HISTORIC SUMMER LOADS AND LAKE MONTICELLO STAGE

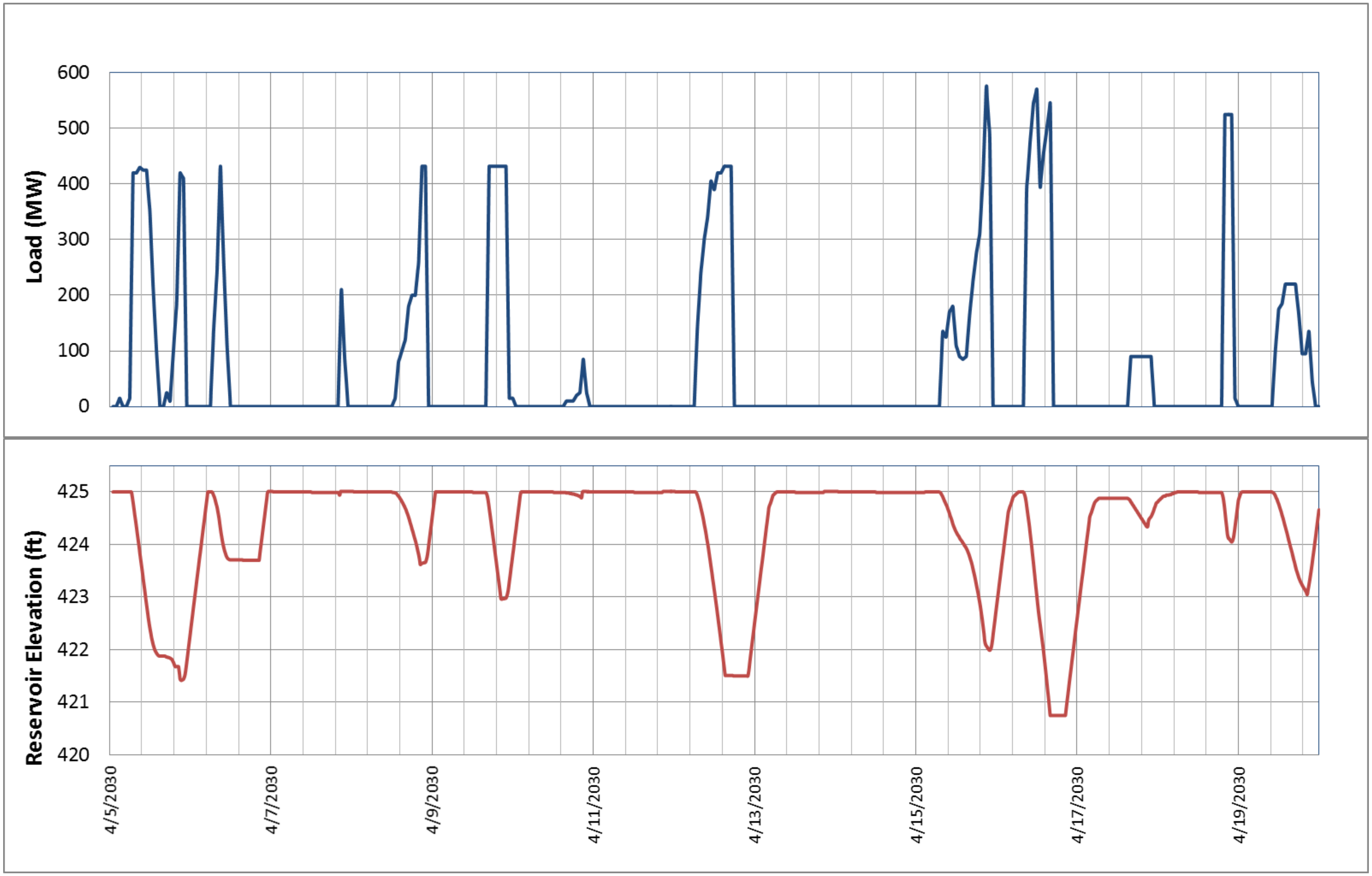

FIGURE 5-3 FAIRFIELD SIMULATED FUTURE SPRING LOADS AND MODELED LAKE MONTICELLO STAGE

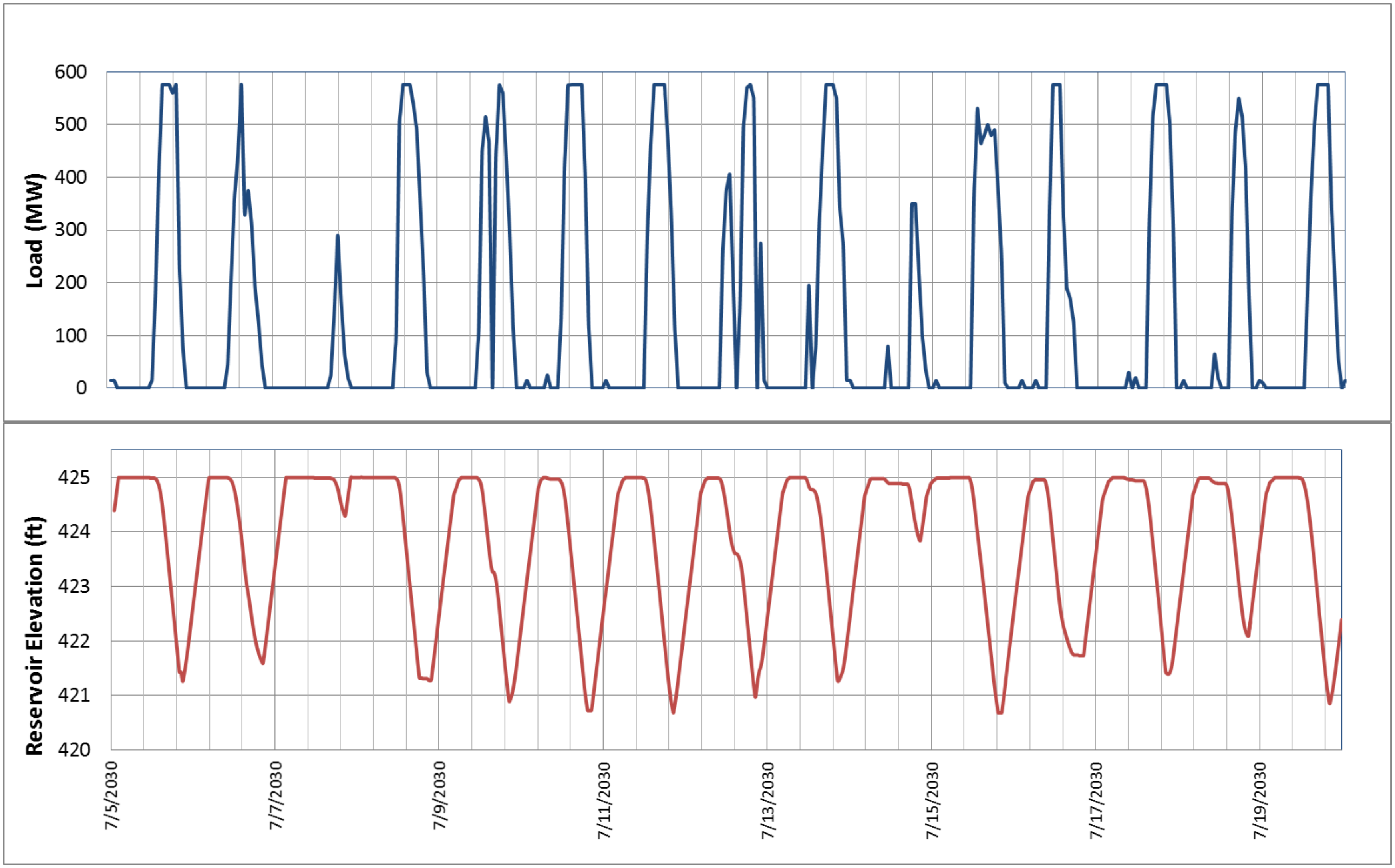

FIGURE 5-4 FAIRFIELD SIMULATED FUTURE SUMMER LOADS AND MODELED LAKE MONTICELLO STAGE