



WATERFALL MAINTENANCE OF THE UPPER KOTMALE EHYDROPOWER PROJECT

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Abstract

Sri Lanka's electricity requirement has been growing at an average rate of 8-9% annually, and this trend is expected to continue in the foreseeable future [1]. To meet the high growth rate of demand for the electricity, more power generating stations should be added to the national grid. Sri Lanka has no fossil fuel resources and therefore implementation of the Upper Kotmale Hydropower Project (UKHP) which uses our indigenous resources is more economical and important for the nation.

After several social, environmental and political debates and delays, the construction works of UKHP has now been initiated and the power station will be commissioned in year 2010 [2].

At the implementation of the UKHP the river water of Kotmale Oya will be diverted at Talawakelle intake dam, into the headrace tunnel of length 12.5 km and then to the power house, which is located about 2 km upstream of existing Kotmale reservoir. The significant impact of the project is that the reduction of water flow over the Saint Clair waterfall affecting the natural beauty of the waterfall.

Democratic Socialist Republic of Sri Lanka has published a gazette extraordinary making the release of water from the reservoir, to maintain the waterfall compulsory. At the construction phase of the Talawakelle reservoir, a special valve has been proposed to install near bottom outlet of the dam for the purpose of releasing water to maintain the Saint Claire water fall:

The objective of this project is to develop an automated system for the optimum water release from the reservoir while meeting the conditions specified in the gazette.



Special computer program has been developed to automate the operation of the valve which release water to maintain the waterfall. A graphical user interface was also developed to facilitate the communication between the operator and the controlling system.

DECLARATION

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree and is also not being concurrently submitted for any other degree.



R. A. L. Ranawaka

I endorse the declaration by the candidate

UOM Verified Signature

Dr. Lanka Udawatta

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List of Principle Symbols/ Acronyms

FSL	- Full Supply Level
Level_R	- Reservoir water level
mmsl	- Meters from mean sea level
n	- Gate operating interval
Lf	- Future reservoir water level
MOL	- Minimum Operating Level
MW _{min}	- Minimum possible loading of the generator
MW _{max}	- Maximum possible loading of the generator
MW _{set}	- Set value of loading of the generator
T _{open}	- Opening time of the valve
T _{close}	- Closing time of the valve
UKHP	- Upper Kotmale Hydropower Project
Vol _{in}	- Volume of water inflow to the reservoir
Vol _{turbine}	- Volume of water outflow for power generation
Vol _{wf}	- Volume of water outflow for water fall
Vol _{RG}	- Volume of water outflow through radial gates
Volin _{night}	- Volume of water inflow during the night time period
Volin _{hour}	- Volume of water inflow to the reservoir in hourly intervals
Vol _{saved}	- Volume of water saved in the previous hours
Vol _{wf_min}	- Minimum volume of water required for the waterfall
SSP	- Safety Set Point
Xref	- Valve Opening Set Point