

Optimal water intake and supply pump scheduling considering water quality safety in multiple water intake system

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ABSTRACT

As of 2016, a large portion (84.7%) of the annual energy consumption for operating water supply business in Korea was for power [1]. As of 2014, about 70%–80% of the power costs for water purification plants in S city were used as water intake and supply pumping costs. Accordingly, the current waterworks business is required to save power costs for efficient management. So, this research utilized a genetic algorithm, a representative optimization technique, to develop an optimal pump operation method that enables the supply of stable water quantity and safe water quality. To propose the optimal pump operation method, the objective of minimizing the costs incurred from water intake to supply was considered, and the pump switching, the water level range of distribution reservoirs and clearwell, which should be considered in actual pump operation, were set as constraints. In addition, the concept of CT values was used to consider water safety. From the results of this research, it is judged that reasonable pump operation would enable not only the saving of power cost and raw water purchase cost but also the supply of tap water to consumers with stable water quantity and safe water quality.

Keywords: CT value; Genetic algorithm; Pump scheduling; Water intake; Water supply

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