Development of Optimum Water System Operation For Saipan Water Distribution System

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The Saipan water distribution system has been divided into 15 sub-regions. Each region is expected to operate somewhat independently. However, due to inadequate inflow to some of the sub-regions, system leakage, and lack of knowledge of system operation, the system is unable to provide 24-hour water services. A stated goal of the Commonwealth of the Northern Marianas Islands (CNMI) government is to provide 24-hour water to all residents served by the Commonwealth Utility Corporation (CUC) water system. The CNMI Governor created a task force whose primary purpose was to find funding and oversee the CUC accomplishments toward the 24-hours water service goal. To assist in reaching their goals, the CUC commissioned the University of Guam Water and Environmental Research Institute of the Western Pacific (WERI) to develop a hydraulic model of the Saipan water system and to train CUC water division staff in the use of that model. WERI researchers have developed computerized models of each of the fifteen sub-regions of the CUC water system using the Haestad WaterCad water system modeling program. They also developed a source transmission and storage model of the Saipan water system. This includes a skeleton of the existing 15-region water system models that are joined together at the boundary points. For the model to provide optimal results and improve the operation of the system it is essential to a) have a good knowledge of the residential and commercial demands being placed on the distribution system and how these demands change during the day, and b) how the pressure through the system changes with time. Without this knowledge it is difficult to develop system operation and to calibrate the hydraulic model of the water system.

This project proposes; a) to better refine estimates of both the quantities and spatial distribution of water demands and how these demands change with both residential and commercial customers of the Saipan CUC water system, and b) to define the impact of demand changes on system pressure during the day and the month. The specific objectives of this project will be to:

1. Determine the average use rate for residential customers in Saipan and to determine the actual use rate for high commercial consumers.
2. Develop Diurnal demand pattern (changes of water demand during the day and month) for residential and commercial customers.
3. Develop a relationship between demand and the system pressure.
4. Export the data developed in Step 1 and 2 into the Saipan Water System hydraulic Model, and run the model in extended period simulation mode.

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