



Development of Optimal Operation of Saipan's Water Distribution System Using a newly Developed Hydraulic Model



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Water hours and low delivery pressure have long been a part of the daily lives of the people in the islands of the Western Pacific. In Saipan, Commonwealth of the Northern Mariana Islands (CNMI), large investments have been made in system improvements, but delivery problems still exist. A stated goal of the CNMI government is to provide 24-hour water to all residents served by the Commonwealth Utilities Corporation (CUC) water system. This goal will be unattainable until the CUC has complete knowledge of their water delivery capabilities and operation.

Over the years the CUC water distribution system has grown and new wells have been added to the system. This physical expansion has been well documented, but improvements in the hydraulic characteristics and delivery capabilities of the entire system have never been fully examined. Recently, Stipulated Orders have been filed in the US District Court for the Northern Mariana Islands to compel the utility company to adhere to federal regulations governing water, sewer, and power. As part of this act, CUC should develop a hydraulic model of the water distribution system that will be used for system improvement, system operation, and future system expansion.

Researchers at university of Guam Water and Environmental Research Institute of the Western Pacific (WERI) have developed computerized models of each of the fifteen sub-regions of the CUC water system using the Haestad WaterCAD water system modeling program. Later on, they 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. Using a Geographic Information System

(GIS) capability and Saipan's 2003 census data, the WERI researchers determined the number of users at each system junction node for residential and commercial customers. During the past several months WERI researchers collected the flow production from the renovated wells during dry and wet seasons. To comply with the stipulated order there is a need to update the hydraulic model and input the inflow/outflow to the system and determine the optimum system operation.

This project proposes to update the Saipan water distribution model and to explore the most effective means of transferring the water sources between the regions. The specific objectives of this project will be to:

1. Update the skeleton model of the CUC water distribution that reflects all the new subdivisions that have been added to the whole system.
2. Determine the amount of water production in each sub-region.
3. Using Geographical Information System (GIS) techniques, locate all production sites.
4. Explore various operational scenarios for effectively transferring water throughout the regions.

The resulting improvements to the water production estimates and the transfer efficiency studies will provide the CUC water division with the capability to: a) identify the rates of unaccounted water throughout the system, b) determine what changes in operation and system improvements are required in order to meet the goals of improved water quality and 24-hour water delivery to all of the CUC customers and, c) comply with stipulated order #1..