

Planning and Designing SCADA Systems for Wastewater Collection Optimization

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ABSTRACT

Wastewater collection systems are often vast networks of interconnected lift stations having varying contributions to the overall collection system due to local weather conditions and customer usage. With increasing demand on existing collection systems and the difficulty faced in increasing wastewater treatment plant capacity due to space and cost constraints, optimization of wastewater collection systems and proper coordination of pumping and diversion of wastewater flows is of great importance. Central to this optimization is a Supervisory Control and Data Acquisition (SCADA) system that can monitor pumping and storage activities and control major pump stations within the collection system. Trending, reporting, alarming, operations and maintenance, and standard operating procedures are additional tools that require access for proper operation and optimization of the collection system.

This paper discusses the planning and design of a wastewater collection SCADA system and process control network using an example project that consisted of an approximately 450 lift station collection system with four physically separated control rooms. Approximately half of the liftstations in the example are existing requiring heavy retrofit work while keeping the process operational which presented construction sequencing and scheduling challenges. The use of digital cellular communications for lift station monitoring and control as well as remote user access to the central SCADA system will be detailed. Additional topics include methodology for selecting fault tolerant and secure process control and communication solutions and securing network communications using software monitoring, network segmentation, access control lists, and virtual private network tunnels, as well as other methods and industry standards. SCADA software and hardware redundancy will be discussed as well as communications failover strategies for disaster recovery. This paper provides an understanding of the options for collection system process control systems, selection of components and solutions, and design considerations for collection system SCADA.

About the Author:



Norman Anderson, PE has over 5 years experience in the design and commissioning of Process Control Systems for the Water Sector. He has provided secure and reliable PLC, SCADA, and Network hardware systems, as well as software architecture designs for a wide range of both water and wastewater facilities. Norman has experience providing complete control system automation solutions for plants, collection, and distribution systems. He has an M.S. in Electrical Engineering from Iowa State University and an M.S. in Physics from the University of Florida. Norman works for CH2M Hill out of their Gainesville, Florida, USA offices.