

PROJECT NARRATIVE



System Description

Owner: San Antonio Water System

Plant Name: Dos Rios Water Recycling Center

A/E Firm: Camp Dresser McKee

Product Type: Ovation

Unit Size (MGD): 83 MGD

Location: San Antonio, Texas

Application: Wastewater Treatment Control (WWT)

Contract Initiation: June 1999

Ship Date: July 2000

Operational Date: December 2000

Major System Components:

- 1 Redundant FDDI Network
- 9 Redundant Controllers
- 14 Operator PC Workstations
- 1 Engineer/Operator PC Workstation
- 1 Historian/Report Server
- Links to existing Q-Line I/O
- 5 Compressor Controllers (Modicon PLCs)
- Filter Network with 20 PLCs

Distributed Control System I/O

Point Count:

4,000 Total I/O Points

300 DataLinked Points



Ovation® expert control system enables the Dos Rios Recycling Center Outfall to release clean water into San Antonio's rivers.

SAN ANTONIO WATER SYSTEM (SAWS)

Dos Rios Recycling Center

Located in San Antonio, Texas

As an emerging leader in the development and maintenance of water resources, the City of San Antonio is on the cutting edge of complex water reutilization solutions that will alleviate the current drain on valuable natural resources and satisfy the water needs of local communities. The Dos Rios Recycling Center, the largest of four recycling centers in the San Antonio Water System (SAWS), was established in 1987 as a central element in SAWS's critical water management plan. The critical water management plan is an ongoing process to conserve drinking water supplies drawn from Edwards Aquifer, the main water supply for San Antonio and surrounding areas.

The Edwards Aquifer has been the mainstay for all of San Antonio's water needs for nearly 300 years. However, due to San Antonio's population boom, water usage is increasing at a rate faster than the Aquifer can supply. In an effort to preserve this unique natural resource, the City of San Antonio has been developing environmentally and economically feasible water and wastewater recycling programs.

Original System Architecture

With a plant capacity of 250 MGD, Dos Rios opened as a replacement for a 60-year-old sewage facility. The plant operated with the newest, state-of-the-art technology available at the time, and it needed a reliable, fully redundant distributed control system that could handle growth and demand. While SAWS was dedicated to environmental responsibility, they also wanted a control system that demonstrated high productivity through commitment and competent performance without compromising their cost-consciousness or quality standards. SAWS considered their needs and objectives, and the right choice was clear—they went with Emerson Process Management's WDPF Information and Control technology using NumaLogic remote I/O.

Original WDPF Architecture

Owner: San Antonio Water System

Plant Name: Dos Rios Wastewater Treatment Plant

A/E Firm: Malcolm Pirnie, Inc.

Product Type: WDPF

Unit Size (MGD): 180 MGD

Location: San Antonio, Texas

Application: (WWT)

Contract Initiation: April 1985

Operational Date: December 1986

Major System Components:

- 15 Distributed Processing Units
- 3 Standard Engineer's Stations
- 17 Standard Operator's Stations
- 1 Historical Storage & Retrieval
- 1 Logger
- 1 Calculator Unit
- 3 PC Interfaces
- 1 DEC MicroVAX 3300
- Redundant Coaxial Cable Data Highway

WDPF provided a flexible, open architecture design that could be expanded without costly upgrades or modifications. Process diagrams, alarm displays, live and historical trends, process point reviews, and other operator functions made full system control manageable and maintainable.

In the years following, San Antonio's population growth and subsequent water demand continued to skyrocket. After 10 years of hard use, the NumaLogic system maintained its reliability and effectiveness, but SAWS felt a newer control system would optimize operations, lower operating costs, and allow them to provide better customer service. Again, Emerson offered the needed solution at the right time—a newly designed migration process to upgrade to Ovation[®] expert control technology.

Migration and Installation

The latest Dos Rios installation was a landmark for Emerson for several reasons—first, SAWS became the first NumaLogic WDPF-to-Ovation migration. Additionally, it was the first Ovation installation to use the full Windows NT operating platform. The NT platform was the logical choice because it incorporated newest technology such as the Ovation Developer Studio configuration tools with the Ovation NT operator workstation and enterprise historian. It is also completely compatible with the existing Solaris-based Power Tools.

Saving money by retaining equipment and software

Reusing WDPF hardware eliminated costs of new equipment and operator retraining. Migration allowed SAWS to retain their considerable original investments in I/O, cabinetry, and engineering (process graphics, programming, etc.). First, an Ovation controller fieldkit replaced the existing DPUs. By preserving three plant areas of Q-Line I/O, Emerson minimized the cost of terminations and installation. The control programming and plant operation remained unchanged on the new system. To preserve the original points names, loops and ladders were translated into control sheets of SAMA logic. SAWS's original investment in Plant Control and Monitor Graphics was translated into the Windows NT operating platform. During this translation, Emerson implemented a control graphics design that eliminated the original system membrane keyboard and replaced it with a mouse-driven control sub-screen.

Emerson installed a SCADA MODBUS Radio System

SAWS was plagued by communication problems with the control carriages for the sand filters. During the last 100 years, flooding destroyed the existing copper communication system. Emerson implemented a replacement of the original RTUs with a MODBUS solution that can now be controlled and monitored from the Windows NT operating platform. Collected operational information is stored and easily accessed via the Enterprise Historians, an added benefit that SAWS had not realized until now. The installed system has a Master Modicon PLC that communicates via an unlicensed spread spectrum radio band to 20 individual control carriages equipped with Modicon slave

Emerson provided two independent Enterprise Process Historians on the data highway. Each historian is tightly integrated to the Ovation Control System to process values, operator actions, and alarm messages, and to collect and store data. The Enterprise Historian collects a wide variety of data through Emerson's complex System Display Software that includes:

- Alarms Displays
- Diagnostic Displays
- Trend Displays
- Point Summary Screen
- Historical Point Review

SAWS wanted a new system that simplified and reduced engineering cycle time. Emerson answered with the Ovation Developer Studio, an easily modifiable configuration tool to create and maintain control strategies, process graphics, point records, report generators, and system configurations. With a constantly growing customer base, it was important that SAWS have flexible software that would handle a changing system.

The Developer Studio offers a range of capabilities, including:

- Control Builder
- Graphics Builder
- Point Builder
- Configuration Builder
- Security Builder
- I/O Builder
- Report Builder

The Developer Studio interacts with Ovation's embedded database management system to coordinate and maintain plant configurations while connecting with other plant sources. This feature figures in well with SAWS's future plans of connecting Dos Rios to the three other recycling plants.

PLCs. Control information is passed from any NT workstation to a carriage or from carriage to carriage.

Emerson's cutover plan eliminates interruptions

While the main goal was to upgrade the existing DCS with the Windows NT operating platform and Ovation control system, there were many other issues to consider prior to installation. First, there could be no operational impact to the customer during cutover, so it was decided that implementation would commence using an area-by-area approach. Second, the customer imposed area time constraints to avoid any possible license violations. In response to these customer cutover needs, Emerson assembled an installation team to meet these challenges.

The Right Choice

By virtue of system design and installation enhancements, Ovation met SAWS's most crucial goal—future expandability and flexibility. Ovation is platform-independent, using third-party, commercial hardware to constantly keep up with the fast pace of technology. Emerson supports long-term technology plans through easily implemented system additions. To avoid obsolescence, Ovation also allows for system upgrades as faster processor speeds and new technologies become available.

Among the many improvements that solidified SAWS's choice was Ovation's fully redundant, fault-tolerant dual-counter rotating ring network. This highly improved network used fiber optic cable and FDDI technology to replace the redundant coaxial cable data highway. Not only did it provide the real-time plant-LAN interface capabilities that the Dos Rios plant needed, but it also included an ODBC interface that allowed external users access to real-time and historical data. When SAWS requested external graphic viewing via an Intranet connection, Emerson engineers quickly went to work to develop new technology. SAWS operators quickly discovered Ovation's benefits. While the points are still updated every second and highway operation is unaffected by any single failure, Ovation's FDDI network is more than 50 times faster than the previous network and doesn't require highway time updates.

Future Plans

SAWS is currently in the process of implementing and integrating the three independent control systems of their Leon Creek, Salado Creek, and Dos Rios Water Recycling Centers into a single PC/PLC-based control system. Again, Emerson was chosen to create total system integration, allowing operators to monitor and control the three facilities from any location. Emerson used the existing equipment wherever possible, and created the ability to upgrade the existing plant controls at Leon and Salado with minimal additional SAWS investment.