

Introduction to SCADA & Operator Responsibilities

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QA Tester, HTT

What is SCADA?

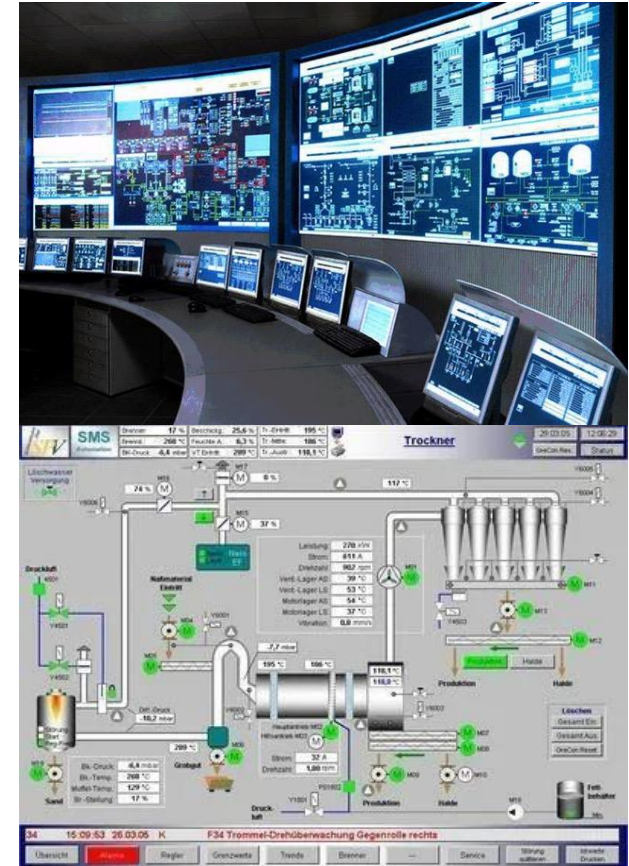
Supervisory
Control
And
Data
Acquisition

SCADA Is...

- An integrated system of software, hardware, and communications
- A bridge between field equipment and operators
- A tool for real-time data acquisition (flow, level, pressure, alarms)
- A platform used in water and wastewater systems
- A way to support monitoring and control of operations

Two Core Functions

- **Monitoring:** Real-time & historical data visualization
- **Control:** Remote or automated equipment operation



Common SCADA Software Components

Monitoring & Visualization

- HMI (operator screens)
- Alarms & notifications
- Trending & reporting

Data & Communications

- Data acquisition from field devices (PLCs, RTUs)
- Historian (data storage)
- Event logging & audit trail

Control & Operations

- Equipment control & setpoints
- Acknowledging alarms

Security & Access

- User roles & permissions
- System authentication

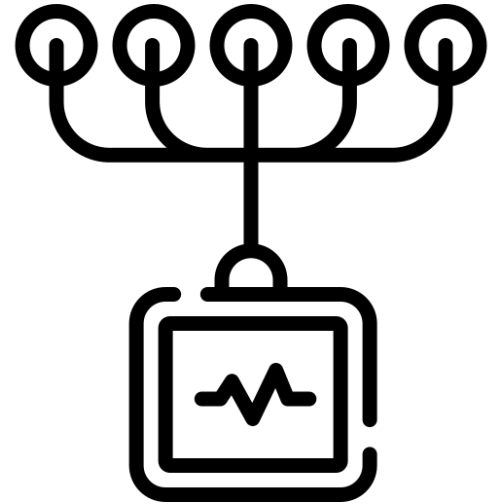
Remote Access & Configuration

- Mobile / remote viewing
- System configuration tools

What is Telemetry?

Telemetry...

- Sends data from remote equipment to a central location
- Monitors pumps, tanks, valves, and other assets in real time
- Alerts operators when something needs attention



How Telemetry & SCADA Work Together

- Sensors → RTU/PLC → Communications → SCADA → Operator
- Data flows continuously or on event
- Alarms notify operators instantly

SCADA lets operators **respond faster, prevent emergencies, and optimize system performance**

Industries that rely on SCADA

Process Industries

- Food & Beverage
- Pharmaceuticals & Life Sciences
- Manufacturing & Automation

Utilities & Energy

- Water & Wastewater
- Energy & Power
- Oil & Gas

Infrastructure & Services

- Transportation
- Public Infrastructure
- Recycling & Waste Management

And many more industries that depend on real-time operations

Purpose of SCADA Systems in Water Utilities

Data

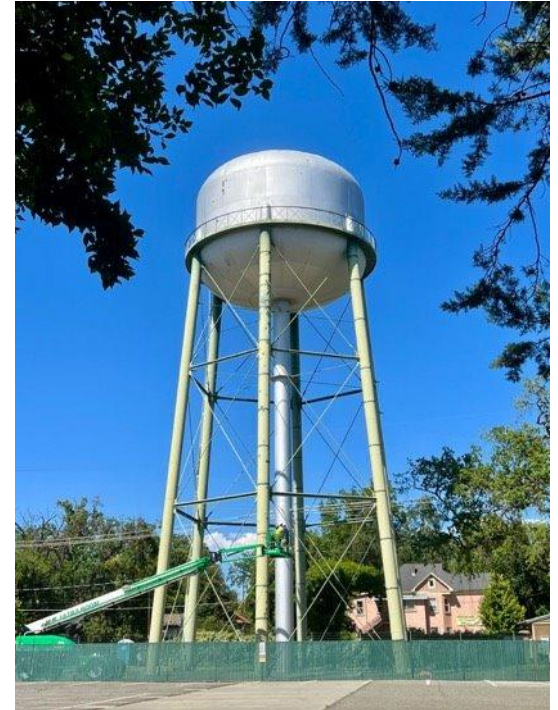
- Real-time monitoring of system conditions
- Continuous collection of operational information

Control

- Process automation and operator intervention
- Faster response to system changes

Outcomes

- Improved efficiency and reliability
- Regulatory compliance and reporting
- Safer system operation and decision-making



Evolution from Manual Operations to Automated Monitoring

Before

- Manual, localized, or relay-based control
- Limited visibility & localized data
- Reactive monitoring
- Required on-site personnel for operation
- Paper-based recordkeeping and reporting
- Radio systems (330–512 MHz, 900 MHz) needed specialized maintenance
- Auto-dialer systems dependent on legacy telephone infrastructure
- Satellite communications with high implementation and operating costs
- Limited practicality of early cellular communication technologies

After

- Centralized, automated control
- Real-time data monitoring from anywhere
- Recording of all historical data
- Remote control
- Predictive maintenance
- Improved safety

Applications across the Water & Wastewater Ecosystem

- Water Distribution
- Water Storage
- Water Collection
- Wastewater Treatment
- Water Quality

Typical Application Areas



Pump Stations



Lift Stations

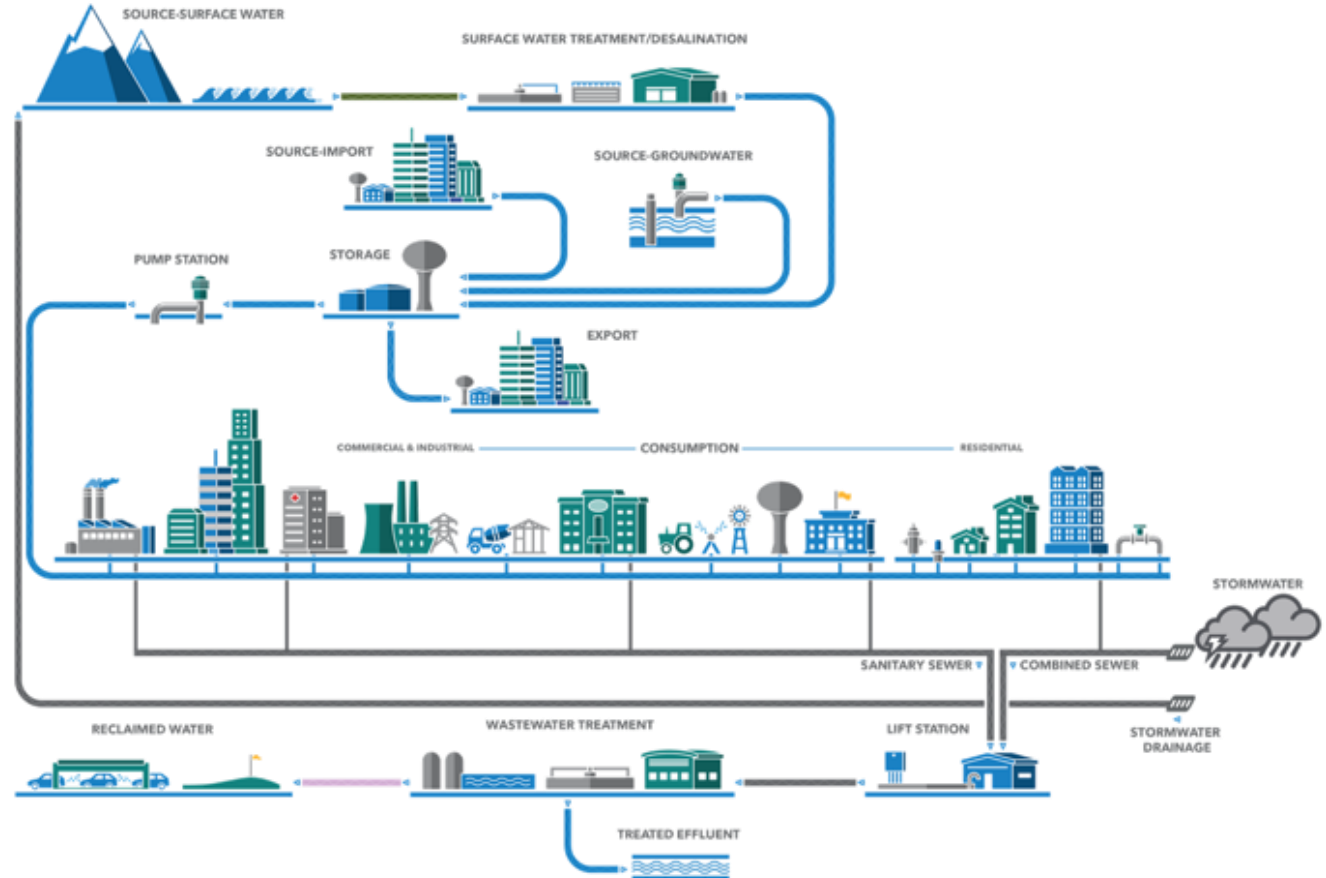


Water Tanks & Wells

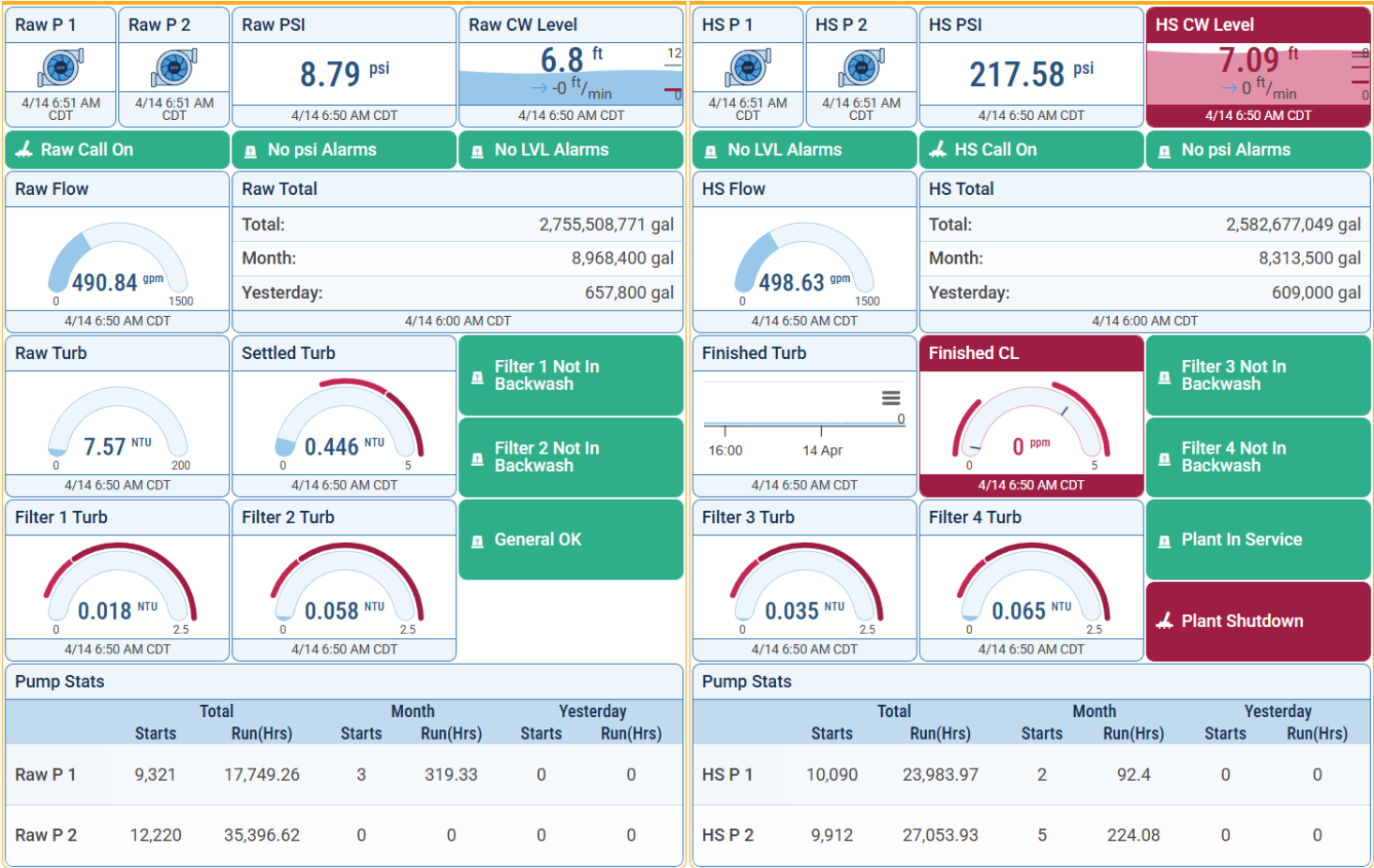


Treatment Plants

SCADA Throughout a Water & Wastewater Network



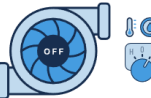
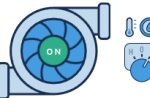
Water
Plant



Water Storage & Distribution System



Vacuum
Station

Vac P1  4/18 2:49 PM CDT		Vac P2  4/18 2:49 PM CDT		Vac P3  4/18 2:49 PM CDT		Xfer P1  4/18 2:49 PM CDT		Xfer P2  4/18 2:49 PM CDT		Sewer P1  4/18 6:29 PM CDT		Sewer P2  4/18 6:29 PM CDT		 Airvac Power OK																																																				
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Pump Stats <table><tr><th></th><th>Starts</th><th>Total Run(Hrs)</th><th>Starts</th><th>Yesterday Run(Hrs)</th></tr><tr><td>Vac P1</td><td>26,580</td><td>31,216.39</td><td>0</td><td>0</td></tr><tr><td>Vac P2</td><td>27,058</td><td>31,368.45</td><td>0</td><td>0</td></tr><tr><td>Vac P3</td><td>28,559</td><td>30,448.56</td><td>0</td><td>0</td></tr></table>						Starts	Total Run(Hrs)	Starts	Yesterday Run(Hrs)	Vac P1	26,580	31,216.39	0	0	Vac P2	27,058	31,368.45	0	0	Vac P3	28,559	30,448.56	0	0	Pump Stats <table><tr><th></th><th>Starts</th><th>Total Run(Hrs)</th><th>Starts</th><th>Yesterday Run(Hrs)</th></tr><tr><td>Xfer P1</td><td>9,562</td><td>270.19</td><td>0</td><td>0</td></tr><tr><td>Xfer P2</td><td>11,318</td><td>325.23</td><td>0</td><td>0</td></tr></table>						Starts	Total Run(Hrs)	Starts	Yesterday Run(Hrs)	Xfer P1	9,562	270.19	0	0	Xfer P2	11,318	325.23	0	0	Pump Stats <table><tr><th></th><th>Starts</th><th>Total Run(Hrs)</th><th>Starts</th><th>Yesterday Run(Hrs)</th></tr><tr><td>Sewer P1</td><td>19,976</td><td>758.55</td><td>0</td><td>0</td></tr><tr><td>Sewer P2</td><td>11,727</td><td>40,663.75</td><td>0</td><td>0</td></tr></table>						Starts	Total Run(Hrs)	Starts	Yesterday Run(Hrs)	Sewer P1	19,976	758.55	0	0	Sewer P2	11,727	40,663.75	0	0	 Sewage High Level Clear	
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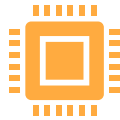
WWTP



Connecting Field Operations & the Control Room



SCADA links field equipment and control room operators by giving remote access to real-time data



Field sensors collect key data such as pressure, flow, and temperature



Data is transmitted to a centralized HMI for monitoring and visualization



Operators can detect issues early and respond by remotely controlling equipment (pumps, valves)



Improves efficiency, safety, and response time across the system

SCADA as a Decision-Support Tool

- SCADA is **not a replacement for operator judgment**
- Provides real-time data, alarms, and system visibility
- Helps operators identify trends and respond faster
- Supports **informed decision-making**, but does not replace human expertise
- Operators remain responsible for **interpreting data and taking action**

Operator Responsibilities

1

Monitoring
alarms and
trends

2

Responding to
abnormal
conditions

3

Verifying field
equipment
operation

4

Maintaining
accurate
records

5

Coordinating
with IT &
maintenance
personnel

Bringing It All Together

- SCADA provides visibility across the entire water & wastewater system
- Enables real-time monitoring, alarms, and remote control
- Supports faster response and more efficient operations
- Operators turn data into decisions
- Reliable systems depend on both technology and human expertise