
SCADA Transformation in Wastewater

Cape May County Municipal Water Authority

Rob Winder – CMCMUA

Matt Ruth - Avanceon

AVEVA



About CMCMUA

Vision

CMCMUA will be a leader in the pursuit and implementation of innovative, environmentally sustainable and reliable wastewater treatment and solid waste management systems.

Mission

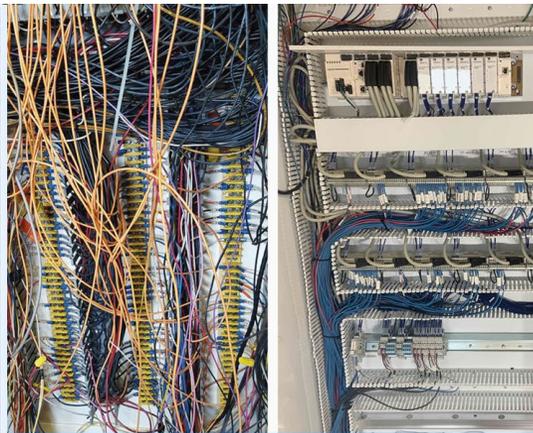
To efficiently implement progressive and fiscally prudent solutions to safeguard the public health and protect Cape May County's unique natural environment in partnership with an engaged community and staff.

History

The construction phase for the four (4) regional systems, which include Ocean City, Cape May, Seven Mile Beach-Middle and Wildwood Lower, began in 1979 with the first facility completed in 1982 and the fourth plant finished in 1988.



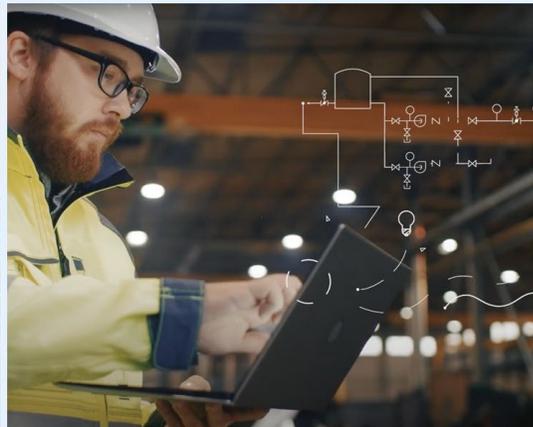
New Systems



Upgrades



Data and MES



OT Support

About Avanceon

Mission

Focused on guiding, implementing and supporting operational technology solutions for manufacturing, industrial and utility organization as they take the steps on their Digital Transformation journey.

Our Promise

To create organizational and personal success for our customers through the solutions we provide for them

History

Established in 1984 with the goal to help our customers translate their needs, walk with them through their implementations and elevate them to a successful outcome.

AVEVA Endorsed Integrator since 2009 focused on SCADA and Advanced Applications.

www.avanceon.com

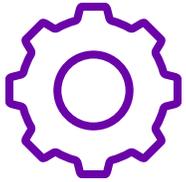
<p>AVEVA</p> <p>ENDORSED System Integrator</p>	<p>Endorsed Operate</p>
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AVANCEON

Taking the key steps of Digital Transformation



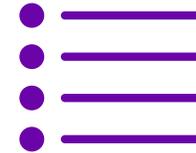
Challenge

- Address Systemic Obsolescence at the MUA
 - Knowledge extinction from people retiring
 - Original systems no longer manufactured or supported



Solution

- Deployed AVEVA System Platform, OMI, Edge and Historian to digitize the tribal knowledge, streamline process visibility and leverage cutting edge technology benefits



Benefits

- Data presented as Information for true Decision Making
- Reliable and Redundant
- Accessible by Everyone from Anywhere
- Fully documented and Standardized for future growth

Obsolete SCADA

CMCMUA is 50! Time to Retire that SCADA System?

- Clean Water Act of 1972 triggered Wastewater Regionalization.
- CMCMUA was established in 1972 and started their designs.
 - Does anyone still have their Commodore 64?
 - Do you still have your owners manual?
 - Can you buy parts for your Commodore 64?
 - Are the games still attractive?
- How to migrate...



The MUA Challenge

- Capital
- Institutional Knowledge
- That One Guy



Project Chartered

Contract and Responsibilities



- SCADA software was the pivot point for the project's success
- All aspects of the projects to support the SCADA were set up under a New Jersey IT based contract
 - SCADA
 - IT Architecture
 - Control System Design
 - Electrical Design
 - Standards and Structure for all aspects of their operations
- Unique NJ IT based contract
 - No construction / fabrication
 - Allowed consistency with software platform(s) and integration firm
- 3 key decisions for the upgrade:
 - AVEVA
 - Schneider Electric
 - Avanceon

AVEVA components

Addressing the needs of a modern Wastewater operations

- Foundations
 - System Platform
 - Security
 - Redundancy
 - Resource management
 - Standard instance management
- Visualization
 - Two Types of HMI to address redundancy
 - AVEVA OMI – HMI Container for Control Room and Plant function
 - AVEVA Edge – Pump Stations and Failover functionality
- Tools for Operations
 - Historian
 - Alarm Dialer – Win911
 - Reporting – Dream Reports
 - Asset Management

Project Course and Scope

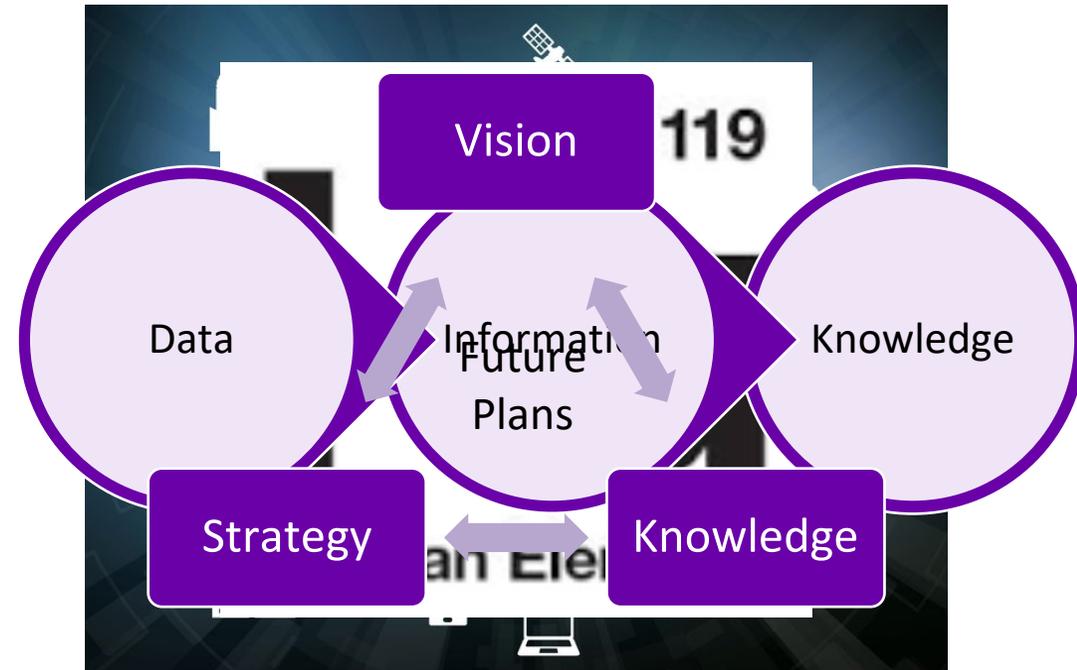
Standardization Across Five (5) Sites

- Cascade one plant and process at a time
 - Seven Mile (1st Contract)
 - Wildwood (2nd Contract)
 - Ocean City (2nd Contract)
 - Cape May (2nd Contract)
 - Landfill (3rd Contract)
- Each plant has 6 to 10 process areas
 - Plus 4 to 10 pump stations
- Decentralized Control Methodology
 - 56 PLC's in total over four sites
 - Thousands of data points



Key Requirements and Considerations of the System

- Address the Big Human Element Elephant
 - Engaging with new and existing operators
 - Simplify and Streamline the information
 - Make it easy
- Accessible by Everyone from Anywhere
- Shift to have Information / Knowledge
 - Away from “volumes of data”
 - Ability for operator to mine it and understand
- Reliable and Redundant
- Platform for future expansion





State	Priority	Name	AlarmComment	Time
ACK	1	SM_01_001_003_COMM_001.AimS	Bar Screen 1 Inlet Sluice Gate Modbus - Comm Fail Alarm	9/26/2022 10:33:22 AM
ACK	2	SM_01_001_003_MQV_001.FaultAimS	Bar Screen 1 Inlet Sluice Gate Fault Alarm	9/7/2022 8:54:25 AM

Look Carefully!

Tell Me What You Saw!

Safety

LEL: 0.3 %

H2S: 2.7 ppm

Bar Screen Hours/MG: 0.9

- Comm Fail
- All Closed
- All Off
- Invalid



- Bar Screen System Control Power
- Actuator Warning

Lead/Lag Selection

Bypass Reset

Situational Awareness

- Situational Awareness is the ability to identify, process, and comprehend the critical information about an incident.

The screenshot displays a SCADA interface for CMC MUA. At the top, there is an alarm log with the following data:

State	Priority	Name	AlarmComment	Time
ACK	1	SM_01_001_003_COMM_001.AImS	Bar Screen 1 Inlet Sluice Gate Modbus Comm Fail Alarm	9/26/2022 10:33:22 AM
ACK	2	SM_01_001_003_MOV_001.FaultAlmS	Bar Screen 1 Inlet Sluice Gate Fault Alarm	9/7/2022 8:54:25 AM

The main interface is titled 'Screening' and shows a process flow with three main sections: Bar Screen 1, Bypass Channel, and Bar Screen 2. Each section includes controls for Inlet Sluice Gate, Outlet Sluice Gate, and various level sensors (High Level, Upstream High Level, Differential Level). Safety indicators for LEL (0.3%) and H2S (2.7 ppm) are shown at the top. A 'Comm Fail' alarm is highlighted with a red circle and a yellow box around the 'Inlet Sluice Gate' control for Bar Screen 1. The interface also features a 'Bar Screen Hours/MG' indicator (0.9) and 'Grit Chambers' labels. At the bottom, there are buttons for 'Lead/Lag Selection' and 'Bypass Reset'.

Contextual Alarming

- As the Operator drills down into the system the alarm notifications become screen specific.

The screenshot shows a navigation menu at the top with the following items: CMC MUA, Seven Mile, Plant, Preliminary Treatment, and Screening. Below the menu, a list of alarm notifications is displayed:

State	Priority	Name	AlarmComment
UNACK	3	SM_01_001_003_MOV_002.MiscAlmS	Bar Screen 1 Outlet Sluice Gate Miscompare Alarm
ACK	1	SM_01_001_003_COMM_001.AlmS	Bar Screen 1 Inlet Sluice Gate Modbus Comm Fail Alarm
ACK	2	SM_01_001_003_MOV_001.FaultAlmS	Bar Screen 1 Inlet Sluice Gate Fault Alarm

The interface also shows a list of system components with their respective alarm counts:

- Septage: 1 (UNACK), 2 (ACK), 1 (ACK)
- Screening: 1 (UNACK), 2 (ACK), 1 (ACK)
- Grit Chamber: 2 (UNACK)
- Odor Control: 1 (ACK)
- Recycle: 1 (ACK)
- Peroxide: 1 (ACK)
- Sumps: 1 (ACK)

The screenshot shows a detailed view of an alarm notification. The navigation menu at the top is the same as in the previous screenshot. The alarm notification is displayed in a table:

State	Priority	Name	AlarmComment
UNACK	3	SM_01_001_003_MOV_002.MiscAlmS	Bar Screen 1 Outlet Sluice Gate Miscompare Alarm
ACK	1	SM_01_001_003_COMM_001.AlmS	Bar Screen 1 Inlet Sluice Gate Modbus Comm Fail Alarm
ACK	2	SM_01_001_003_MOV_001.FaultAlmS	Bar Screen 1 Inlet Sluice Gate Fault Alarm

The interface also shows a list of system components with their respective alarm counts:

- Septage: 1 (UNACK), 2 (ACK), 1 (ACK)
- Screening: 1 (UNACK), 2 (ACK), 1 (ACK)
- Grit Chamber: 2 (UNACK)
- Odor Control: 1 (ACK)
- Recycle: 1 (ACK)
- Peroxide: 1 (ACK)
- Sumps: 1 (ACK)

Naming Convention

- A unique way of identifying specific equipment in order to control, monitor, document, and historize information across multiple platforms.

The screenshot displays a SCADA interface for CMC MUA. At the top, there is an alarm log table with columns for State, Priority, Name, AlarmComment, and Time. Below this is a navigation breadcrumb: CMC MUA > Seven Mile > Plant > Preliminary Treatment. The main area shows a process flow diagram for 'Preliminary Treatment' with components: Peroxide (Level: 16.60 gal), Odor Control (Level: 408.20 gal), Septage (Tank 1 Level: 5.62 ft, Tank 2 Level: 5.74 ft, Discharge Flow: 218.00 gpm), Screening (Level: 8.34 ft), Grit Chamber (Flow Meter: -560.00 gpm), and Recycle Water. A 'Screening' component is highlighted with a red box. At the bottom, a detailed breadcrumb path is shown: Plant > Preliminary Treatment > Screening > SM_01_001_003_Screening > BarScreen 1 > SM_01_001_003_InletSluiceGate01 > SM_01_001_003_MOV_001. The final component, SM_01_001_003_MOV_001, is highlighted in yellow.

State	Priority	Name	AlarmComment	Time
ACK	1	SM_01_001_003_COMM_001.AImS	Bar Screen 1 Inlet Sluice Gate Modbus Comm Fail Alarm	9/26/2022 10:33:22 AM
ACK	1	SM_01_001_004_MTR_004.DriveFaultAlmS	Grit Chamber 2 Bucket Elevator Drive Fault Alarm	9/20/2022 11:31:40 AM
ACK	1	SM_01_001_004_MTR_003.DriveFaultAlmS	Grit Chamber 2 Bucket Drive Fault Alarm	9/20/2022 11:25:40 AM

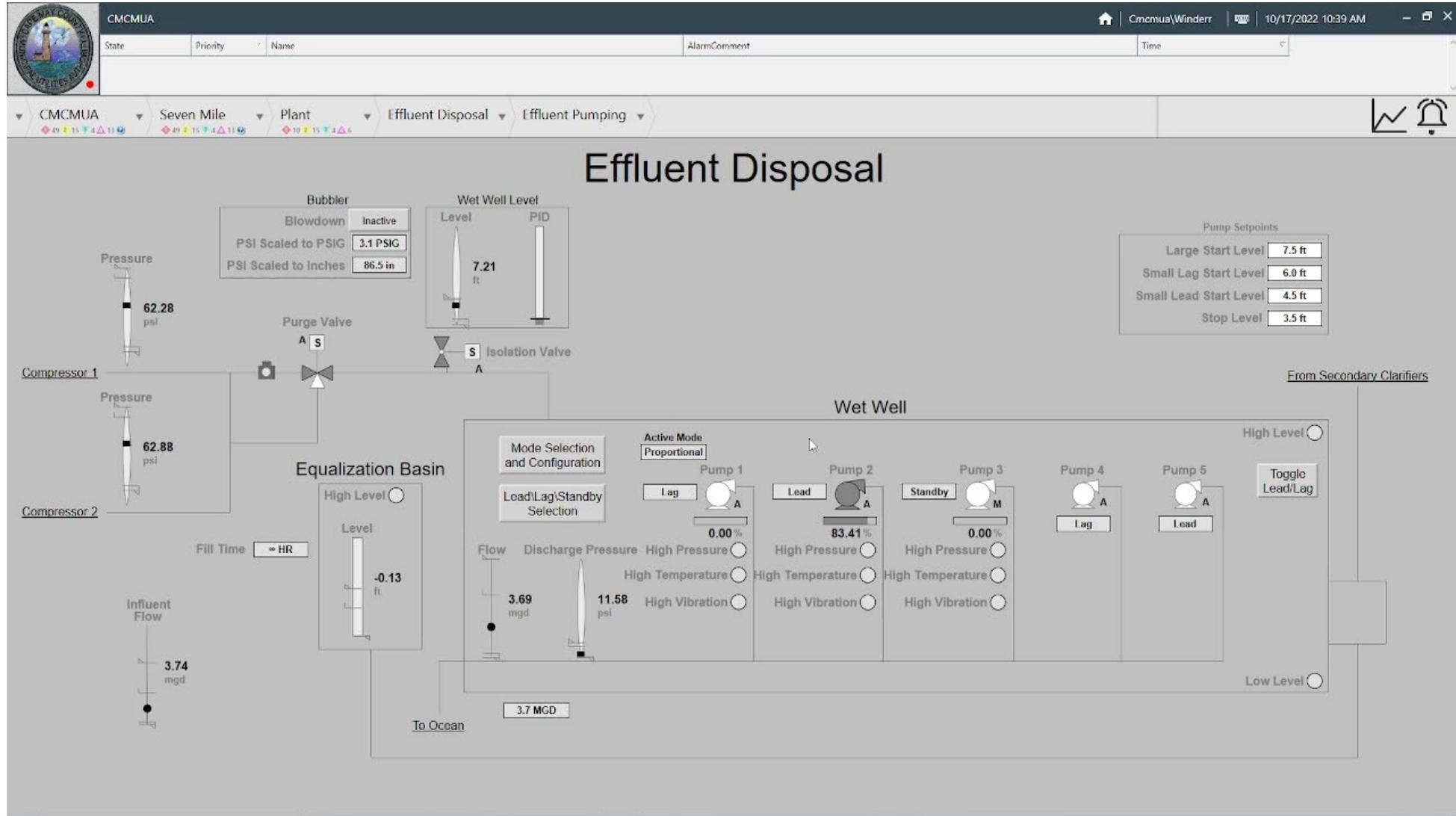
State	Priority	Name	AlarmComment
UNACK	3	SM_01_001_003_MOV_002.MiscAlmS	Bar Screen 1 Outlet Sluice Gate Miscompare Alarm
ACK	1	SM_01_001_003_COMM_001.AImS	Bar Screen 1 Inlet Sluice Gate Modbus Comm Fail Alarm
ACK	2	SM_01_001_003_MOV_001.FaultAlmS	Bar Screen 1 Inlet Sluice Gate Fault Alarm

Plant > Preliminary Treatment > Screening > SM_01_001_003_Screening > BarScreen 1 > SM_01_001_003_InletSluiceGate01 > SM_01_001_003_MOV_001

Screening

Equipment Faceplates

- Equipment Faceplates give the Operator detailed information and the ability to control the equipment and change all setpoints associated with that specific piece of equipment.



Safeties

- How come my equipment is not running?
Safeties are now on the equipment faceplate so the Operator knows exactly why a piece of equipment did not start.

The screenshot displays a SCADA interface for a wastewater treatment plant's thickening process. The interface is titled "Thickening" and shows a process flow diagram with four pumps (Pump 1 to Pump 4) and four grinders (Grinder 1 to Grinder 4). Pump 4 is highlighted with a red box and a red 'X' icon, indicating a fault. The interface also displays various sensors, including torque and shear pin sensors for the thickeners, and safety features like a safety shower and H2S analyzer. A table at the top shows an alarm log for "Thickening Sludge Pump 4 Drive Fault Alarm".

State	Priority	Name	AlarmComment	Time
ACK	3	SM_01_006_013_PMP_004.DriveFaultMS	Thickening Sludge Pump 4 Drive Fault Alarm	9/21/2022 1:50:02 PM

Boots on the Ground!

- Data is displayed as information.
- All information is in context.



IT Security

AVEVA System Platform Supports

- Next Gen Firewalls
- Micro Segmentation
- Anti-Virus Solutions
- Multi-Factor Authentication
- Windows Active Directory



Branden Kelly

Results and Next Steps

- CMCMUA looked at their 40 year SCADA problem and came up with an innovative solution
- By leveraging the unique IT contract vehicle they developed a project to propel their operations to the future
- The Project Delivers on the key goals
 - Reliable and Redundant - Fail safe for operational uptime
 - Secure - Highest level of cyber protection
 - Accessible by Everyone from Anywhere
 - System fully documented
 - Standardized for future growth
 - Platform for future expansion
- The future is bright for the system and the municipality to get the benefit from I4.0 technology for their operations and customers





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Questions?

Please wait for the microphone.
State your name and company.



Please remember to...

Navigate to this session in the mobile app to complete the survey.



Thank you!