



Setting the Standard for Automation™

United Water New Jersey -SCADA Project

ISA Water & Wastewater and
Automatic Controls Symposium

June 23, 2011

Standards
Certification
Education & Training
Publishing
Conferences & Exhibits

Presenter

- Engineering Systems Project Manager for United Water
- Joined United Water in Summer 2007
- Responsible for overall strategies and project management for SCADA systems
- Has managed over \$7.5M of SCADA system investment
- Previously worked at Facility Diagnostics as Controls Engineer and IBM as a Management Consultant
- BA, Computer Engineering – Drexel University



UWNJ System Overview in Spring 2008

- Haworth Surface Water Treatment Plant
 - Provides potable water for 800k+ people in Northeastern, NJ
 - 200MGD peaking capacity
 - Direct Filtration Plant with Ozone
 - Controlled by:
 - 80% Legacy RTU Controllers
 - 20% by PLC's
 - 1980's control strategies
 - Two distinct process control systems
- Remote Sites
 - Total of 120+ remote sites monitored/controls
 - 93% of sites utilize an Legacy RTU
 - A small number have a Legacy RTU with a PLC
 - 7% used a mix of PLC Brands
 - Two distinct remote control systems exist

SCADA System Upgrade Drivers

- Legacy RTU Risks
 - financial viability
 - Legacy technology
 - Single Source
 - Lack of local support
 - Significant operational, reporting, and data quality issues
 - Not Open Architecture
- Major Plant Upgrade of Treatment Process (DAF, Ozone, & Residuals Handling)
 - PLC process controls
 - Modern HMI
 - Unable to integrate with Legacy RTU Equipment

SCADA System Upgrade Drivers

- Remote Sites
 - Need for complex control at new remote sites
 - Mixed Communication
- SCADA Reporting
 - Difficult and tedious task to generate simple reports
 - Two separate data sources
 - In ability to update reports
 - Only accessible to a few people
- Control Room Consolidation
 - Separate SCADA and Plant Controls combined into a single

Plant SCADA Upgrade Project

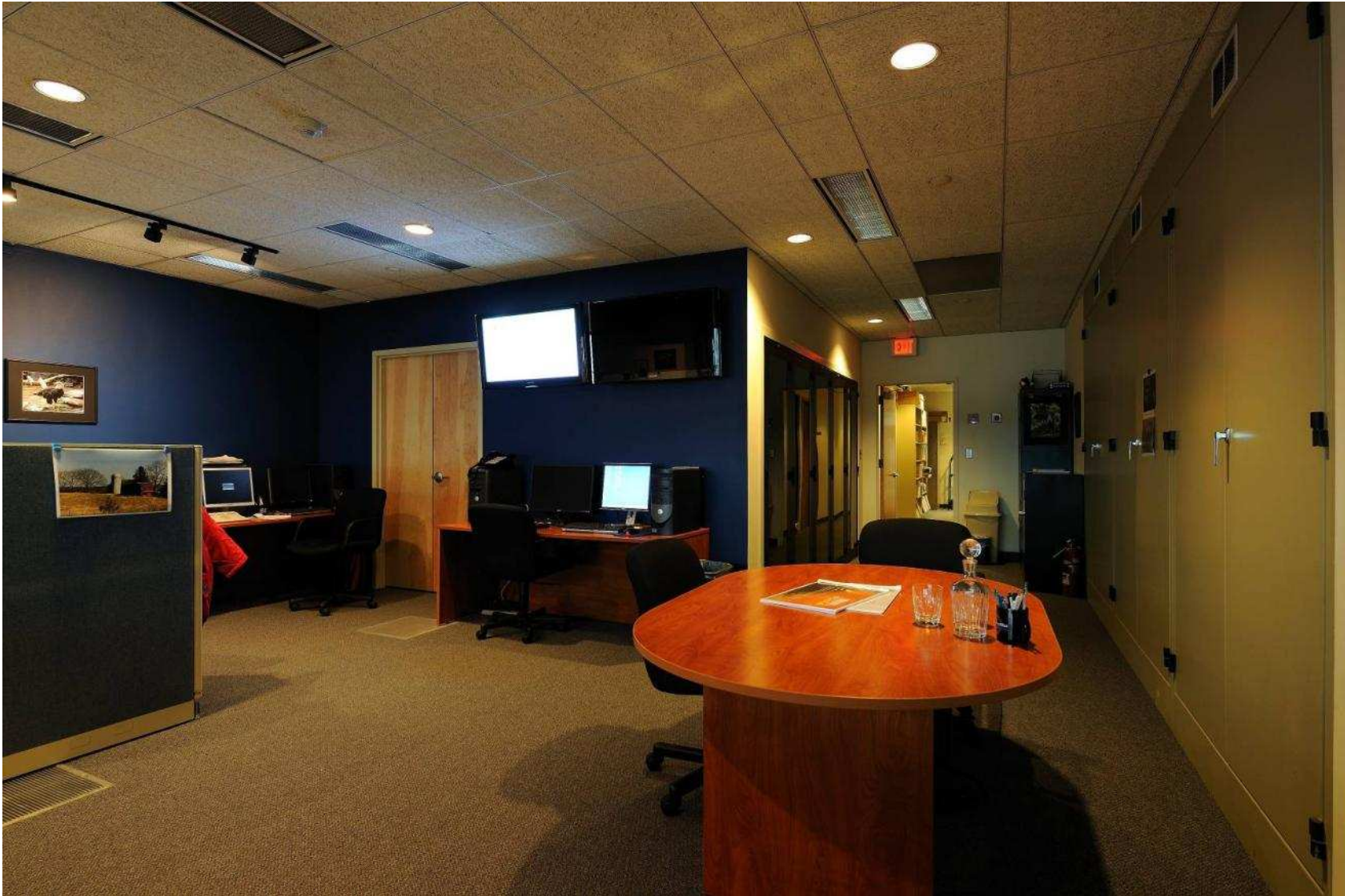
- Phased Project Approach
 - Phase 1 – Infrastructure Improvements
 - Phase 2 – UWNJ SCADA Reporting Project
 - Phase 3 – Haworth Treatment Plant SCADA Upgrade
 - Treatment Plant Upgrade Project
 - Phase 4 – Control Room Upgrade and Consolidation
 - Phase 5 – Remote Site Upgrade

Phase 1 - Infrastructure Improvements

- Goals
 - SCADA Upgrade Preparation
 - Construct a dedicated SCADA Datacenter
 - Upgrade SCADA server, network, UPS, and backup infrastructure
 - Implement Redundant SCADA servers in a central location

- Status
 - Room Update and datacenter construction complete in Nov 07'
 - Server Infrastructure installed in Dec 07'
 - SCADA backup configured in Jan 08'
 - Migration of Historian Server completed in Feb 08'

SCADA Room



Phase 2 – SCADA Reporting Project

- Business Drivers
 - Two distinct sources for reporting
 - In accurate reports
 - Lack of effective data management tools
 - Reports difficult to modify
 - Data distributed using MS Excel

- Objective
 - Implement effective data management tools
 - Eliminate redundant work processes
 - Automate repetitive processes
 - Establish standards
 - Leverage web based reporting tools
 - Future proof with a scalable system

Cont.

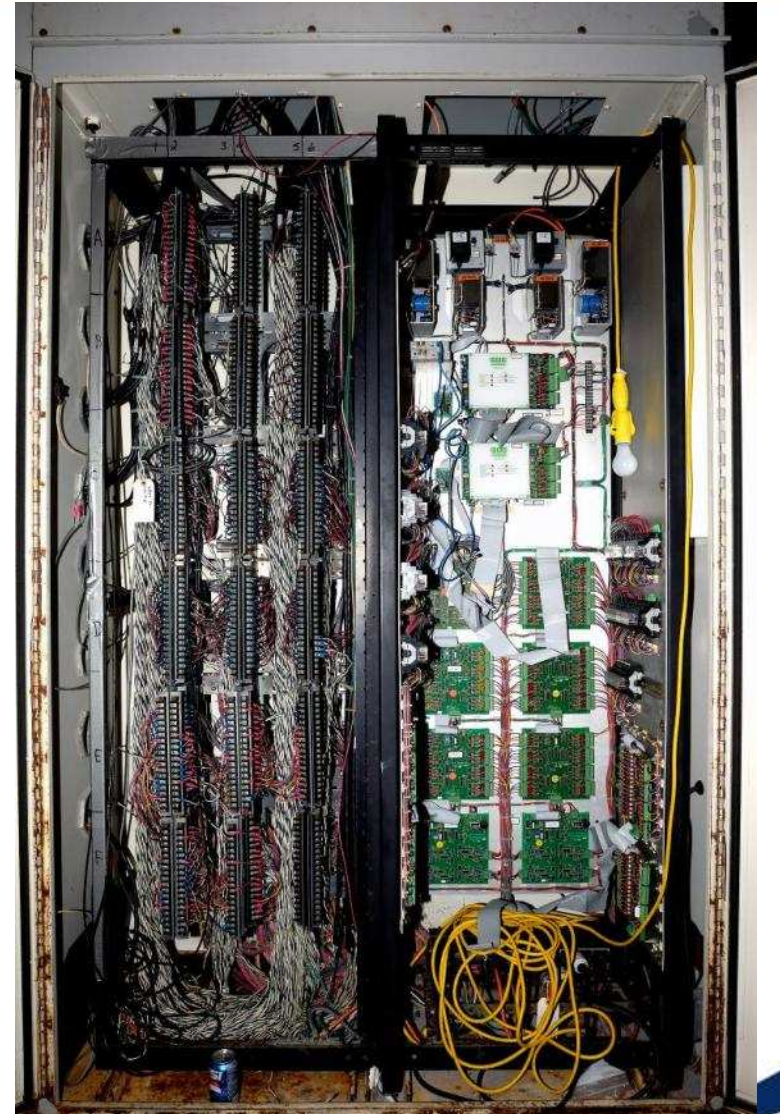
- Solution
 - A water specific operations reporting tool
 - SQL server based with a Web Interface
 - Assessable from Corporate Intranet

- Challenges
 - Existing data was not defined consistently or correctly
 - Defining an end point to the project

- Success Factors
 - Team work
 - Strong Business Reporting Definition

Phase 3 – HWTP SCADA Upgrade

- Drivers
 - Integrate with new Plant processes
 - Replace aging legacy control system
 - Provide a common and scalable system
 - System documentation
 - Incorporate processes not on SCADA
- Approach
 - Design/Build
 - Design/Build firm partners
 - Legacy equipment vendor
 - Systems integrator
- Timeline
 - Kick-off August 2008
 - Substantial Completion April 24, 2009



Phase 3 – HWTP SCADA Upgrade

- Challenges
 - Parallel to a Major Plant Upgrade
 - Maintain Plant Operations with **NO** interruptions
 - Schedule – 5 months from project kick-off to first conversion
 - Over 2,500 physical points
 - Limited existing system documentation
 - Coordination with other project work

- Technology
 - Redundant PLC's with Remote Ethernet I/O
 - Redundant Network Infrastructure with fiber optic's to each control cabinet
 - Redundant HMI servers
 - Plant Wide Ethernet Radio

Cont.

- Success Factors
 - The Team
 - Working relationship with Vendor
 - Factory Testing
 - Planning
 - Documentation
 - System Testing

- Lessons Learned
 - Communication, communication, communication
 - Make Smart and Quick Decisions
 - Murphy is always present

Major Plant Process Upgrade

- Plant Upgrade Project
 - Separate from SCADA Upgrade Program
 - Design-Build-Construct contract
 - Only include Plant Upgrade SCADA Components
 - Ozone
 - Dissolved Air Flootation (DAF)
 - Residuals, Chemical, Chlorination, and Misc.

- SCADA Responsibilities
 - UW Engineering Systems
 - Provide SCADA Requirements
 - Design/Installation oversight
 - FAT Witness
 - Commissioning
 - Acceptance Testing
 - Constructors
 - Process Design
 - Deliver of Instrumentation and Controls

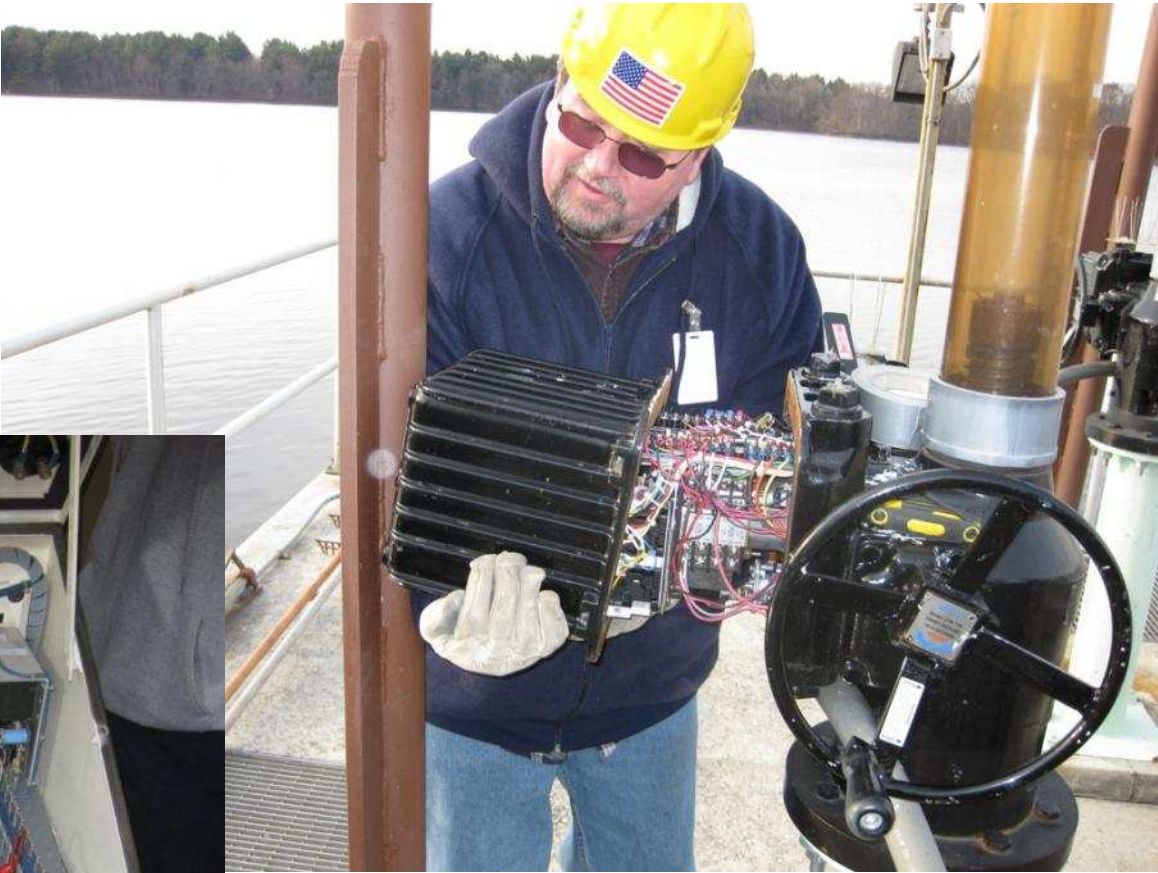
Cont.

- Technology
 - Same as the SCADA upgrade

- Challenges
 - Fast tracked process control development (~10 Months)
 - Multiple Integrators that were managed by Constructor
 - Integrators not following templates and standards provided
 - Startup/Commissioning in parallel to SCADA Project work

- Lessons Learned
 - Defined Roles and Responsibilities
 - Enforce Standards
 - Expect the Unexpected
 - Insist on progress meetings

Electrical Documentation



Cont.



Factory Acceptance Testing



First IO Point Transfer



Control Panel Relocation



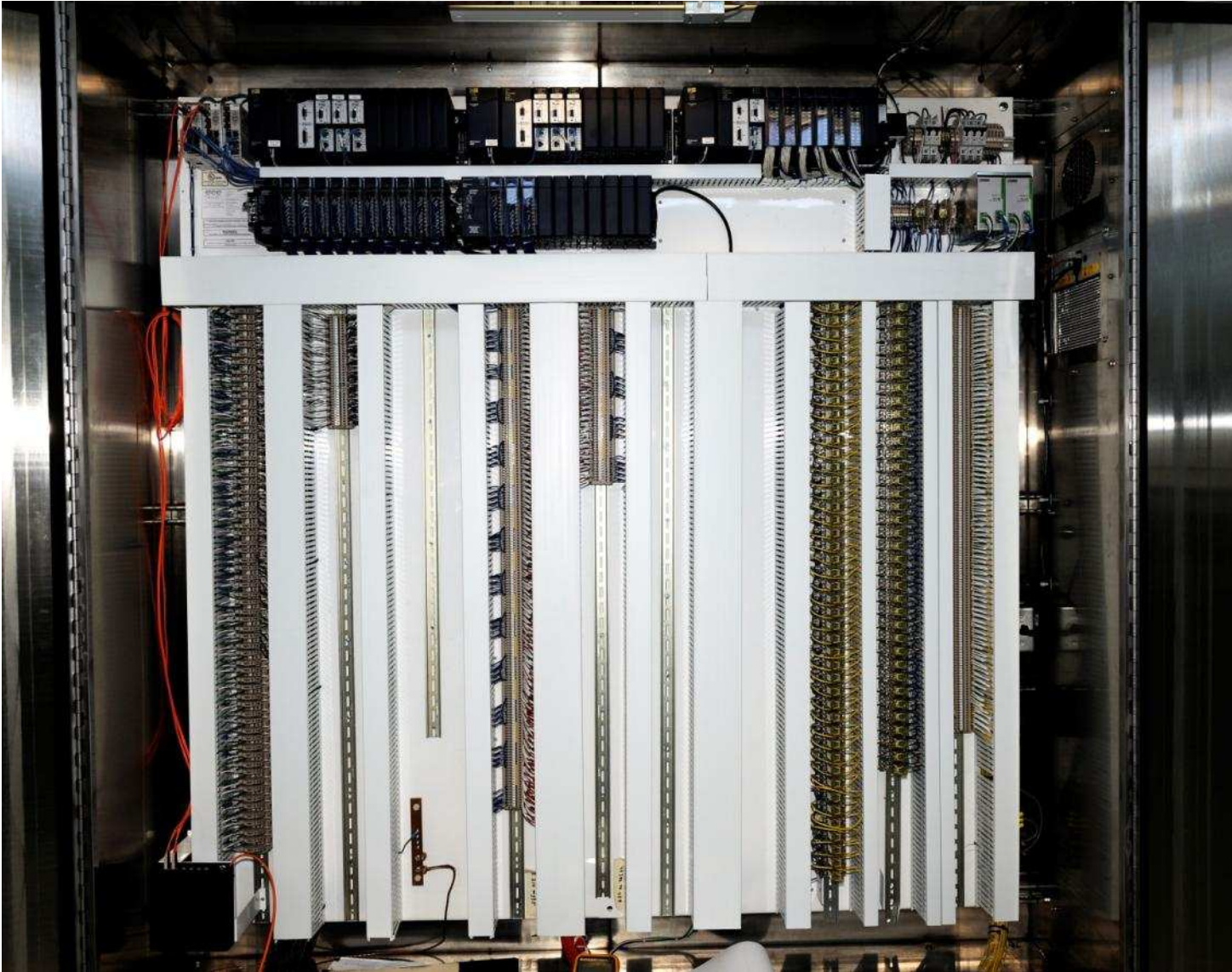
Before



After



Finished Cabinet



Testing



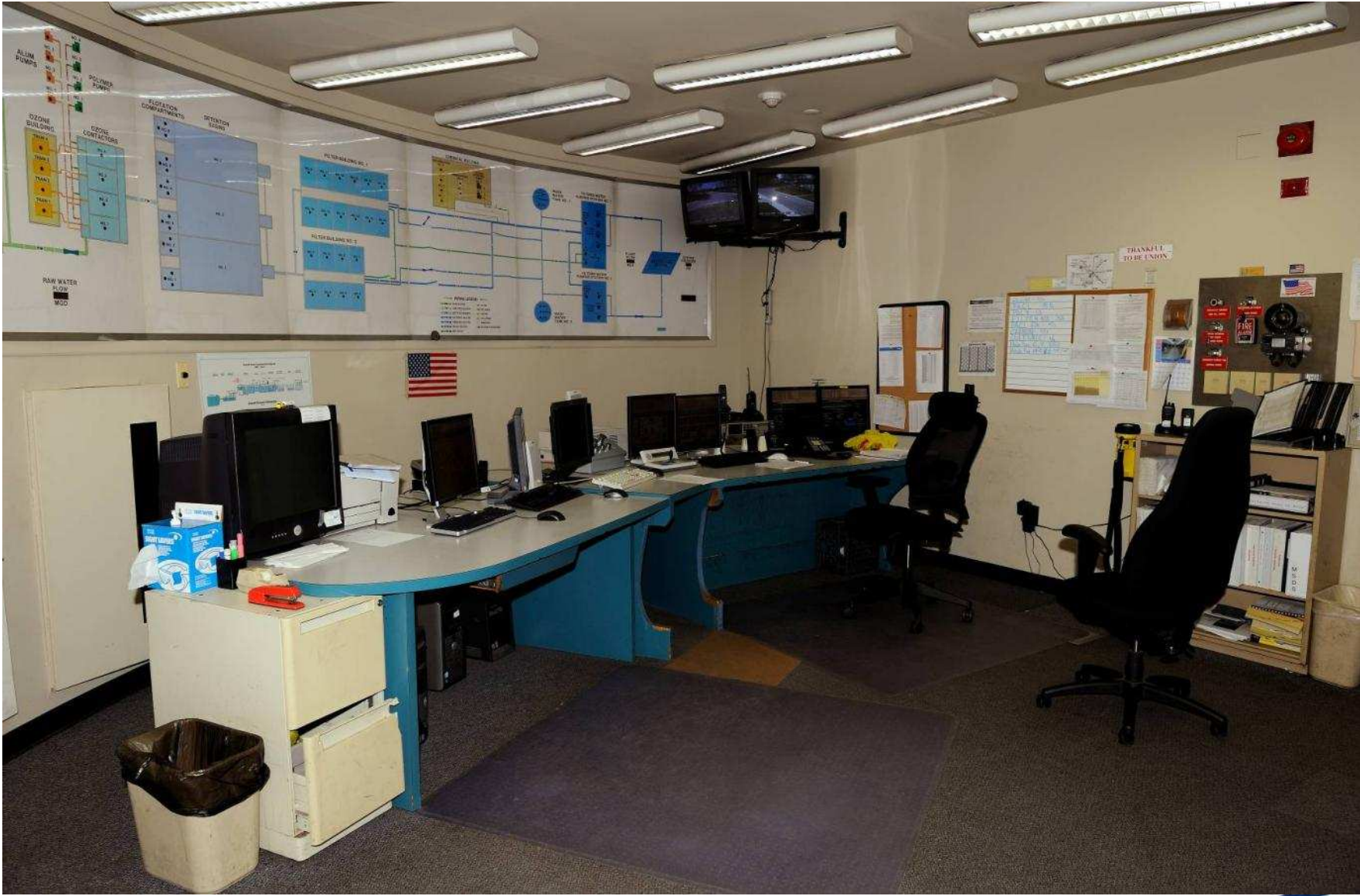
Panel Relocation



Phase 4 – Control Room Upgrade/Consolidation

- Drivers
 - Consolidate into 1 control room
 - Old and not functional
- Timeline
 - Design/Procure September – November 2008
 - Construction December 2008 – April 2009
- Challenges
 - Yet another project to manage
 - Working with multiple contractors
 - Relocating Infrastructure (Fiber and Process Control Equipment)
- Lessons Learned
 - Gain Operator Input
 - Surprises around every turn.

Plant Control Room (Downstairs)



T & D Control Room (Upstairs)



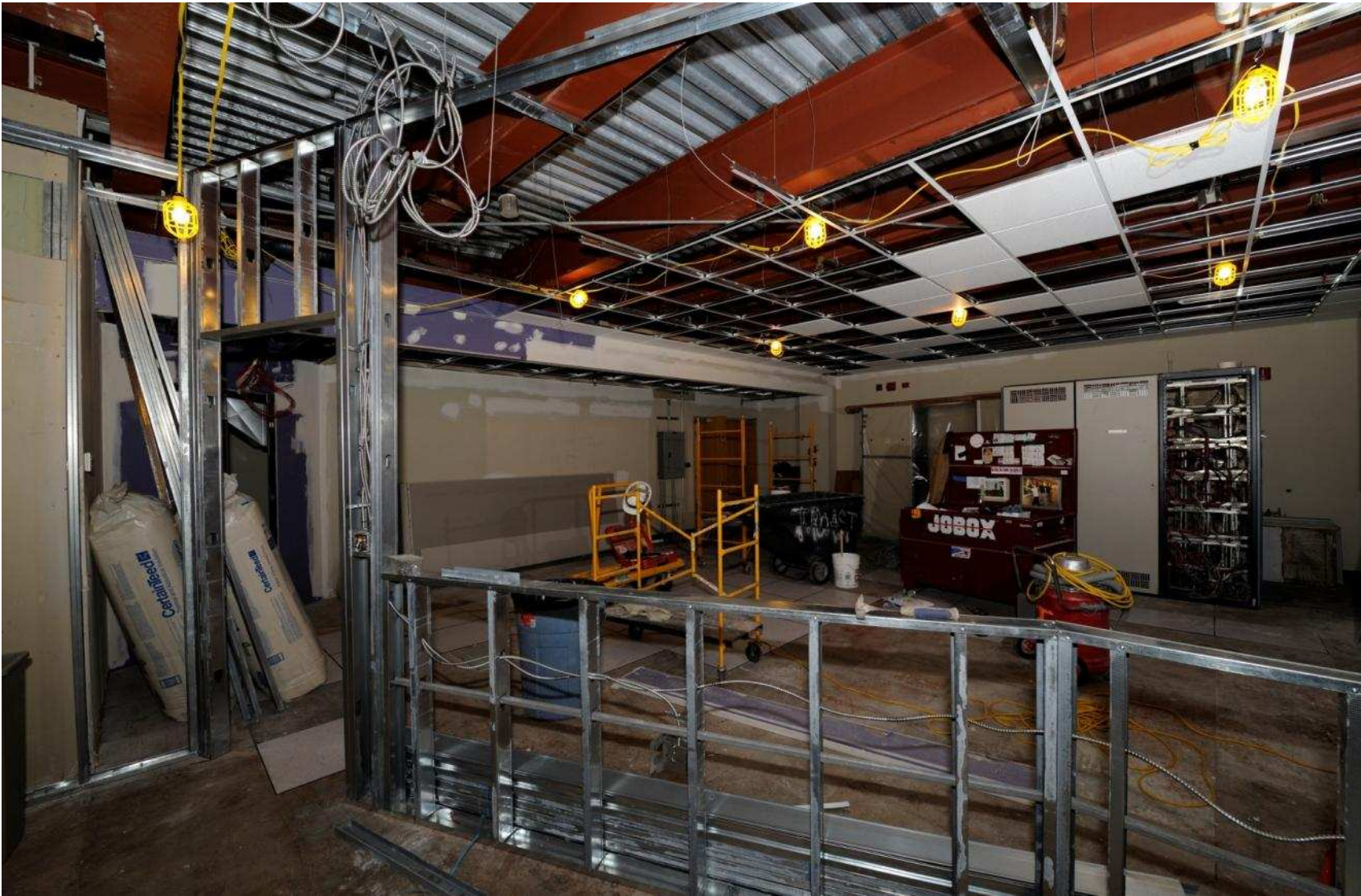
Demolition



Clean Slate



Fit out



Almost Done



Finished Product



Phase 5 – Remote Site SCADA Upgrade

- Business Drivers
 - Aging Legacy RTU
 - Difficult to upgrade
 - New systems are complex
 - 75% utilize high latency data

- Approach
 - Design-Bid-Build
 - Construct common templates for boosters, wells, tanks, etc...
 - Communication Plan
 - Document

- Goals
 - Limited Number of control panels
 - Template the code
 - Documentation
 - Training



Cont.

- Technology
 - Modern RTU Solution
 - DNP Communication
 - New HMI
 - Radio Network
 - Cellular Network

- Challenges
 - Project Capital
 - Implement new projects with current system
 - No system documentation
 - Large service area
 - Reduce operational costs



Questions/Discussion

