

SCADA Current Trends & Opportunities

Leveraging SCADA as a Tool for Operations

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City of Guelph Water Services

Halton Region SCADA Seminar
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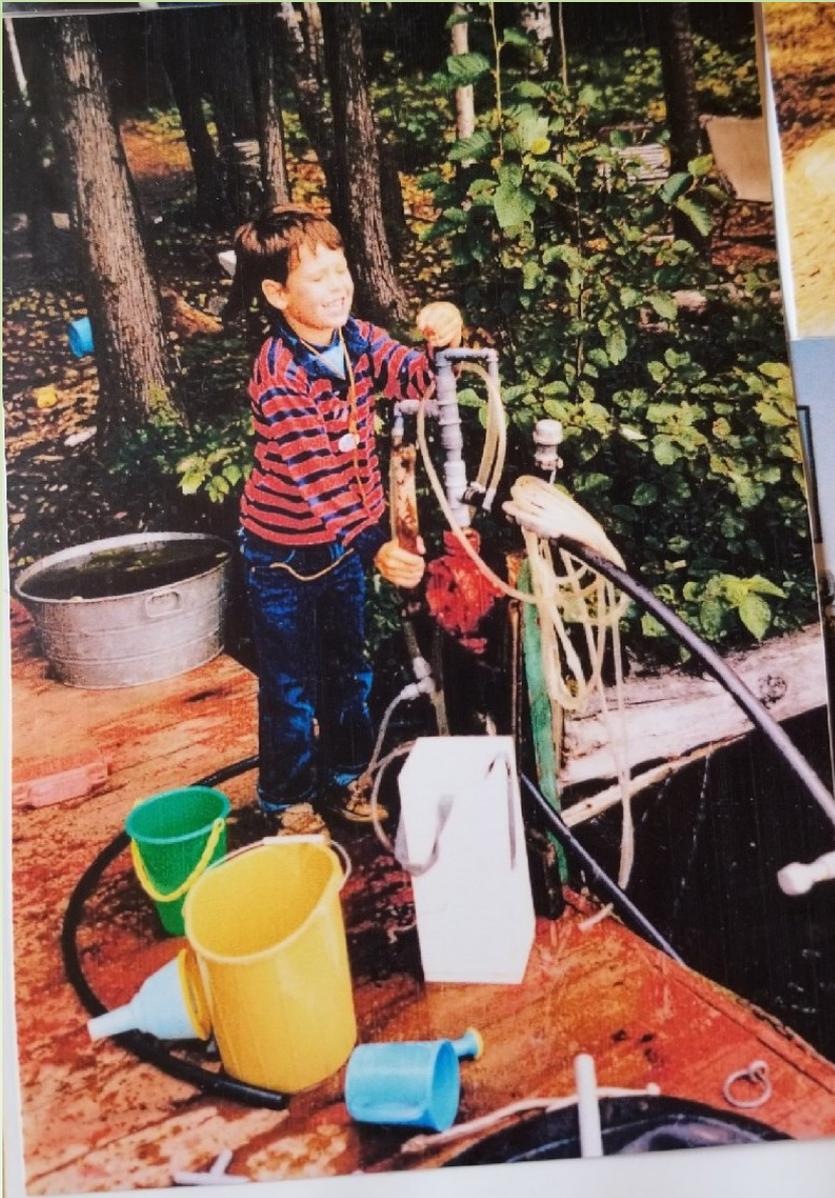
Presentation Outline

- Some Background
- Review of what SCADA is
- State of Most SCADA Systems

- Situational Awareness
- High Performance HMI
- Alarm Management
- Data Redundancy – making it easier
- SCADA communication networks
- Cyber Security

- Building on What You Have
- What Guelph Water is Doing





**I wanna be a
Water Guy
when I grow up!**

So I got to live the dream!



About the Speaker

Graham Nasby, P.Eng., PMP, CAP
Water SCADA & Security Specialist
City of Guelph Water Services



- 10 years in the consulting sector;
- Joined Guelph Water Services in 2015

- OWWA and WEAO Member, Member of OWWA Automation Committee
- Co-chair of ISA112 SCADA Systems standards committee
- Voting member of ISA101 HMI Design standards committee
- Voting member of ISA18 Alarm Management standards committee
- Named Canadian Expert on IEC/SCC-TC65 with Standards Council of Canada

- Guest instructor at McMaster University and Fleming College
- Has published over 40 papers and articles on automation topics
- Received University of Guelph “Mid Career Achievement Award” in 2014
- Named ISA’s technical division leader of the year award in 2013.

- Contact: graham.nasby@guelph.ca

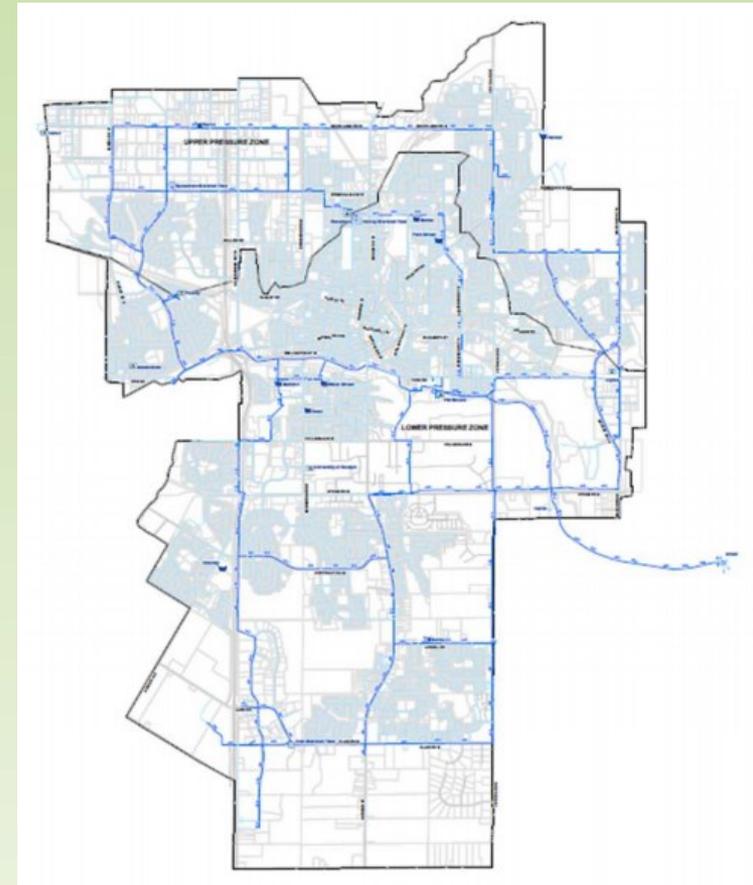
City of Guelph Water Services

- Guelph, Ontario, Canada
- 130,000 residents
- 21 groundwater wells
- 3 water towers
- 549 km of water mains
- 49,000 service connections
- 2,750 fire hydrants
- 46,000 m³/day [12 MGD]



Guelph Water Facilities

- Approx. 15km x 15km area
- 35 Facilities
 - 4 booster stations
 - 21 wells
 - 2 valve chambers
 - 3 water towers
 - 5 monitoring sites
- 40 PLCs plus 2 data centers
- Redundant Datalogging
 - Realtime datalogging
 - QuickPanels with store/forward
 - DNP3 Dataloggers with Store/Forward
- High availability SCADA network
 - Primary: private fibre optic
 - Secondary: private wireless, with 45 second auto-failover

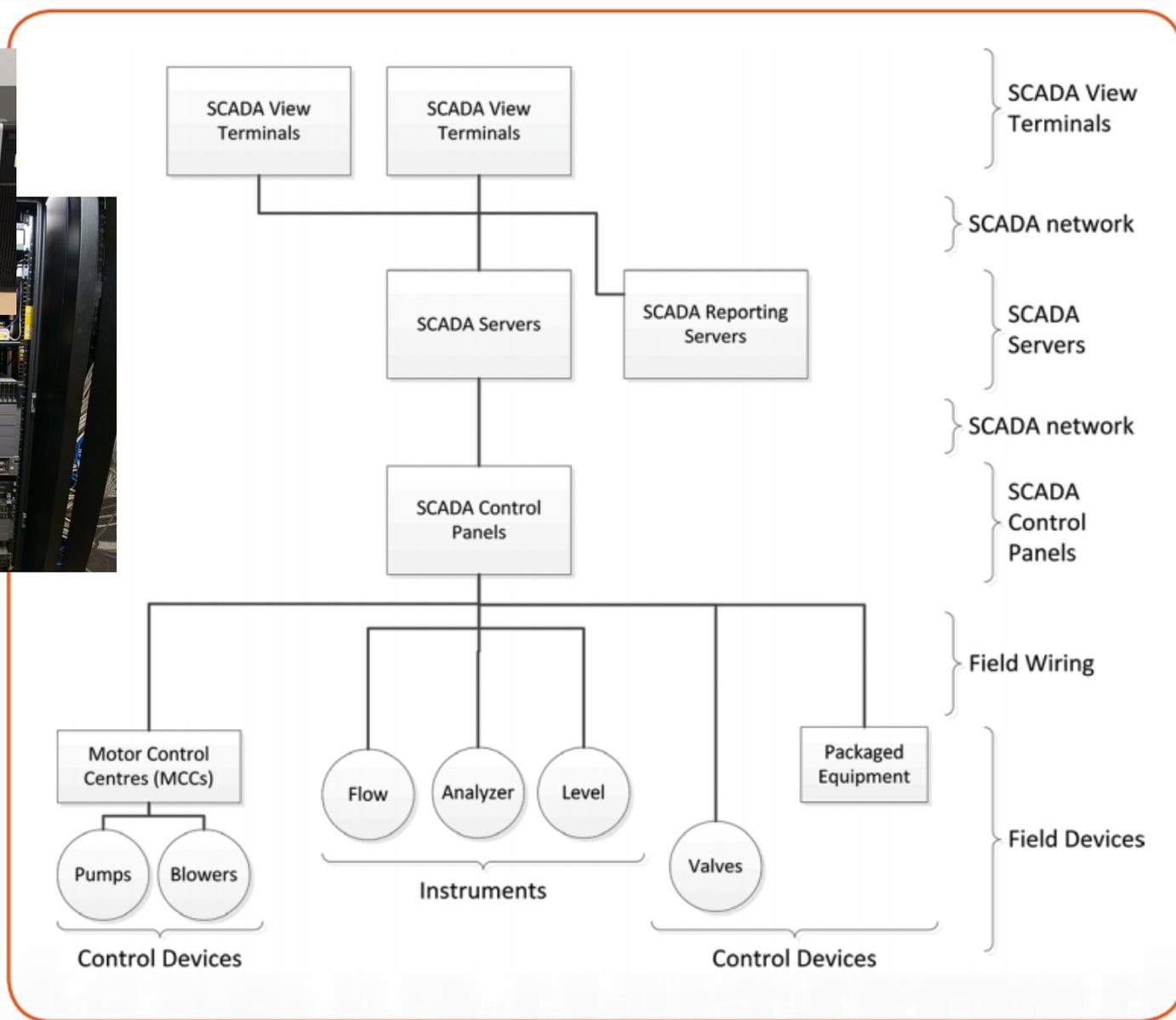
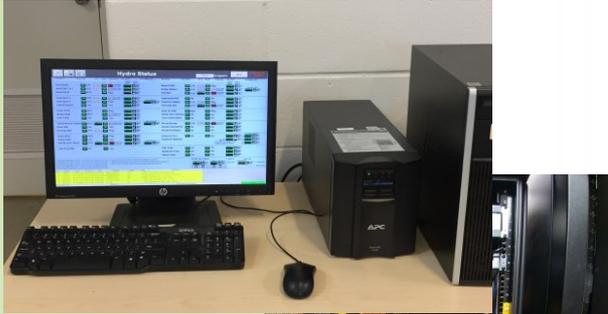


Review: What is SCADA?



SCADA = Supervisory Control and Data Acquisition

Typical SCADA Architecture



Why we have SCADA systems

- Unattended automatic control of water facilities
- Logging of critical control parameters
 - Chlorine Residuals (e.g., 5 minute recording intervals)
 - Turbidity
 - Well Flow Rates & Daily Flow Totals
 - POE Flow Rates & Daily flow Totals
 - Tower Levels & Pressure
- Provides “visualization” of water facilities to Operators
- Enables remote monitoring and control by Operators
- Triggering and Annunciation of Alarms
- Automated responses (increase chlorine dose, shutdown, etc.)
- Reporting based on logged process data

Current State of SCADA Systems

- **“Automation projects have the greatest opportunity to add value when process improvements are made along with the application of new technology.”**

Peter Martin, VP of Schneider Electric

(previously CEO of Invensys, maker of Wonderware HMI software)

So why do so many of our SCADA systems “barely work”?



Current State of SCADA Systems



**Should this
guy be
designing
your water
utility's
automatic
control
system?**

Current State of SCADA Systems



How about this person?

They seem to know a lot about concrete and pipe...

Current State of SCADA Systems



Do we need to involve operations and maintenance in the design process?

Current State of SCADA Systems



Does this programmer need to understand the process to be able to program the control system?

**Good Control System Design
is a team effort and requires time**

**Rushed Design & Programming
= Crappy SCADA**



Designing Process Limits & Operating Envelopes

7.6 Post-Contact Chamber Chlorine Residual

Using sodium hypochlorite addition, we aim for an operating envelope as follows from the post-contact chamber sample line. Operationally we have found that a target of 0.80 mg/L (0.60 to 1.10) results in good chlorine residual readings in the distribution system.

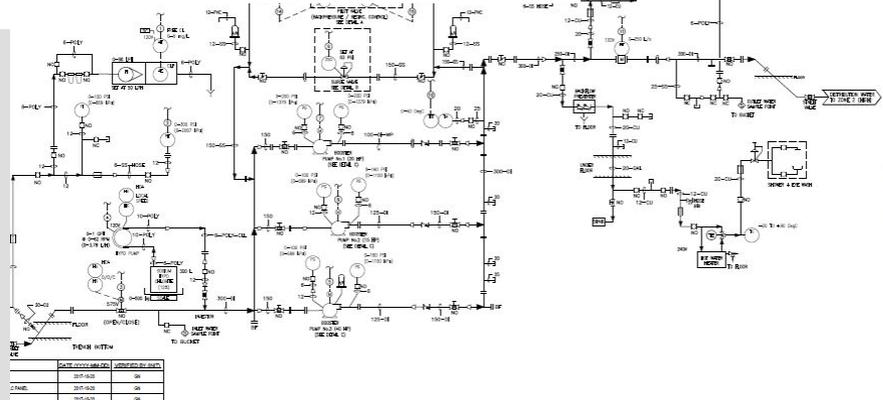
Table 16 – Post Contact Chamber Free Chlorine Operating Envelope

4.00 mg/L	High Regulatory Limit
2.50 mg/L	High Chlorine Shutdown Interlock
2.25 mg/L	HHI Chlorine Alarm
2.00 mg/L	HI Chlorine Alarm
1.90 mg/L	Extreme top of Envelope
1.70 mg/L	Top of Envelope
0.80 mg/L	Target
0.70 mg/L	Bottom of Envelope
0.60 mg/L	Extreme bottom of Envelope
0.55 mg/L	LO Chlorine Alarm
0.45 mg/L	LOLO Chlorine Alarm
0.40 mg/L	Low Chlorine Shutdown Interlock
0.30 mg/L	Low limit to meet CT (regulatory)
0.05 mg/L	Low Distributions Limit (regulatory)

City of Guelph Water Services
Emma Well

EMMA WELL UPGRADE PROJECT

Process Control Narrative
(PCN)



City of Guelph Water Services
Emma Well

EMMA WELL UPGRADE PROJECT

Process Control Narrative
(PCN)

Guelph
Water Services

Location: Robertson Booster
14 Robertson Rd., Guelph
Water Services - Supply

Sheet Title: P&ID (1 of 2)
Well + Treatment

Date and set out by:

There is an Automatic Control Systems Profession!

Depending on the project you may need to get a professional who designs automatic control systems involved!

This is not the same as a “programmer.”

An Automation Professional’s expertise includes: Control System Theory, Instrumentation, Instrumentation, Safety Systems, Motor Control, Valves, Actuators, Electrical Design, I/O Design, Programming, and Commissioning.

In the USA, where Engineering Licences are discipline-specific, there is a separate Engineering License for “Control Systems Engineer.”

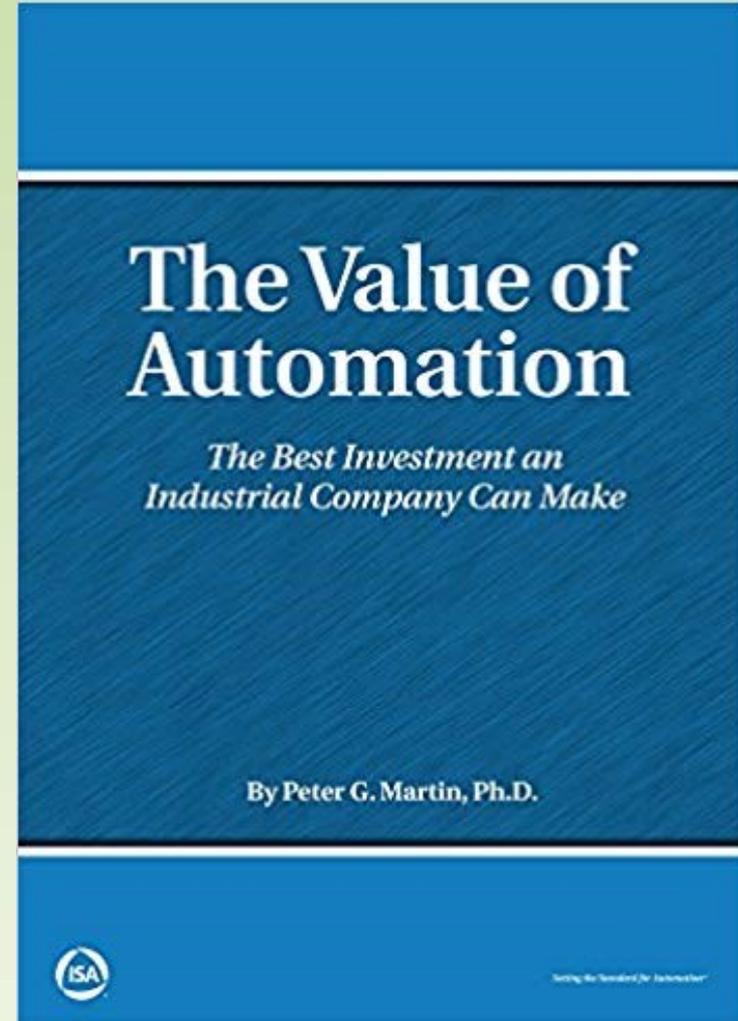
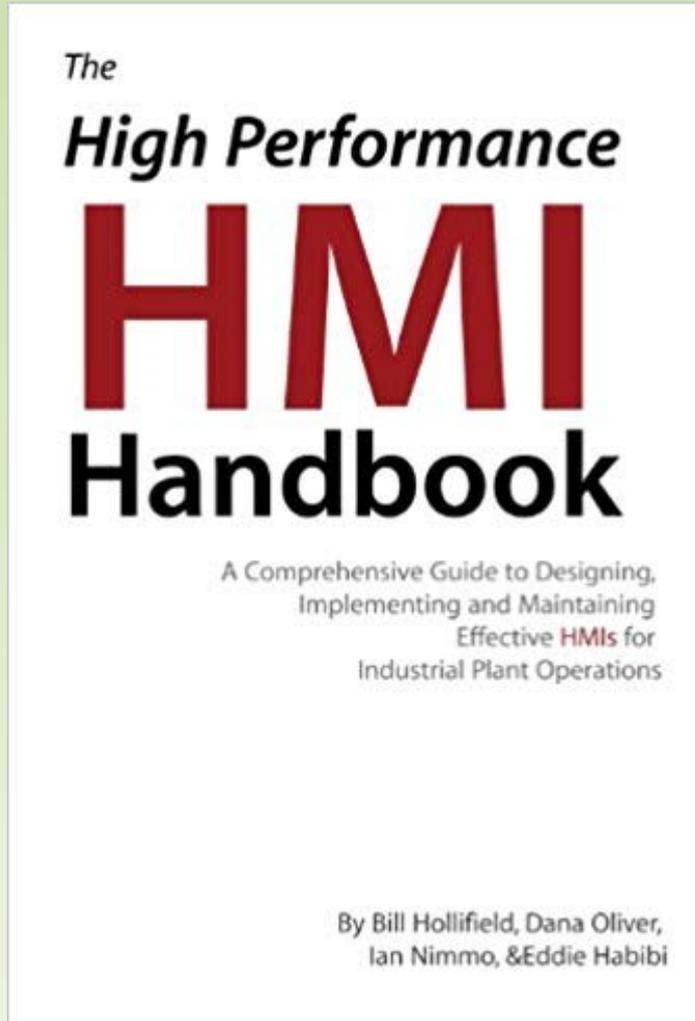
There are also certifications individuals can get to demonstrate their skills/knowledge/experience with Automatic Control Systems.



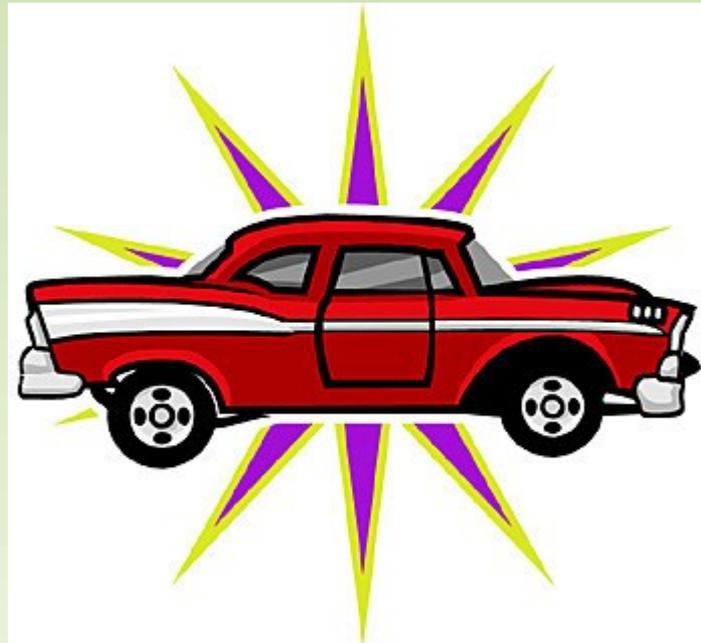
Common Problems with SCADA Design

- Use of old out-dated technology
- Use of old outdated programming templates and hardware, many of the templates and techniques still being used are over 30 years old
- “Let’s just copy what we did on the last job”
- “Let’s just replicate what the old PLC/HMI did”
- “How the control system will work” often left until too late in design process
- Not enough time allocated to properly design the control system with participation from operations, so programmers always playing catch-up
- Not enough time is spent to model what operating ranges of the plant will be, and when permissives, alarms and interlocks should be activated
- Not enough time invested to write a proper Process Control Narratives and P&ID drawings to define what process is supposed to be doing
- Not enough time allocated in programming & commissioning schedules
- Older SCADA programming packages often labour-intensive to program!

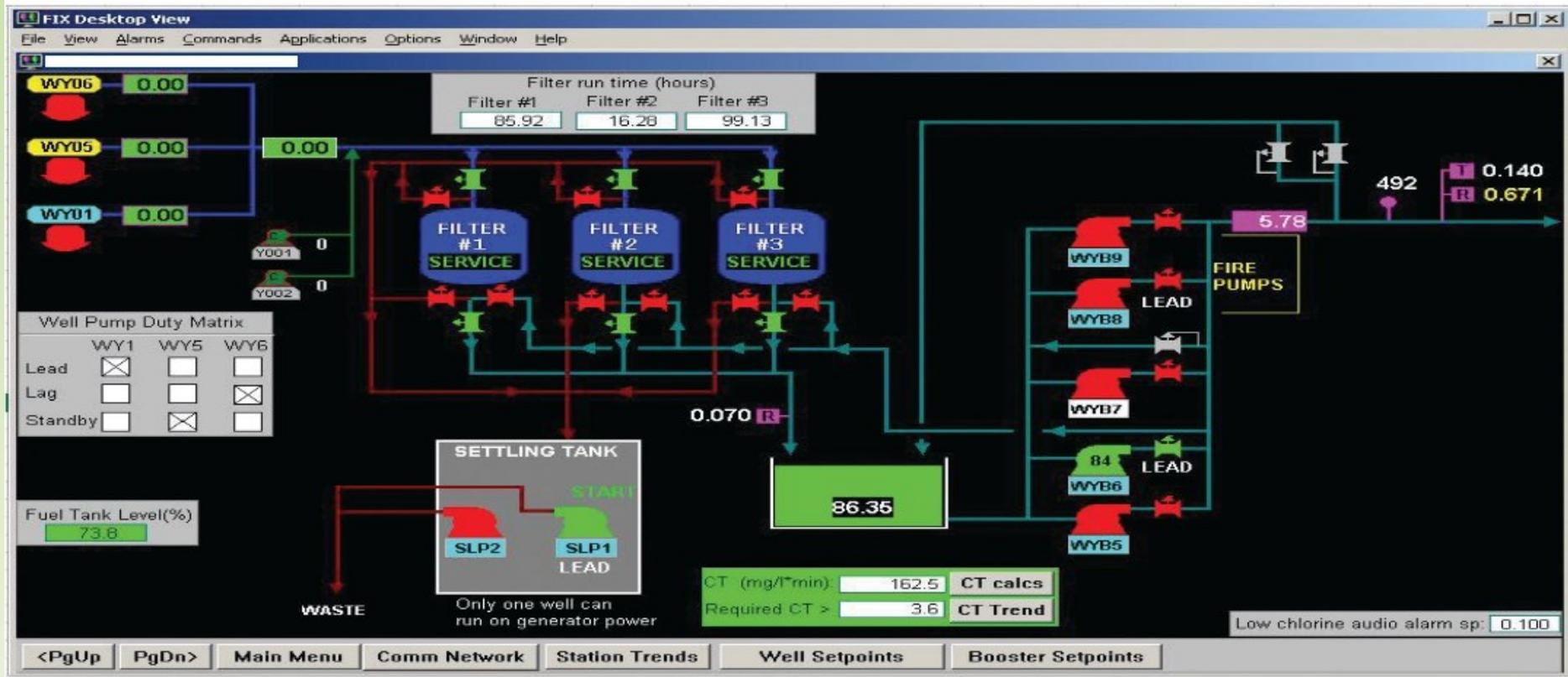
Two SCADA Books You Should Read



So, what is new with SCADA?

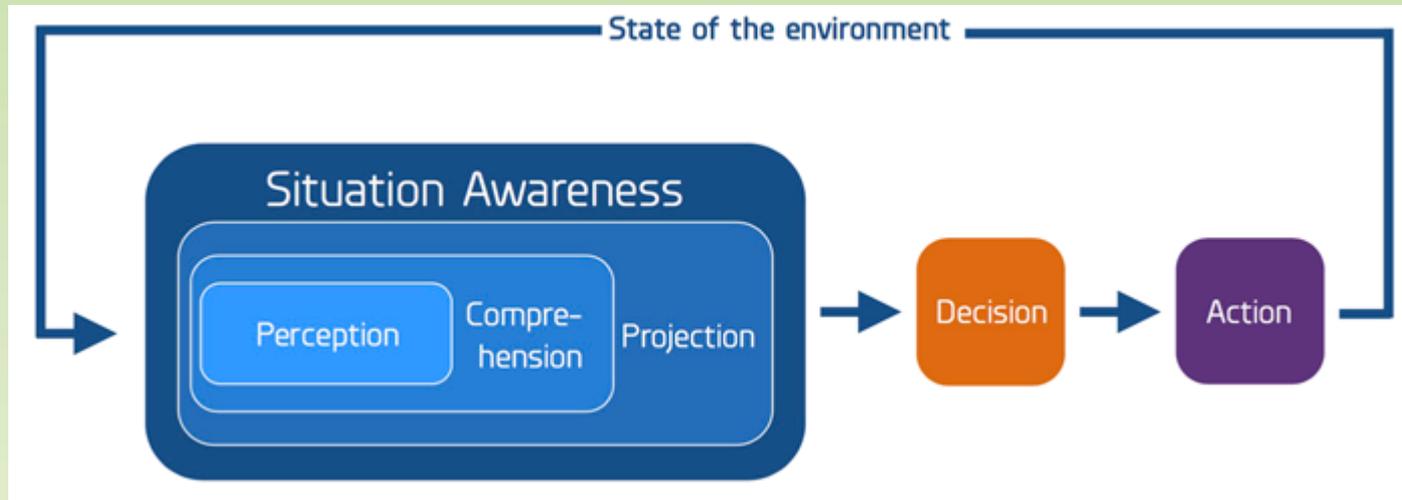


What's new in SCADA?



- What is running?
 - Is the process running well?
- What if you are colour blind?
 - Is anything abnormal?

SCADA: Situational Awareness



To be an effective operator

—

you have to be aware of what your plant is doing

Common SCADA problem



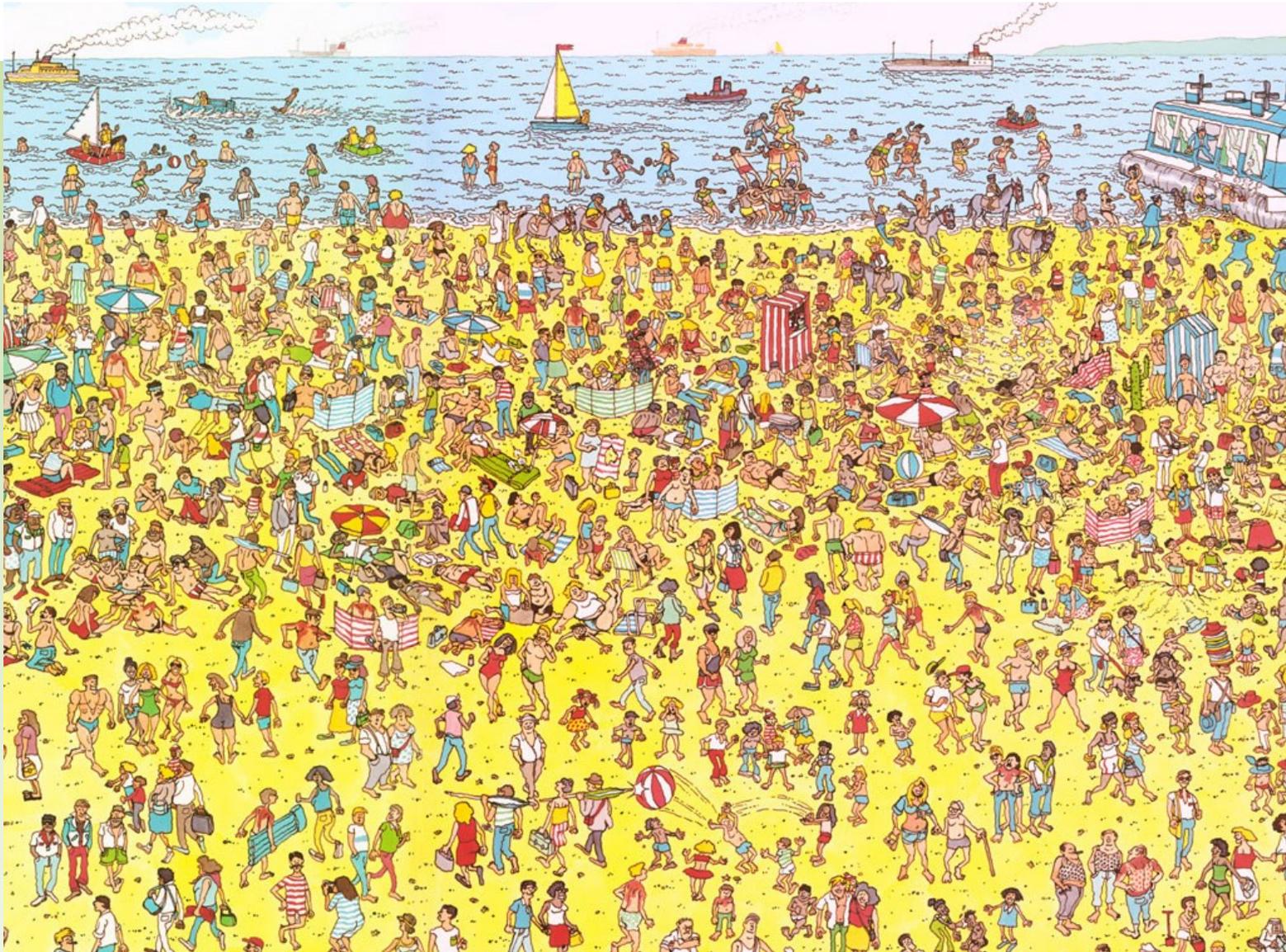
**In some SCADA systems....
You can't see the whole picture**

Common SCADA problem



What your SCADA system may not be showing you

CAN
YOU
FIND
THE
PROBLEM
ON THE
SCADA
SCREEN?





Friendly
SCADA Guy



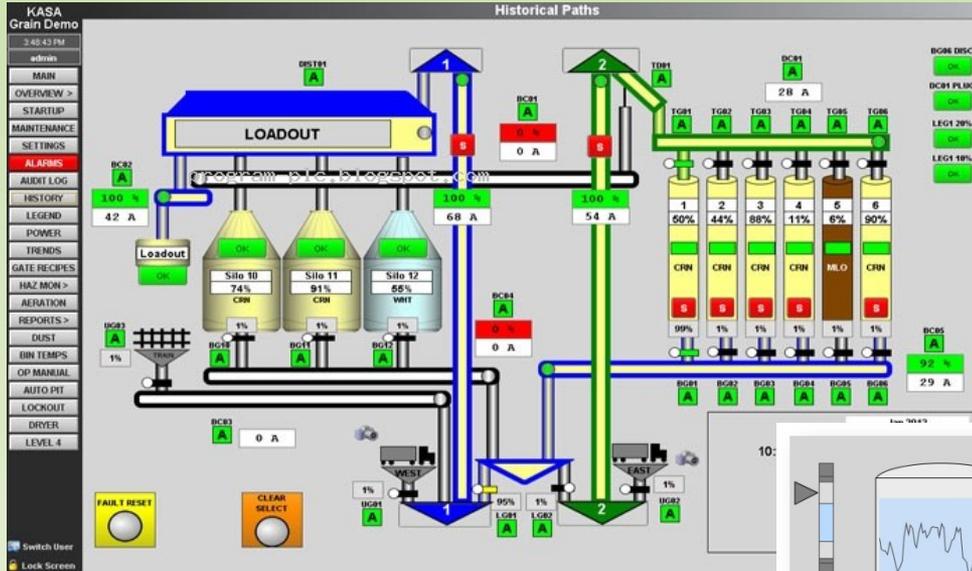
Situational Awareness

- **To be able to react to a problem, Operators need to be aware of the problem**
- Old way operating “by alarm” (reactively)
- New approach: Present data to operators so they can proactively respond to problems as they develop
- Reserve alarms only for events that require immediate action
- High Performance HMIs (Human Machine Interfaces)
- Alarm Management (better designed alarm systems)
- Understanding your operating envelope (know your plant’s limits)

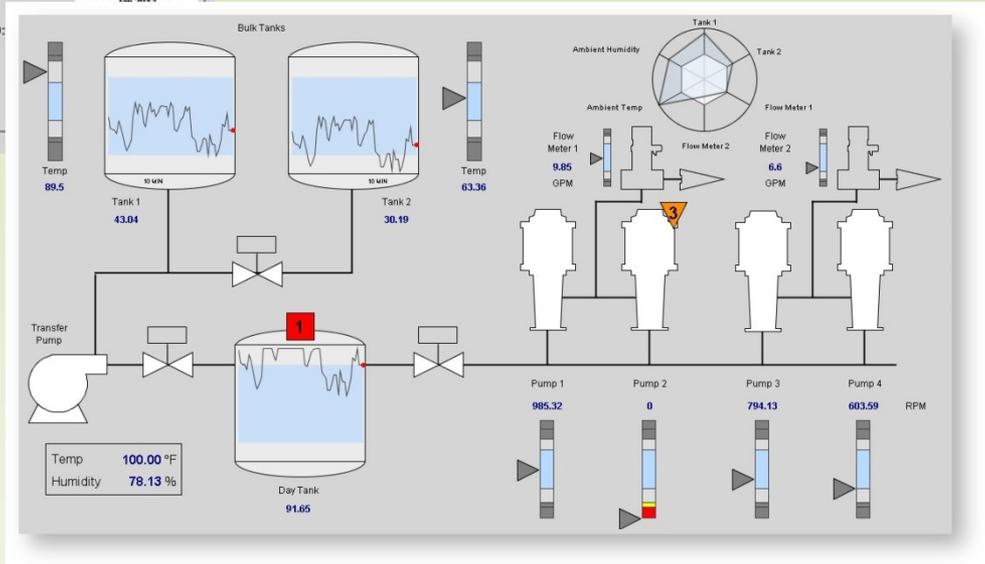
High Performance HMIs

High Performance HMIs

HMI = Human Machine Interface (computer screen)

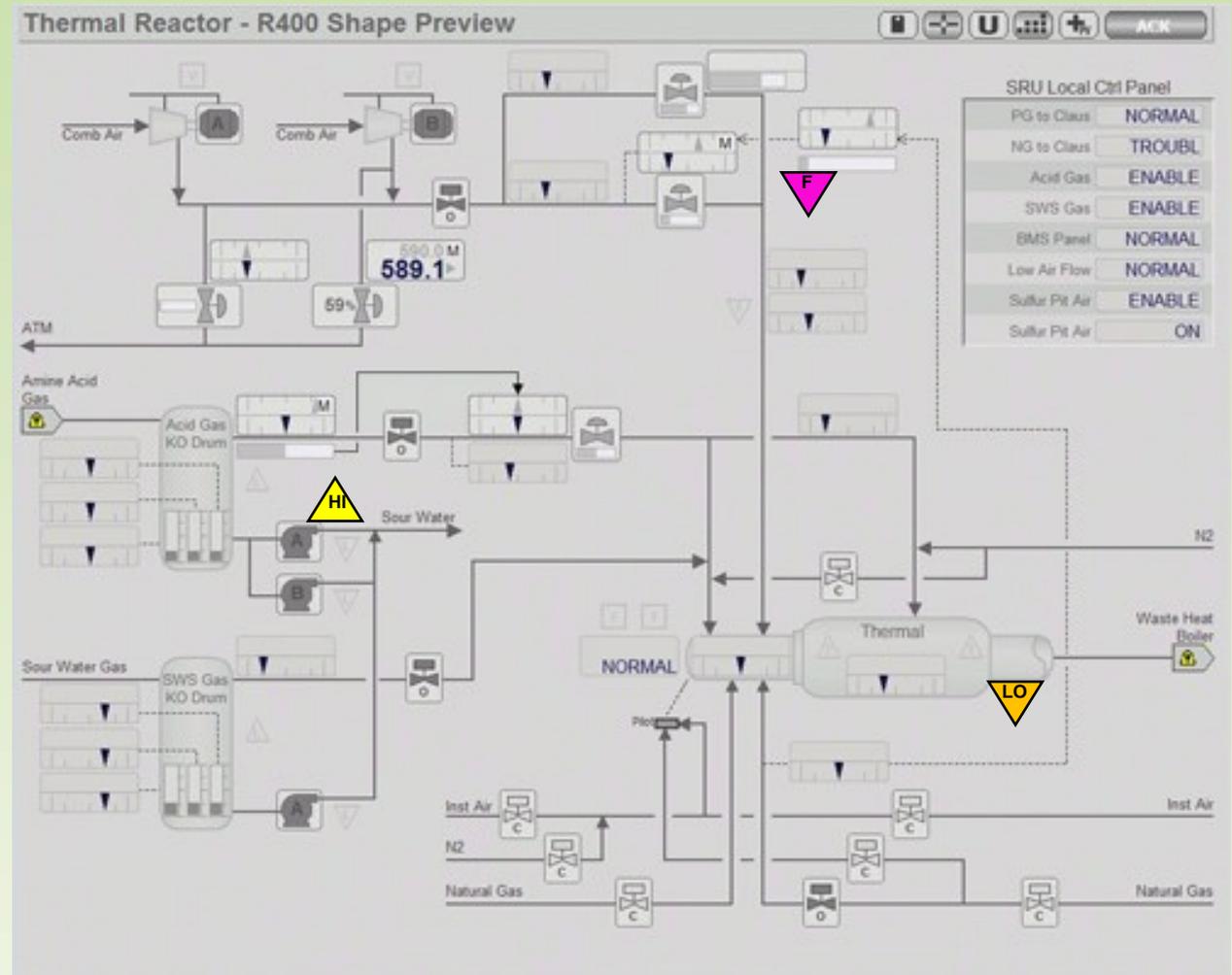


High Performance HMI
Colour scheme



Poor Colour Scheme

High Performance HMI – Plant Running Normally



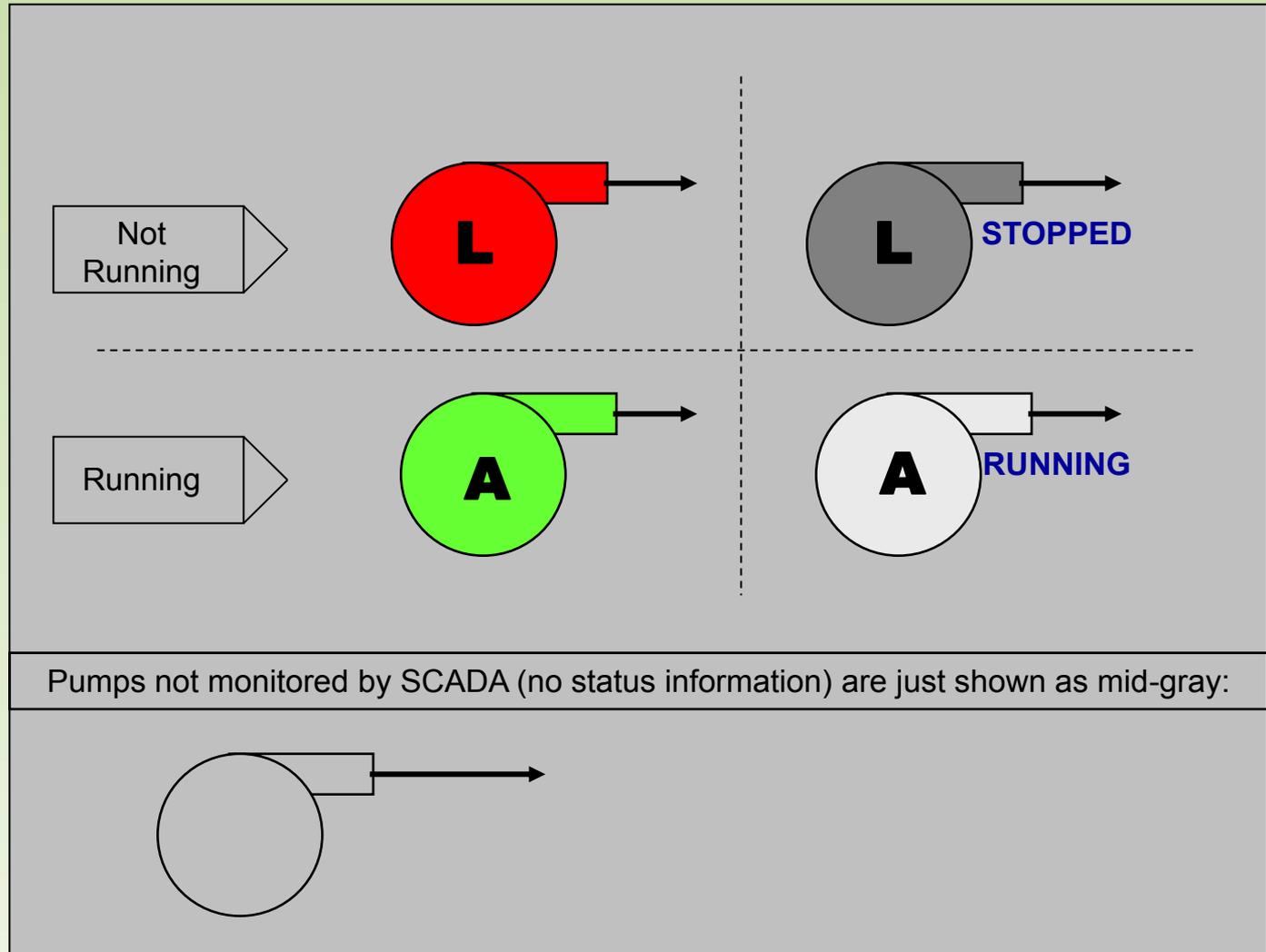
Notice the
Lack of Colour

High Performance HMI – Showing Pump Statuses

Red/Green
for status

vs.

Greyscale &
redundant
coding
(colour & text)



High Performance HMI – Analog Values

Often Seen



Only a Colour Change!

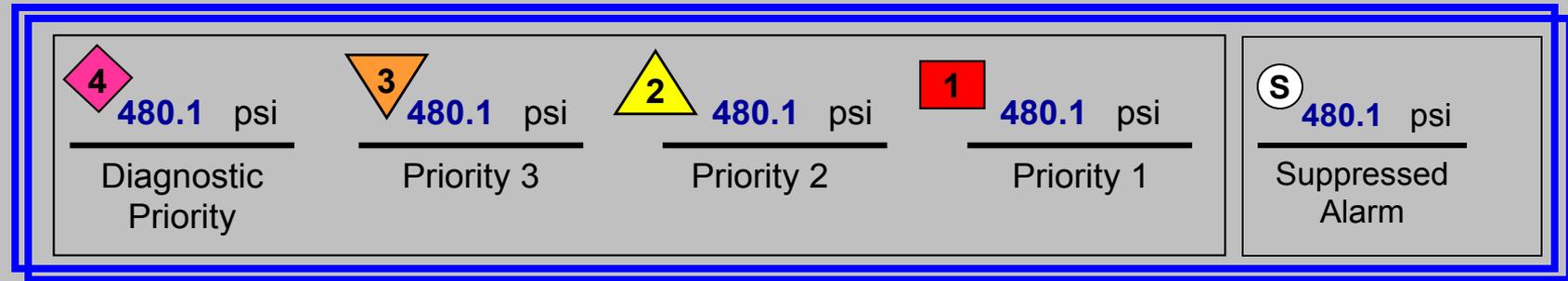
Better



Betterer



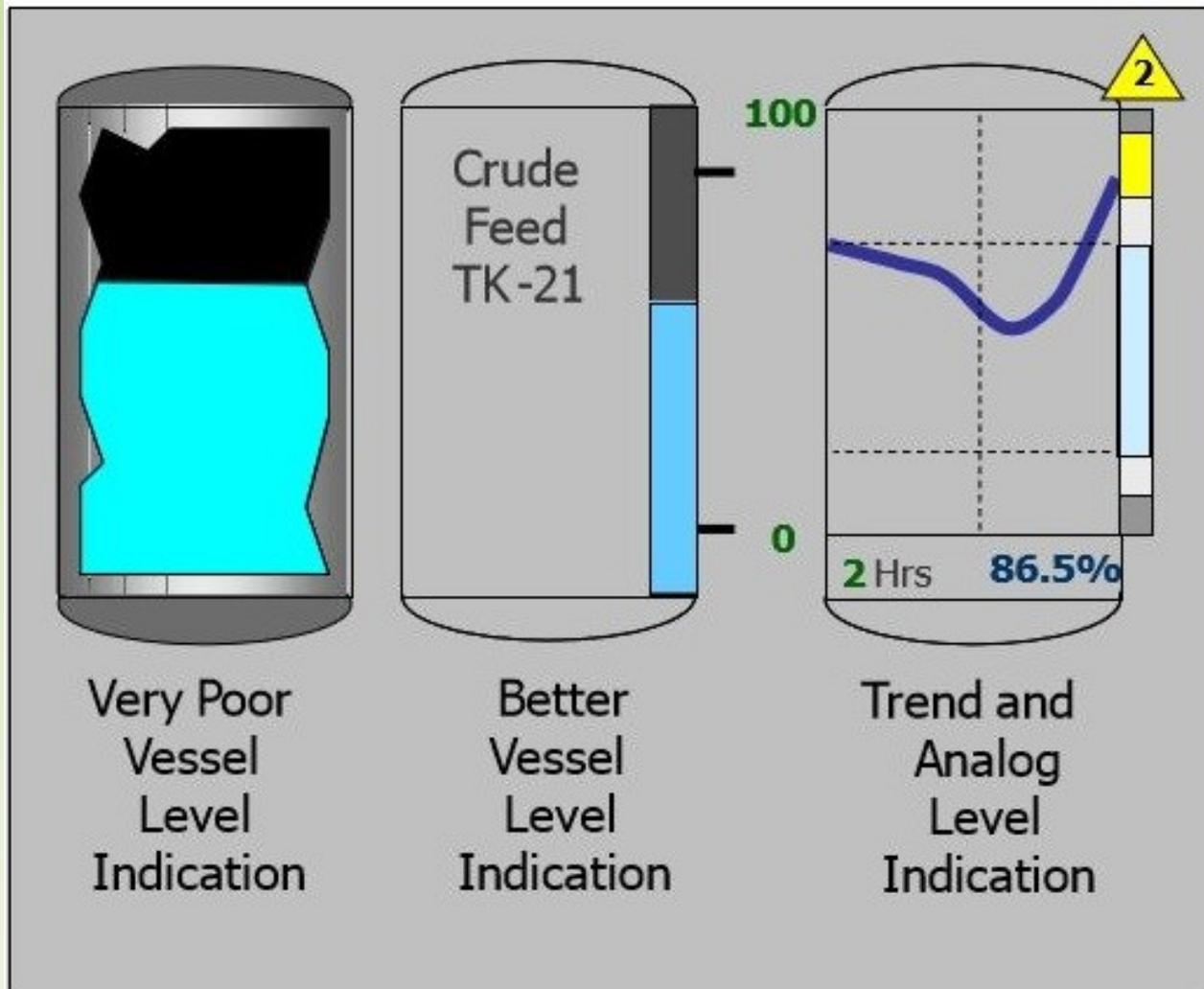
Best!



Show alarms in multiple ways: Colour, Shape, Text (“redundant coding”)

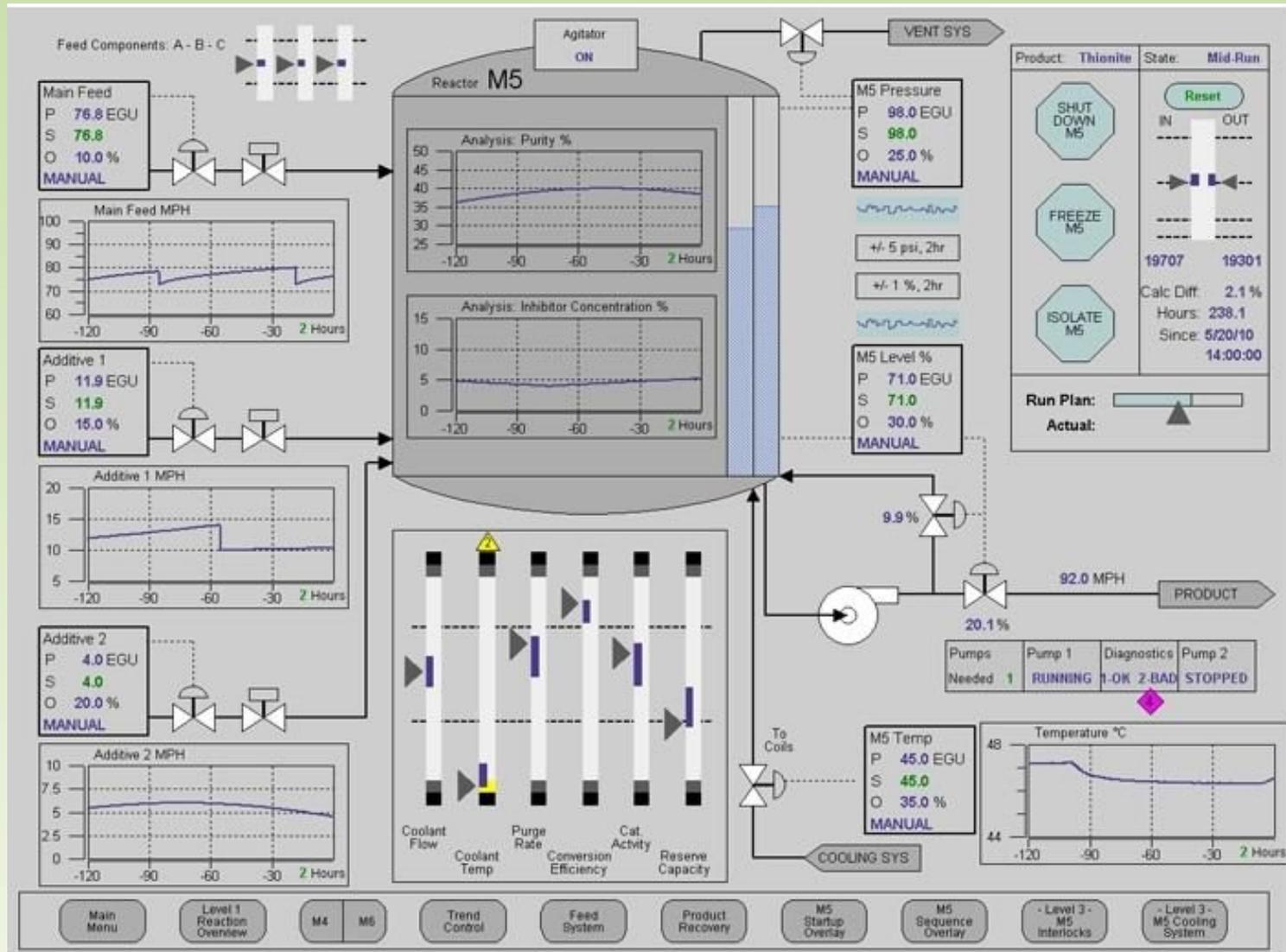
Source: High Performance HMI Handbook

High Performance HMI – Tank Levels Depiction



Source: High Performance HMI Handbook

High Performance HMI – Embedding Trends

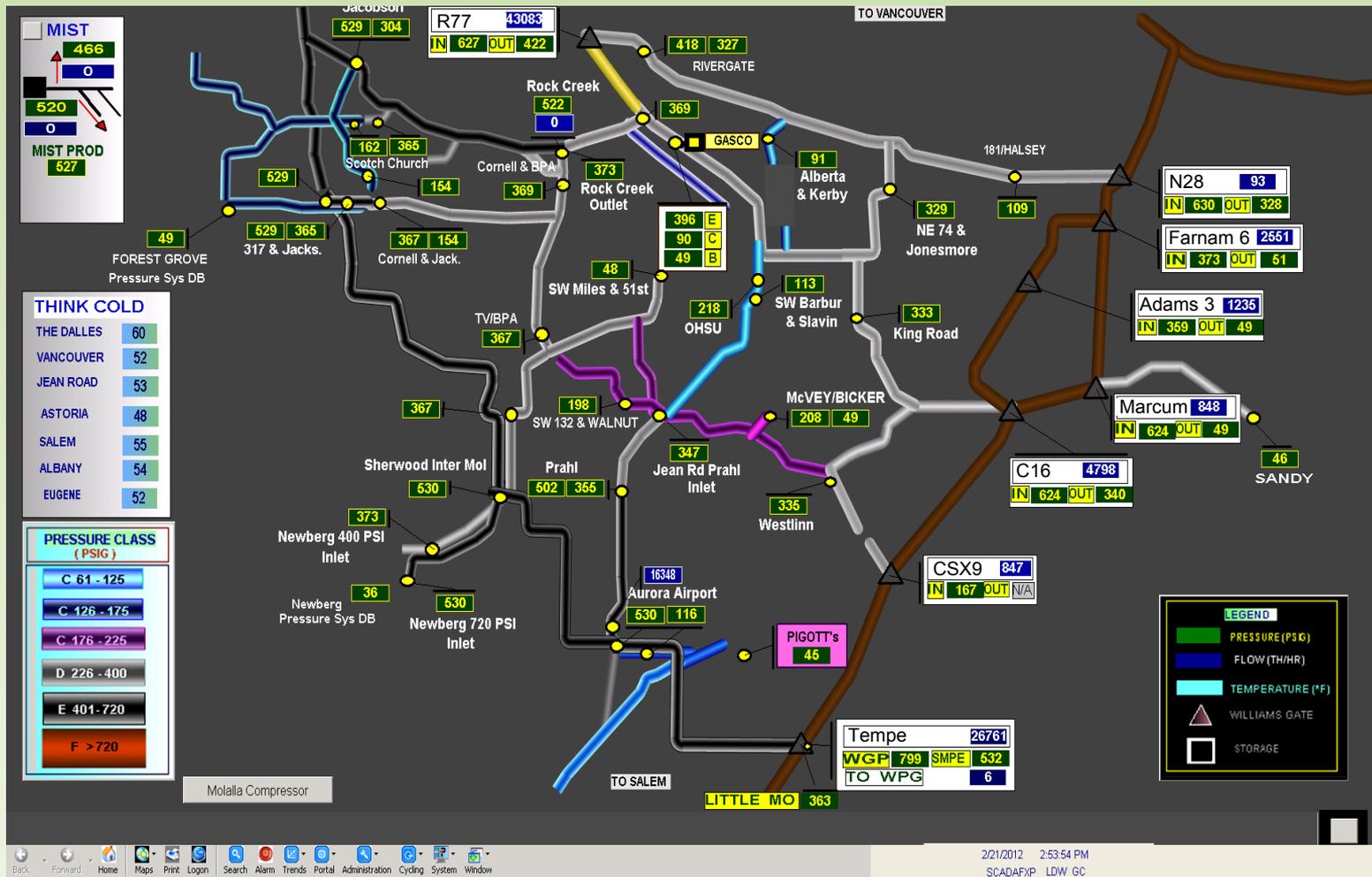


Source: High Performance HMI Handbook

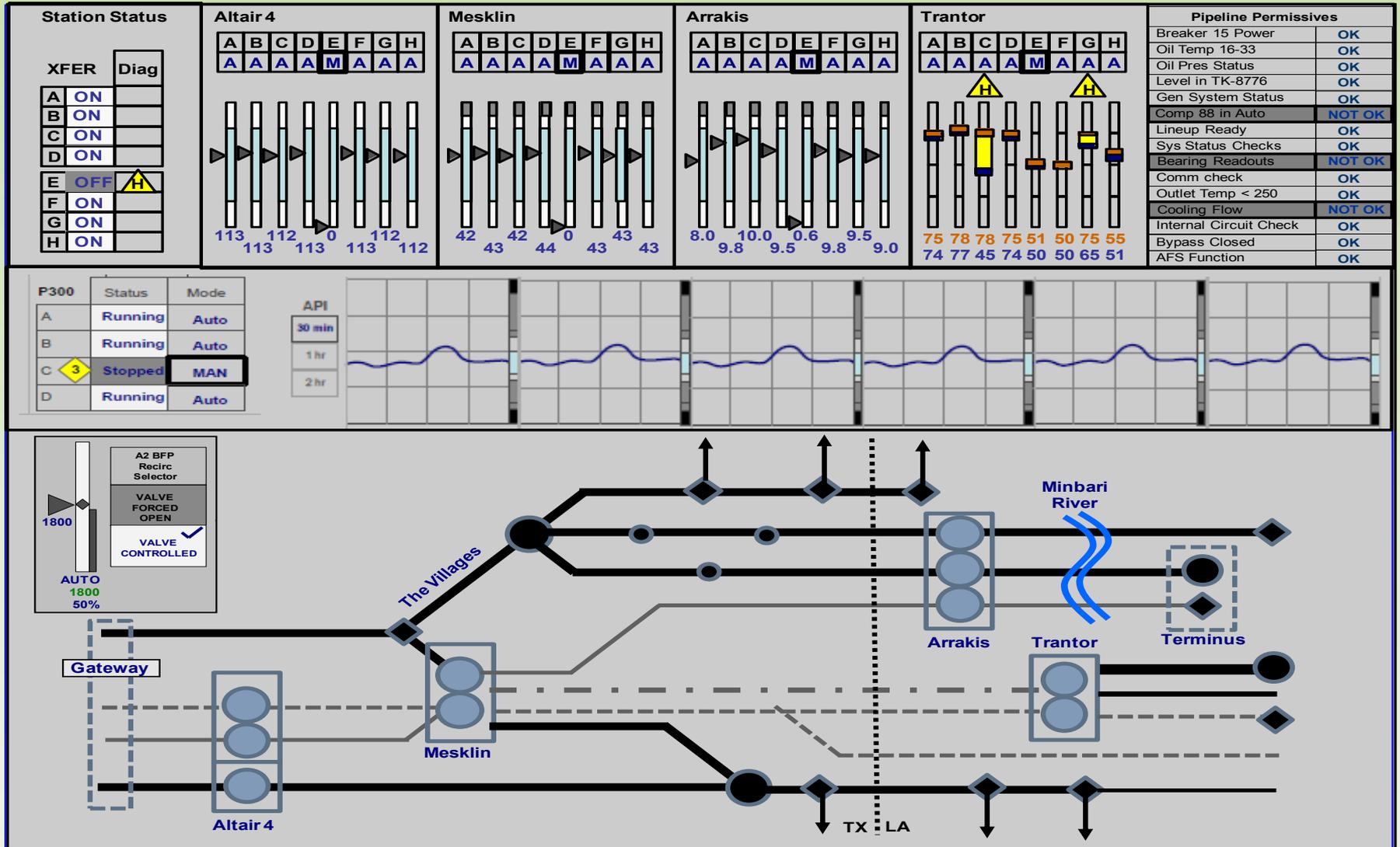
High Performance HMI – Display Hierarchy

- **Level 1 – Plant or Entire System Overview**
 - Entire Operator Span of Control. “Single-Glance”
- **Level 2 – Sub-Process Overview**
 - More details than a Level 1 display, smaller area
- **Level 3 – Equipment or Details Screen**
 - Specific details about part of the process or control
- **Level 4 – Specific Task or Diagnostic Screen**
 - Very detailed screen, only used for diagnostics

High Performance HMI – The old way

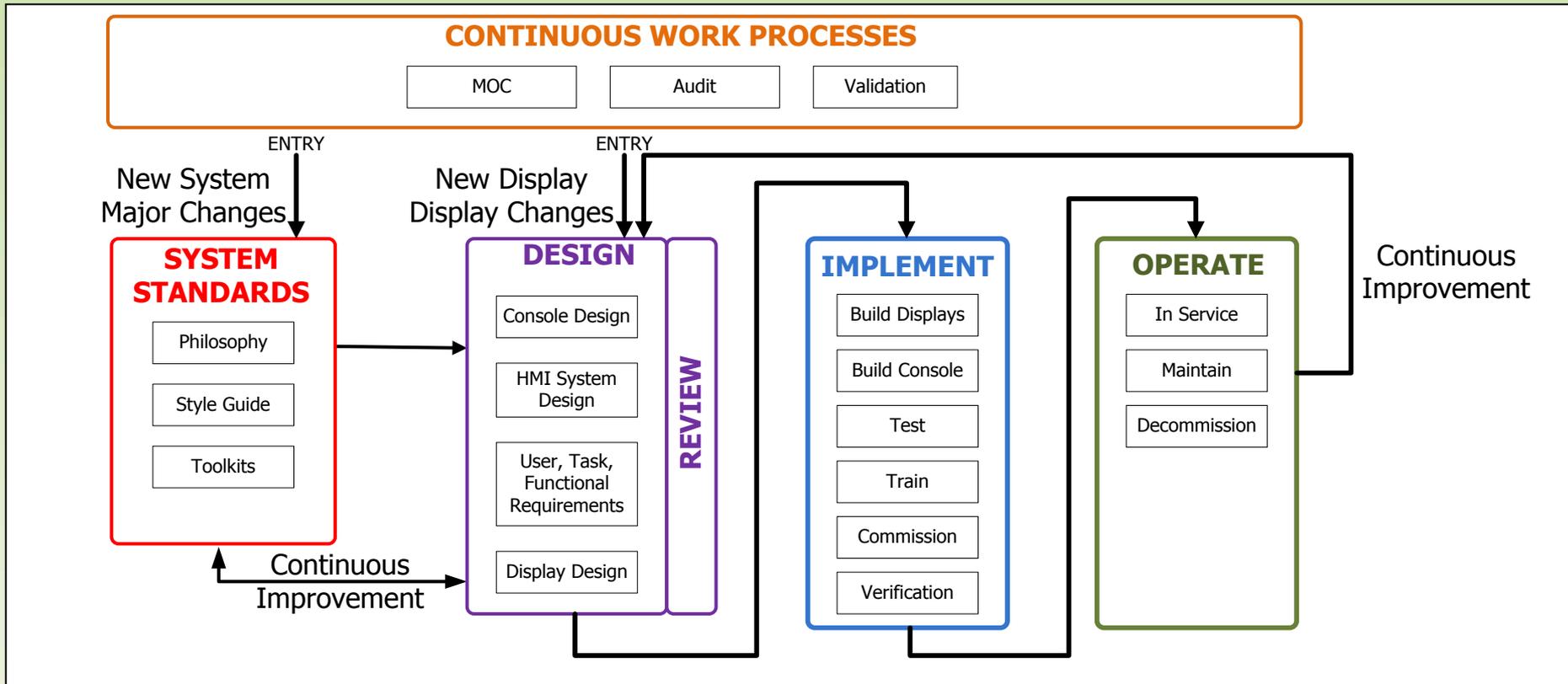


High Performance HMI – Proper Level 1 Display



Source: High Performance HMI Handbook

High Performance HMI – ISA101 Standard



Source: ISA101 HMI Lifecycle Diagram

Alarm Management

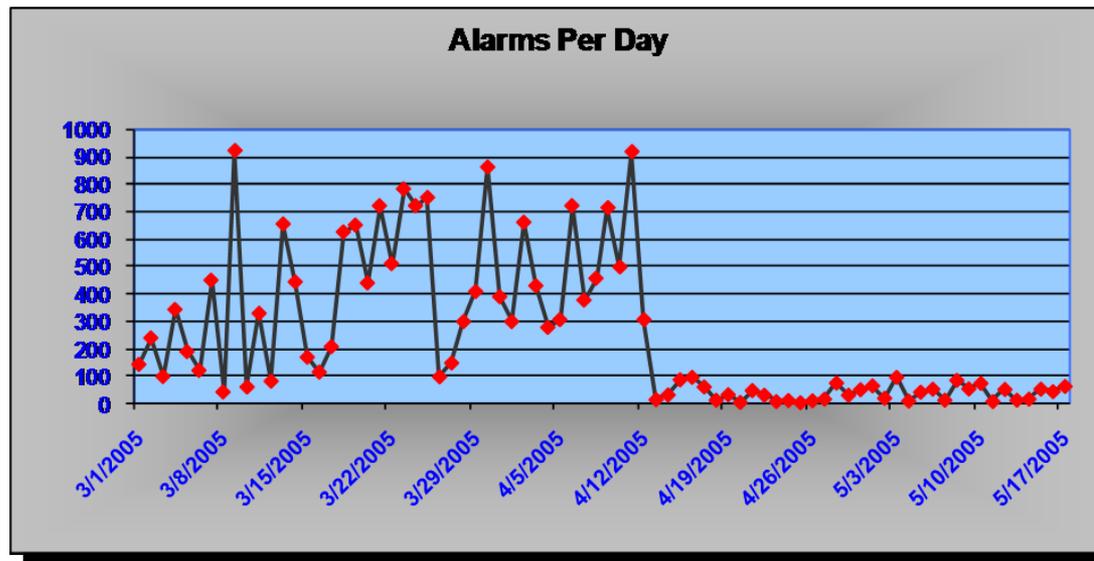
Alarm Management: ISA18.2

ANSI/ISA-18.2-2016 *

Management of Alarm Systems for the Process Industries

Alarm: *An audible and/or visible means of indicating to the operator an equipment malfunction, process deviation or abnormal condition requiring a timely response.*

Methodology for identifying, rationalizing and designing alarms to be a powerful tool for operations, and eliminating non-useful alarms

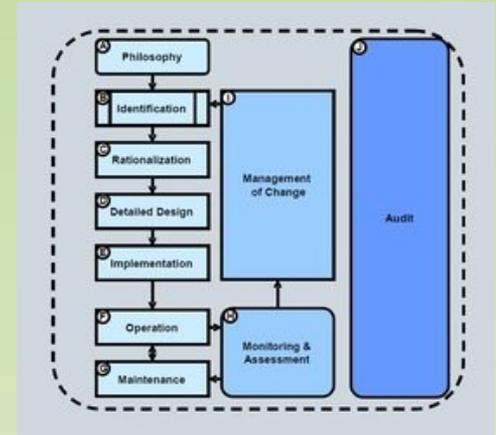


Typical example of results of 18.2 being implemented (showing before/after)

Alarm Management: ISA18.2

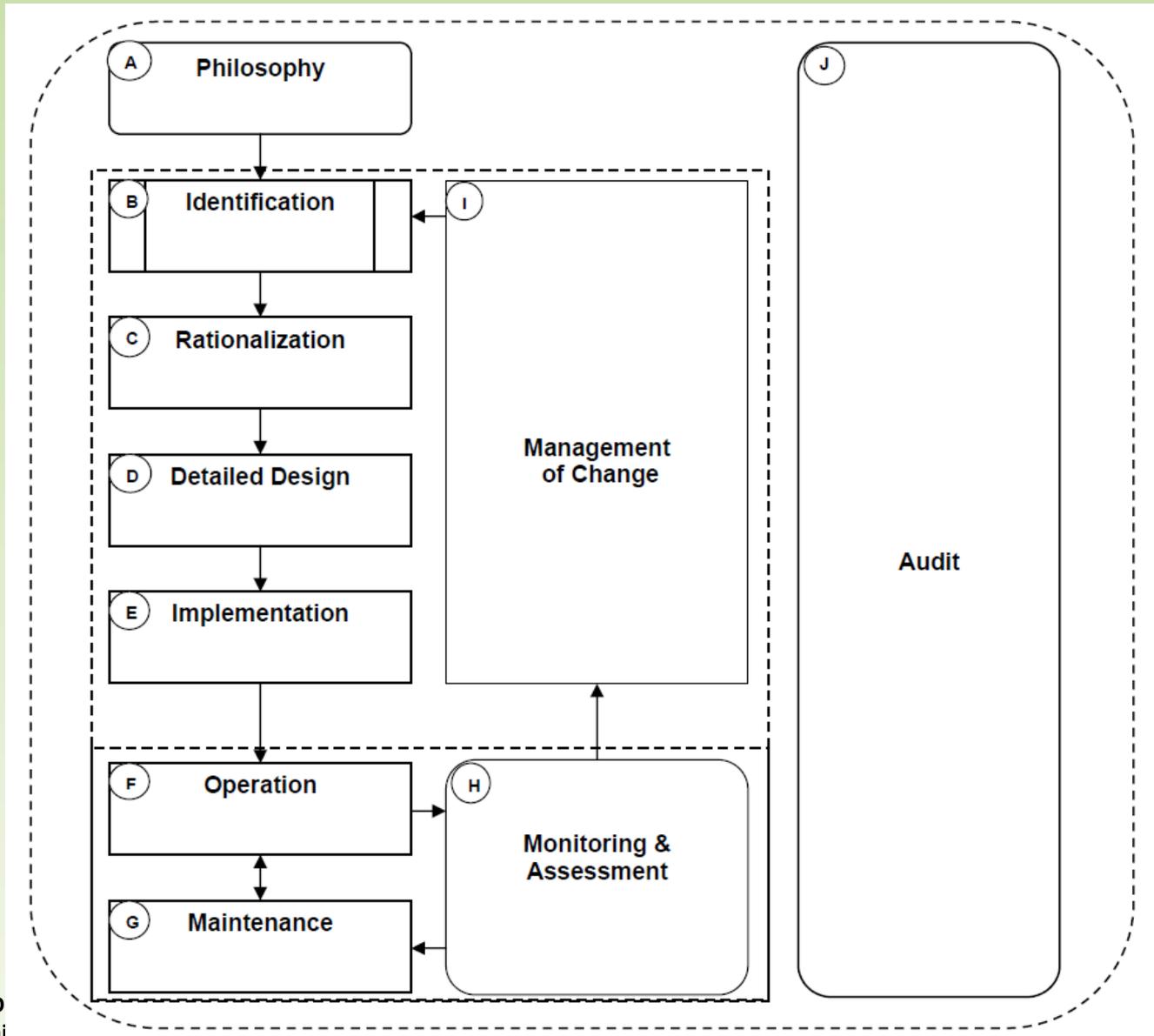
ANSI/ISA-18.2-2016:

Management of Alarm Systems for the Process Industries



- Addresses the development, design, installation, and management of alarm systems in the process industries
- Defines the terminology and models to develop an alarm system – and the work processes to effectively maintain it throughout its lifecycle
- Six technical reports available to explain specific applications in greater detail
- Based on work by the ISA18 committee, which has been active since 2003.
- First version of ISA18.2 standard published in 2009, became IEC-62682 in 2015, and updated version published in 2016.

Alarm Management: ISA18.2 Alarm Mgmt. Lifecycle



Alarm Management: Master Alarm Database (MADB)

Centralized repository of approved alarms and their configuration.

An approved/documented list of all your alarms in one place.

Tag	Priority	Desc.	Condition	Consequence If Ignored	Consequence Severity	Expected Operator Response	Time to Respond
P1-380-LAH-201	LOW	Aeration 1 High Level	High Level Switch Activated for 10sec	Overflows in Secondary clarifiers.	MINOR	Check Level Controller	2 hours
P1-380-AAL-102	MED	Aeration 1 Low DO	DO below 3ppm for 30min	Loss of Biological Action, Risk of Damage to Biological Mass	MAJOR	Investigate and turn on additional blowers	1 hour
P1-380-PALL-456A	LOW	Aeration 1 Air Pres. Low Low	Less than 15psi for 5min	Loss of Energy if Air Leak, Poor Aeration (Note: there is a low DO alarm)	MINOR	Check pressures in air distribution system via HMI, check valves in field	4 hrs

Alarm Management: Master Alarm Database

- **Alarm Tag**
- **Alarm Description** (full description & what is shown on HMI)
- **Identification:** Trigger Condition, Purpose
- **Rationalization:**
 - Consequence & Severity if Ignored
 - Expected Operator Response, Time to Respond
 - Alarm Priority & Alarm Class
 - Justification for having this alarm configured!
- **Design:** Trigger Condition, On/Off Delays, Additional Filtering Logic, Setpoints, Routing/grouping information for the HMI
- **Operation:** When put into service, If Periodic Testing is required

Alarm Management: Key SCADA Features

- Master Alarm Database
- Ability to create non-alarm messages and logged events
- Support for Alerts, Prompts, and Maintenance Messages
- HMI Alarm Summary Display Screen
- Alarm Sorting, Filtering, Routing
- Alarm Areas/Grouping
- Alarm Priorities
- Alarm Classes

Alarm Management: Key SCADA Features cont'd

- Standardizing Alarm Features with Function Blocks
- On-Delay, Off-Delay, Deadband
- Conditional Alarming: base condition plus additional logic
- Alarm Shelving Method with Authorization / Logging
- Alarm Out of Service
- Change Control – Permissions, Setpoints, Configuration
- Configuration Change Logging
- Alarm Setpoint/Attribute verification & enforcement

Alarm Management: Non-Alarms

HMI: Alarms, Events and Notifications

- SCADA Systems can have multiple types of notifications

Operator notification types	Operator is expected to take an action	Operator might need to be aware but is not required to take action <i>(Action might be expected from someone other than the operator.)</i>
Arises from an abnormal process or equipment situation	Alarm	Alert
Arises from a normal situation	Prompt	Status

Figure 6 – Sample criteria for notification types from an alarm philosophy

- SCADA systems should have support for:
 - Alarms
 - Other notifications: alerts, prompts, maintenance messages
 - Event messages
 - Logged-only events

Alarm Management: Dedicated Alarm Display

- Dedicated screen for displays alarms – only alarms
- Ideally on its own dedicated monitor in multi-monitor setup

Open Alarm Viewer

Catastrophic
 Critical
 High
 Medium
 Low
 Selected
 Acknowledged

JAVED (Role)

Tue Jun 02 09:22:58 GMT+05:00 2009

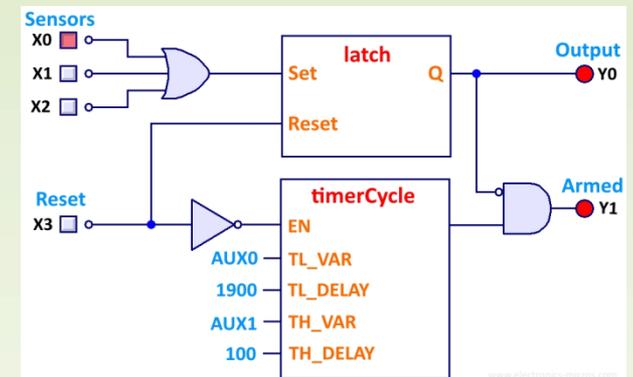
Alarm Viewer

Recent Alarms | Historical Alarms

Date/Time	Type	Name	Tag Name	Value/Diff	Severity	Quality	Message	Acknowledgem...
2009-06-02 09:23:02	Limit	SULPHURIC	Channel_0_User_Defi...	0.009421819	Critical	192	lohi message sul	Required
2009-06-02 09:23:02	Deviation	TEST	Channel_0_User_Defi...	612.0	Catastrophic	192	hihi deviation message test	Required
2009-06-02 09:23:02	Limit	TEST	Channel_0_User_Defi...	48.0	Critical	192	lohi limit message test	Required
2009-06-02 09:22:58	Limit	HCL	Channel_0_User_Defi...	0.62438214	Catastrophic	192	hihi message hcl	Required
2009-06-02 09:22:58	Limit	MIXTURE	Channel_0_User_Defi...	20.004639	Critical	192	lohi message limit Mixture	Required
2009-06-02 09:22:58	Limit	SULPHURIC	Channel_0_User_Defi...	0.44344157	Critical	192	lohi message sul	Required
2009-06-02 09:22:57	Deviation	TEST	Channel_0_User_Defi...	615.0	Catastrophic	192	hihi deviation message test	Required
2009-06-02 09:22:57	Limit	TEST	Channel_0_User_Defi...	45.0	Critical	192	lohi limit message test	Required
2009-06-02 09:22:53	Limit	HCL	Channel_0_User_Defi...	0.97925013	Catastrophic	192	hihi message hcl	JAVED
2009-06-02 09:22:53	Limit	MIXTURE	Channel_0_User_Defi...	30.2655	Catastrophic	192	hihi message limit Mixture	JAVED
2009-06-02 09:22:53	Limit	SULPHURIC	Channel_0_User_Defi...	0.6835348	Critical	192	lohi message sul	JAVED
2009-06-02 09:22:52	Limit	TEST	Channel_0_User_Defi...	41.0	Critical	192	lohi limit message test	JAVED
2009-06-02 09:22:48	Limit	HCL	Channel_0_User_Defi...	0.047570862	Catastrophic	192	hihi message hcl	JAVED
2009-06-02 09:22:48	Limit	MIXTURE	Channel_0_User_Defi...	3.2709394	Low	192	lohi message limit Mix	JAVED
2009-06-02 09:22:48	Limit	SULPHURIC	Channel_0_User_Defi...	0.02965525	Critical	192	lohi message sul	JAVED
2009-06-02 09:22:48	Deviation	TEST	Channel_0_User_Defi...	723.0	Catastrophic	192	hihi deviation message test	JAVED
2009-06-02 09:22:48	Limit	TEST	Channel_0_User_Defi...	39.0	Critical	192	lohi limit message test	JAVED
2009-06-02 09:22:43	Limit	HCL	Channel_0_User_Defi...	0.3043463	Catastrophic	192	hihi message hcl	JAVED
2009-06-02 09:22:43	Limit	MIXTURE	Channel_0_User_Defi...	0.21913764	Critical	192	lohi message limit Mixture	JAVED
2009-06-02 09:22:43	Limit	SULPHURIC	Channel_0_User_Defi...	0.21913764	Critical	192	lohi message sul	JAVED
2009-06-02 09:22:43	Deviation	TEST	Channel_0_User_Defi...	624.0	Catastrophic	192	hihi deviation message test	JAVED
2009-06-02 09:22:43	Limit	TEST	Channel_0_User_Defi...	36.0	Critical	192	lohi limit message test	JAVED
2009-06-02 09:22:39	Limit	HCL	Channel_0_User_Defi...	0.96717709	Catastrophic	192	hihi message hcl	JAVED
2009-06-02 09:22:38	Limit	MIXTURE	Channel_0_User_Defi...	29.4449152	Critical	192	lohi message limit Mixture	JAVED
2009-06-02 09:22:38	Limit	SULPHURIC	Channel_0_User_Defi...	0.66381353	Critical	192	lohi message sul	JAVED
2009-06-02 09:22:38	Deviation	TEST	Channel_0_User_Defi...	68.0	Catastrophic	192	hihi deviation message test	JAVED
2009-06-02 09:22:38	Limit	TEST	Channel_0_User_Defi...	32.0	Critical	192	lohi limit message test	JAVED
2009-06-02 09:22:34	Limit	HCL	Channel_0_User_Defi...	0.2701796	Catastrophic	192	hihi message hcl	JAVED
2009-06-02 09:22:34	Limit	MIXTURE	Channel_0_User_Defi...	0.772794	Medium	192	lo message limit Mixture	JAVED
2009-06-02 09:22:33	Limit	SULPHURIC	Channel_0_User_Defi...	0.18136518	Critical	192	lohi message sul	JAVED
2009-06-02 09:22:33	Deviation	TEST	Channel_0_User_Defi...	830.0	Catastrophic	192	hihi deviation message test	JAVED
2009-06-02 09:22:33	Limit	TEST	Channel_0_User_Defi...	30.0	Critical	192	lohi limit message test	JAVED
2009-06-02 09:22:29	Limit	HCL	Channel_0_User_Defi...	0.06402469	Catastrophic	192	hihi message hcl	JAVED
2009-06-02 09:22:29	Limit	MIXTURE	Channel_0_User_Defi...	3.1376188	Low	192	lohi message limit Mix	JAVED
2009-06-02 09:22:29	Limit	SULPHURIC	Channel_0_User_Defi...	0.94975367	Critical	192	lohi message sul	JAVED

Alarm Management: Programming Best Practices

- Use a standardized function block in your PLC for all alarms
- Key Features:
 - Raw Status vs. Alarm Bit
 - Condition Inversion
 - Logic-Based Suppression
 - ON-Delay
 - OFF-Delay
 - Shelving / Out of Service support (if required at PLC-level)
- Additional Features for Analog/Value Alarms
 - Deadband
 - Alarm Masking if Signal is Bad
 - Masking of Lesser Alarms (L vs. LL)
 - Rate of Change

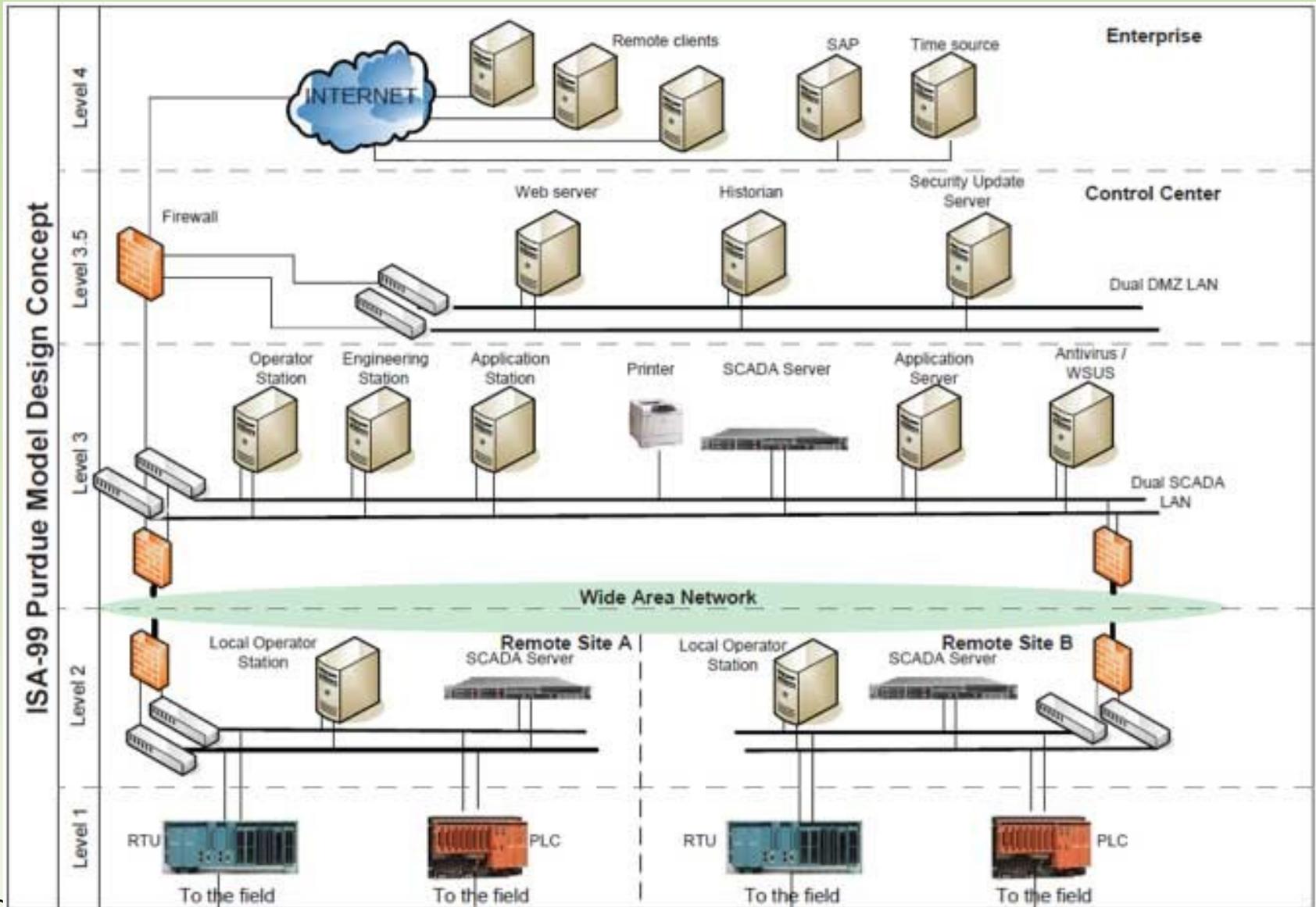


Data Redundancy

Data Redundancy: Logging Data

- O.Reg. 170 requires us to log chlorine residuals every 5 minutes (water)
- Permits require us to track flow rates and flow totals at facilities
- SCADA Systems are not perfect: unit failures and network outages do happen
- Best Practice is to have redundant data logging
 - Main SCADA System logging data
 - Data loggers at sites
- Existing Practice
 - Redundant data loggers. Data must be gathered or imported manually into reporting system
 - Custom programming often needed to implement backup data logging in PLCs
- New Developments
 - New data loggers and operator terminals that do store/forward data logging
 - Reporting systems and historians that can accept data from multiple sources
 - Networking Protocols, e.g., DNP3, that have built-in time- stamping & store/forward logging

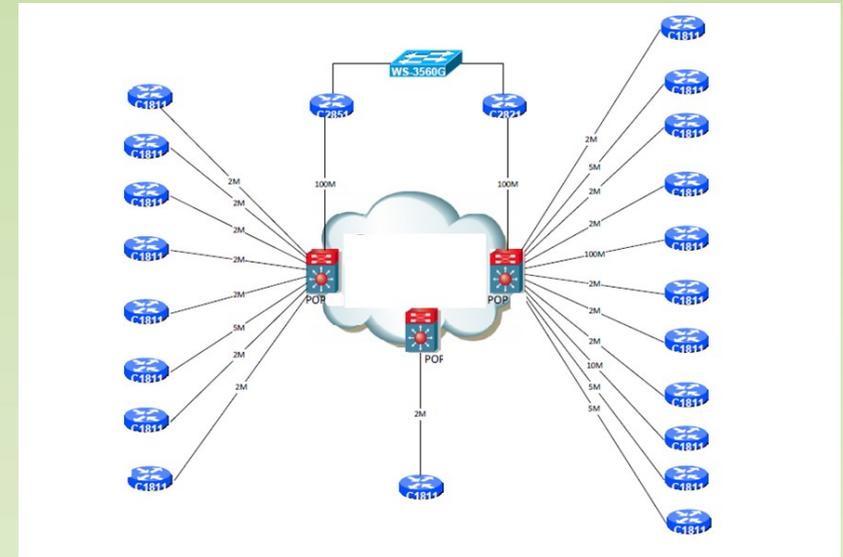
Data Redundancy: Logging Data



SCADA Network Redundancy

SCADA Network Redundancy

- SCADA is critical to operations
 - Data Logging,
 - Situational Awareness,
 - Remote Control by Operators,
 - Automatic Control,
 - Alarms,
 - Reporting



- SCADA relies on its process control network to stay online
 - In-plant Ethernet networks
 - Wide Area Networks (WAN) to remote sites
- Without the SCADA network, the SCADA system cannot operate

SCADA Network Redundancy

- **O.Reg. 170 – Drinking Water Systems**
- Free Chlorine Residuals Must be Logged Minimum Every 5 minutes
- Low chlorine alarms must be communicated promptly

- **Very challenging to meet this uptime for a SCADA network**
- SCADA system must be online 24/7, 365 days/year
- Less than 5 min downtime/year = 99.9995% uptime
- Most IT Systems only reach 95 to 99% uptime (outages at night ok)
- SCADA system has to be **10,000 X more reliable** than an IT system

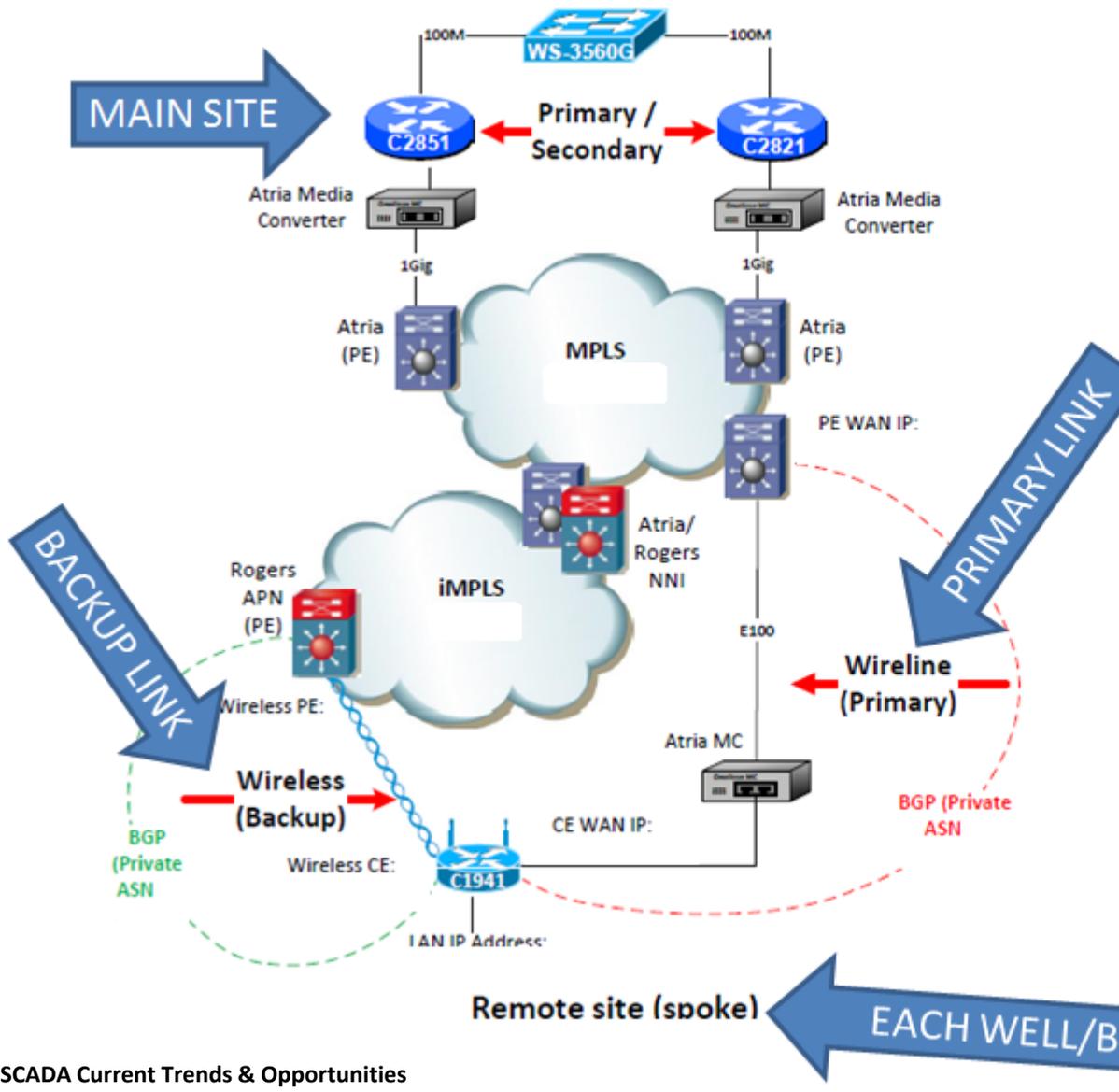
SCADA Network Redundancy

- **SCADA Network Technologies**
 - Fibre optic (public)*
 - Fibre optic (MPLS)
 - Fibre optic (utility owned)
 - Cellular / Wireless*
 - DSL (private or public)*
 - Radios – licensed*
 - Radios – unlicensed*
 - Bell Lines
 - Private Cables
 - ?



*these approaches usually require extra VPN routers/firewalls be used

SCADA Network Redundancy: One Solution



Main site objectives:

- Maintain status quo with existing Primary / Secondary (standby) routers (no config. changes)
- Both Primary and Secondary routers will continue to handle traffic via existing Atria MPLS network
- Rogers will extend a connection from Atria network to Rogers EON network via a new inter-as bridge specific to the customer's VRF
- Both Primary / Secondary routers will communicate to new Wireless backup accesses over this bridge via the existing Atria MPLS network over BGP

Remote sites objectives:

- Maintain current Atria access via Fiber/MC
- Replace current Atria Router with a Rogers Managed Cisco 1941 router w/HSPA+ wireless backup module & antenna
- Rogers will build a new MPLS customer VRF on the EON platform and inter-connect this with the Atria MPLS customer VRF
- Wireless backup will be via Rogers EON network back to Atria MPLS via inter-as bridge
- Wireline primary access will be direct from 1941 to Atria MPLS core via BGP
- Wireless will use AS Prepend inbound and local pref outbound for Wireline
- Assumptions:
 1. Private AS different from Host AS (no AS-Override Required)
 2. Hub and Spoke will be maintained and each spoke will re-use the same Private-As (not required but can be done)

Cyber Security

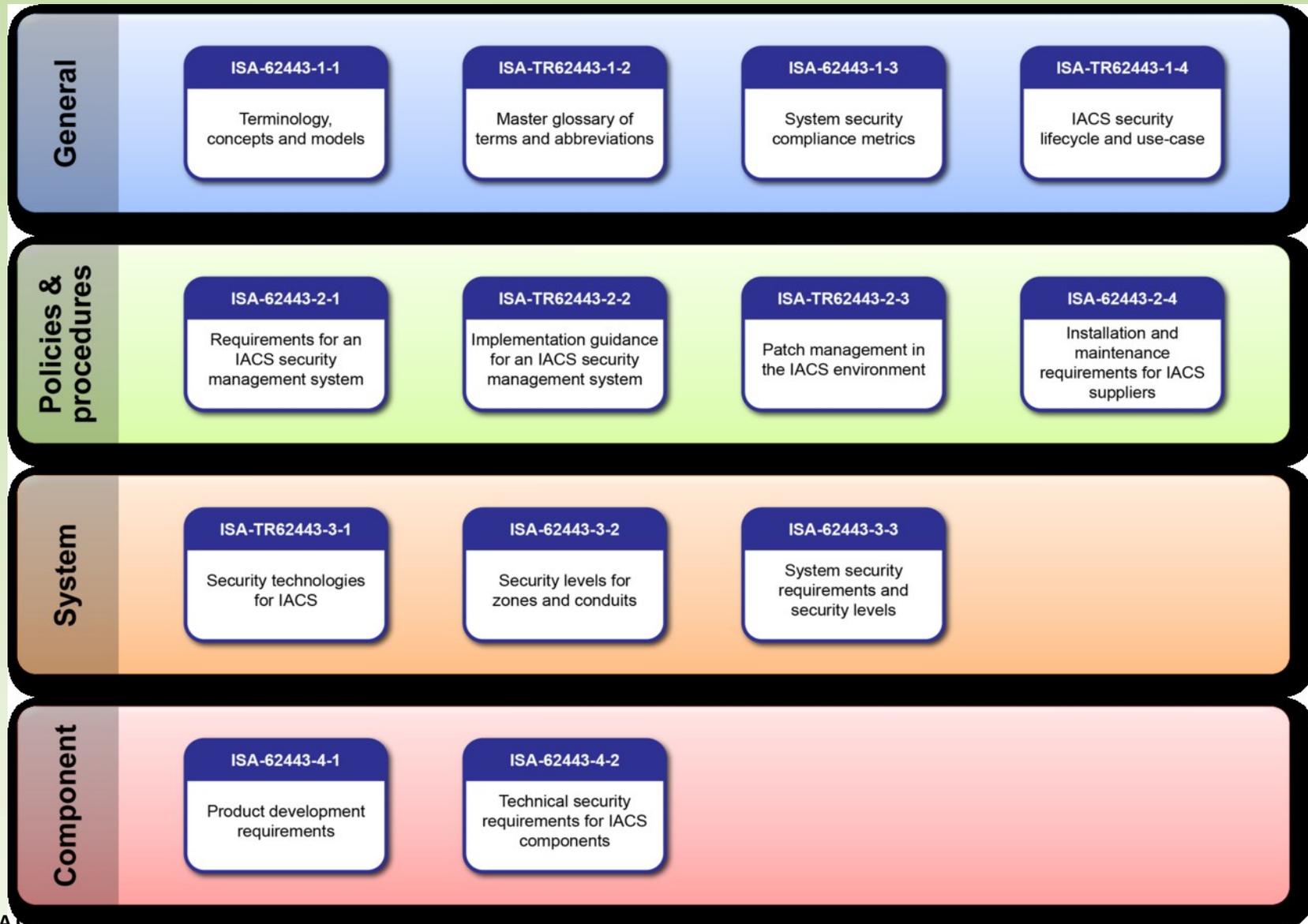


SCADA Cyber Security

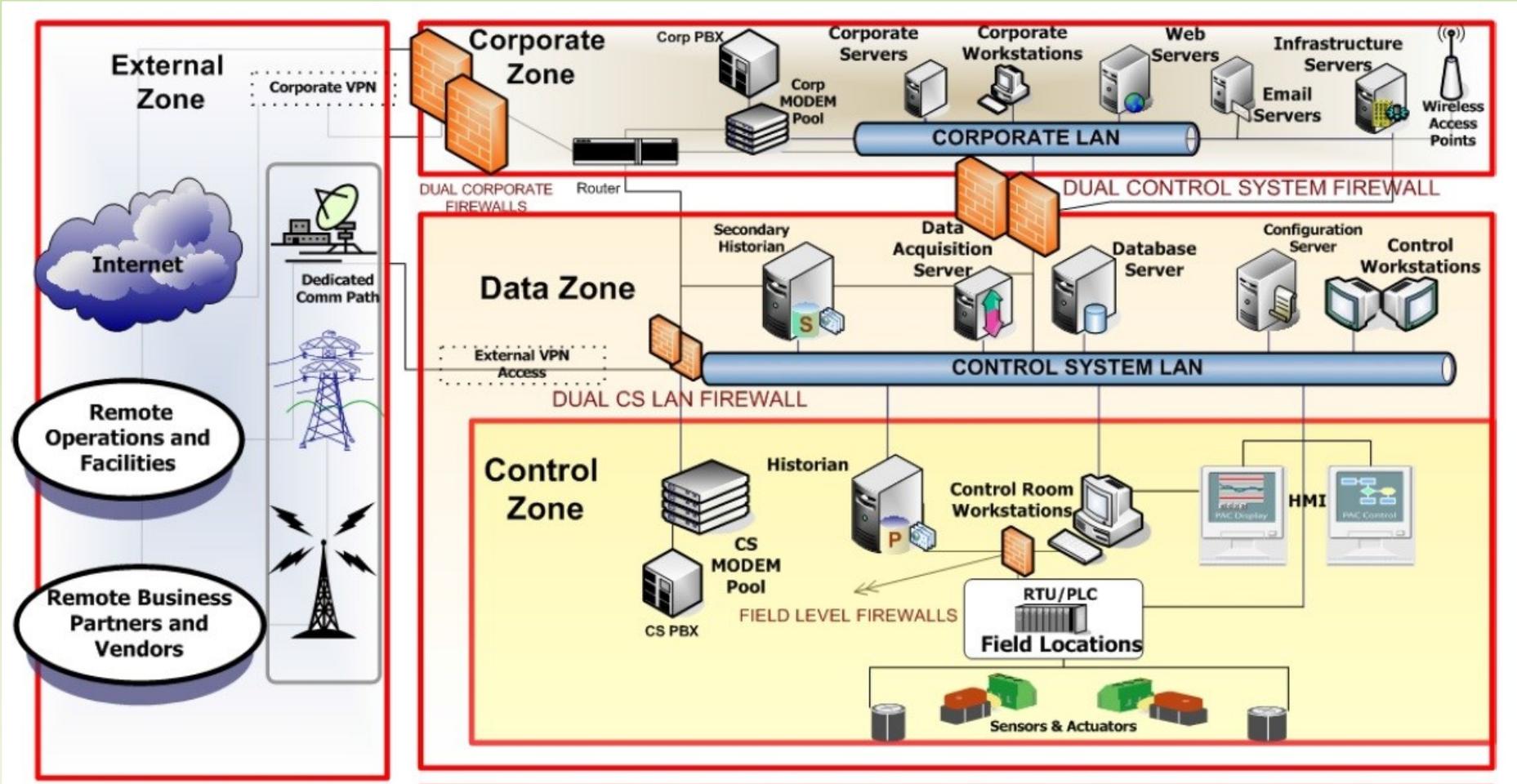
- You need to protect your SCADA system for unauthorized access
- In the past this was difficult to do
- Requires multipronged approach
 - People
 - Process
 - Technology
- There is guidance now available on how to do this
 - ISA/IEC-62443 (formerly known as ISA-99)
 - AWWA GW430
 - NIST Cyber Security Framework

SCADA control system networks must be kept separate from Corporate IT networks

SCADA Cyber Security: ISA/IEC-62443



SCADA Cyber Security: ISA/IEC-62443



Build on What you Have

- **SCADA is essential for both Operations and Compliance**
- **Operators Need Situational Awareness to Operate Effectively**
- **Use the SCADA HMI to show the whole picture to operators**
- **SCADA Alarms systems must be rationalized/documentated**

- **Pay attention to data integrity by investing in data redundancy**
- **SCADA networks are key to robust SCADA systems**
- **Cyber Security is requires a multi-pronged approach**

- **When upgraded SCADA systems, leverage what you have**
- **Take advantage of new technology and ideas**

How Guelph Water is Applying these Concepts

SCADA: What Guelph Water is doing



Guelph Water Services

ADMIN1

7:06:18 PM

GUEST

is logged in

02/10/2018

Arkell Diversion Chamber	Clair Booster	Robertson Booster	Alarm System Test	Historian Trends
Arkell Well 6	Clythe Booster	Scout Camp Station	Security Systems & Bldg Temp	Teledac Menu
Arkell Well 7 & Well 1	Dean Well	Speedvale Tower	Smallfield Edinburgh Gazer	Pump Runtimes
Arkell Well 8	Dodds Avenue Valve Chamber	University Well & Reservoir	Runtime 1 (old) Runtime 2 (old) Runtime 3 (old)	Waste Vs Production
Arkell Well 14	Downey Well	Verney Tower	Storage Update	Hydro-UPS-Generators Power Monitors
Arkell Well 15	Emma Well	Water Street Well	Arkell Control Verney / Clair Control	Well Limit Warnings/Shutdowns
Arkell - Woods System	Helmar Well	Woods Chlorination	Yesterday Pumpage	UV/Gen Runtimes Pressure Map
Burkes Well	Membro Well	Woods Power	System Overview Zone 1 Overview	PLC Controllers 1 PLC Controllers 2
Calico Well	Paisley Station	Woods Reservoirs Woods Hatches	Zone 3 Overview Zone 2 Overview	MAP Dashboard
Carter Wells	Park Wells	Woods Booster	Aqueduct Test Aqueduct Model	Weather/Temp Woods Fuel Depot
Clair Tower	Queensdale Well	Woods UV	Well Levels Chlorine Residuals	PLC Fault Check Open SCADA Sync



Rain Fall **0.00** mm/min
 Temperature **12.03** °C

Unacknowledged Alarms **2**

TELEDAC OK
 Storage Indicator (%)
71.1 Overall
77.5 Enabled Sites

WDCADA1
 SCADA Node Failover Status: **Active**
 SCADA node SAC Status: **RUN**

WDCADA2
 Standby
RUN

Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description
✓	02/10/2018	10:55:14.273	10:55:14.273	WDCADA	DOBG00100EPF	CFN	ALARM	Downey Well Pump Power Monitor
✓	29/09/2018	12:54:05.987	12:54:05.987	WDCADA	MEBG00100EPF	CFN	ALARM	Membro Well Pump Disconnect Off
✓	29/09/2018	12:54:05.921	12:54:05.921	WDCADA	MEBG00100EOL	CFN	ALARM	Membro Well Pump Overload Alarm
✓	29/09/2018	12:54:05.921	12:54:05.921	WDCADA	MEBG00100EGA	CFN	ALARM	Membro Well Pump General Alarm
✓	29/09/2018	12:54:01.935	12:54:01.935	WDCADA	MEBGB0100EPF	CFN	ALARM	Membro Booster Pump Disconnect Off

Total Alarms: 46 | Filter: Off | Sort: Time In, Descending | Run



High Density Information – careful use of colour



Water St. Well - WWS

GUEST

is logged in

MENU

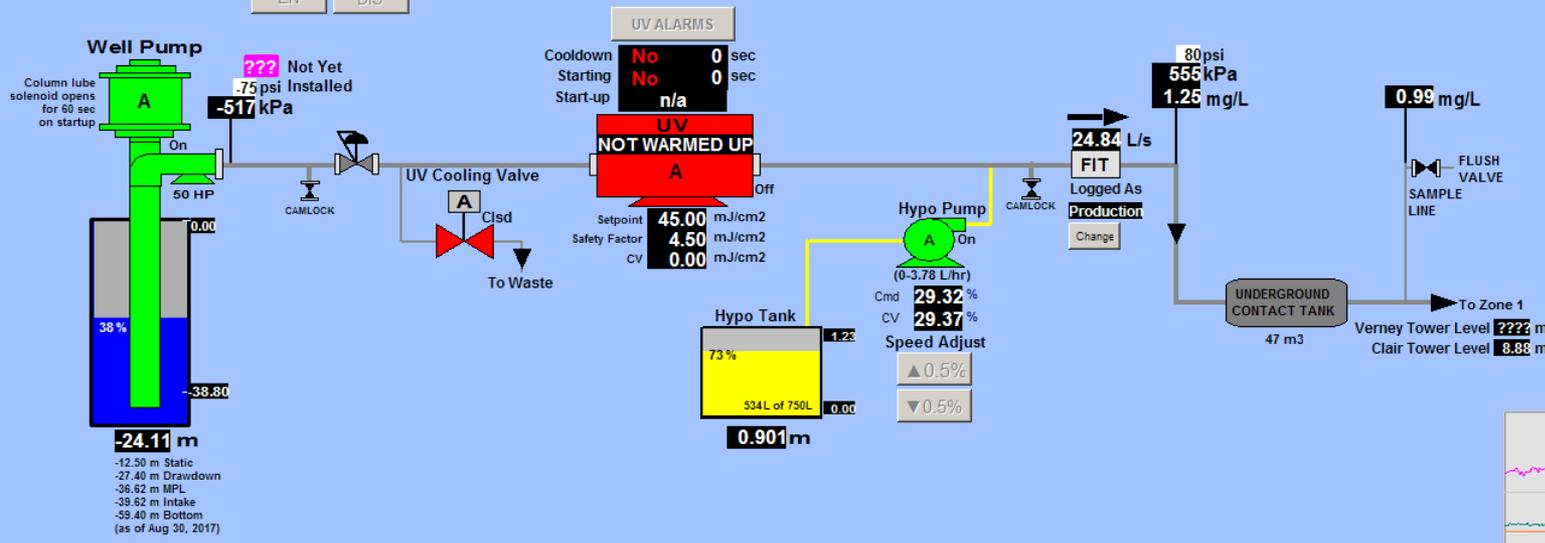
7:06:46 PM
02/10/2018

Auto Control Status **PRODUCING**
 Station OK to Auto Run **READY**
 Auto Run Mode **JUST RUN**
 Control Mode **MODE 1**
 Mode 1: Treatment by contact only
 Mode 2: Treatment by contact and UV
 Station Auto Enable **ENABLED**

EN DIS

Building & Security
 Security Armed **ARMED**
 Intrusion Alarm **OK**
 Trouble Status **OK**
 Door Status **CLOSED**
 Building Temp **22.4** DegC
 Station Power **OK**
 Building Amps **33.3** A **35.0** kW

- Station Permissives
- Flows & Runtimes
- List of Alarms
- Hypo Setpoints
- Station Setpoints
- Interlock Setpoints
- CT Calculator



Online CT Calculator
 CT Minimum **4.00**
 CT Achieved **27.60**
 Valid **YES** CT Met **YES**

Chlorine Residual
 High Interlock **2.50** mg/L
 POE Target **1.00** mg/L
 Low Interlock **0.50** mg/L



PLC Reset

Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description

Total Alarms: 0 | Filter: Area In "WWS" AND Tagname = "WWS" | Sort: Time In, Descending | Run

Station On **27.5** Hrs
 Station Off **0.0** Hrs



Better Pop-Up Windows

Auto Control Status **PRODUCING**
 Station OK to Auto Run **READY**
 Auto Run Mode **JUST RUN**
 Control Mode **MODE 1** Mode 1: Treatment by contact only
 Mode 2: Treatment by contact and UV
 Station Auto Enable **ENABLED**

EN DIS

Well Level

Value **-24.01 m** (-38.8 to 0) Raw Signal: **OK**

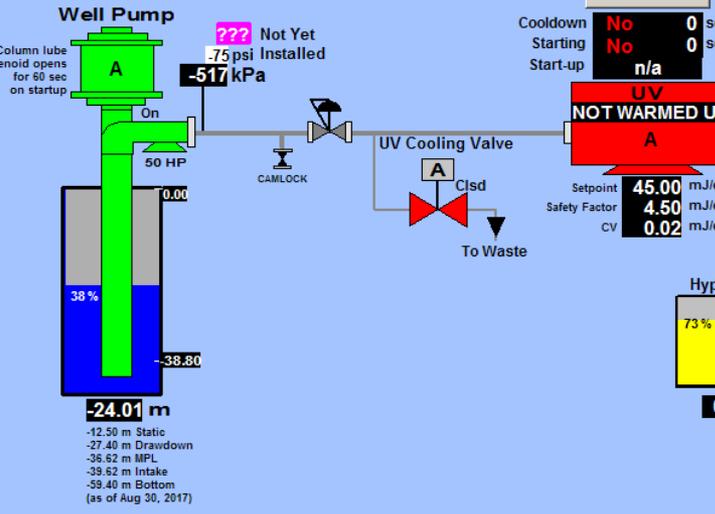
Alarm Setpoints:	Enabled?	ALARM	Last 24 Hours
HIH: 0.00	EN DIS	Disabled OK	[Graph Area]
HI: 0.00	EN DIS	Disabled OK	
LO: 0.00	EN DIS	Disabled OK	
LOLO: 0.00	EN DIS	Disabled OK	
Bad Signal	EN DIS	Enabled OK	

MINIMUM MAXIMUM AVERAGE
 TODAY -24.72 -21.83 -23.44
 YESTERDAY -24.24 -12.01 -17.26

ACK

Building & Security

Security Armed **ARMED**
 Intrusion Alarm **OK**
 Trouble Status **OK**
 Door Status **CLOSED**
 Building Temp **22.4** DegC
 Station Power **OK**
 Building Amps **33.3 A 35.0 kW**



99 mg/L

FLUSH VALVE

SAMPLE LINE

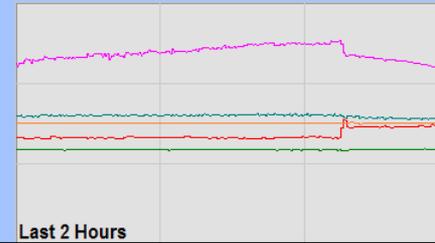
UNDERGROUND CONTACT TANK 47 m3

To Zone 1

Verney Tower Level **?????** m
 Clair Tower Level **8.72** m

Online CT Calculator
 CT Minimum 4.00
 CT Achieved 27.81
 Valid YES CT Met YES

Chlorine Residual
 High Interlock 2.50 mg/L
 POE Target 1.00 mg/L
 Low Interlock 0.50 mg/L



PLC Reset

Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description

total Alarms: 0 Filter: Area In "WWS" AND Tagname = "WWS*" Sort: Time In, Descending Run

Station On **27.6** Hrs
 Station Off **0.0** Hrs

Better Pop-Up Windows – “analog”

Auto Cc
Station OK
Aut
C
Station

Well
Column lube
solenoid opens
for 60 sec
on startup

38%

-24
-12.5
-27.4
-36.6
-39.6
-59.4
(as c

WWS_Analog_Popup.grf

Well Level

Value **-24.01** m (-38.8 to 0) Raw Signal: **OK**

Alarm Setpoints:	Enabled?	ALARM
HIHI: <input type="text" value="0.00"/> EN DIS ● Disabled OK		
HI: <input type="text" value="0.00"/> EN DIS ● Disabled OK		
LO: <input type="text" value="0.00"/> EN DIS ● Disabled OK		
LOLO: <input type="text" value="0.00"/> EN DIS ● Disabled OK		
Bad Signal EN DIS ● Enabled OK		

Last 24 Hours

	MINIMUM	MAXIMUM	AVERAGE
TODAY	-24.72	-21.83	-23.44
YESTERDAY	-24.24	-12.01	-17.26

ACK

7:11:55 PM
02/10/2018

Building & Security

Security Armed **ARMED**
Intrusion Alarm **OK**
Trouble Status **OK**
Door Status **CLOSED**
Building Temp **22.4** DegC
Station Power **OK**
Building Amps **33.3** A **35.0** kW

Station Permissives
Flows & Runtimes
List of Alarms
Hypo Setpoints
Station Setpoints
Interlock Setpoints
CT Calculator

Chlorine Residual
High Interlock **2.50** mg/L
POE Target **1.00** mg/L
Low Interlock **0.50** mg/L

Chlorinator
4.00
27.81
Set **YES**

Last 2 Hours

Pen
Well Level
Discharge Flow
Post Chlorine Residual
Pre Chlorine Residual
Verney Tower Level
Clair Tower Level

Station On **27.6** Hrs
Station Off **0.0** Hrs

PLC Reset

Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description

total Alarms: 0 Filter: Area In "WWS" AND Tagname = "WWS*" Sort: Time In, Descending Run

Better Pop-Up Windows – pump starter

Auto Control Status **PRODUCING**

WWS Well Pump

Control Source

M Manual

A Auto

RUN AUTO CMD

SCADA Manual CMDs

Start

Stop

RUN MAN CMD

Runtimes

This Run Cycle 27.7 hr

Motor (Resettable) 239.5 hr

Pump (Resettable) 239.5 hr

Cumulative 239.51 hr

Volume Today 1574 m3

Volume Yesterday 961 m3

Show/Hide

Building & Security

Security Armed **ARMED**

Intrusion Alarm **OK**

Trouble Status **OK**

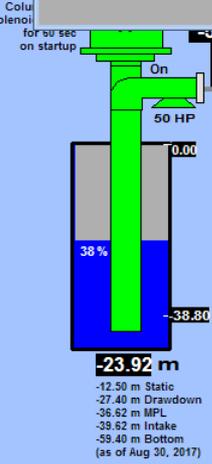
Door Status **CLOSED**

Building Temp **22.4** DegC

Station Power **OK**

Building Amps **33.3 A 34.9 kW**

- Station Permissives
- Flows & Runtimes
- List of Alarms
- Hypo Setpoints
- Station Setpoints
- Interlock Setpoints
- CT Calculator



UV NOT WARMED UP

Setpoint 45.00 mJ/cm2

Safety Factor 4.50 mJ/cm2

CV 0.05 mJ/cm2

Hypo Pump

On

Cmd 29.24% (0-3.78 L/hr)

CV 29.27%

Speed Adjust

▲ 0.5%

▼ 0.5%

Hypo Tank

73%

535L of 750L

0.902m

81 psi

561 kPa

1.26 mg/L

24.57 L/s

FIT

Logged As Production

Change

UNDERGROUND CONTACT TANK

47 m3

Verney Tower Level **2.222** m

Clair Tower Level **8.81** m

Online CT Calculator

CT Minimum 4.00

CT Achieved 28.19

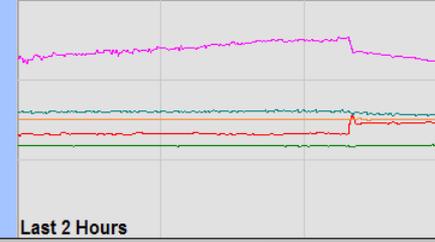
Valid YES CT Met YES

Chlorine Residual

High Interlock 2.50 mg/L

POE Target 1.00 mg/L

Low Interlock 0.50 mg/L



PLC Reset

Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description

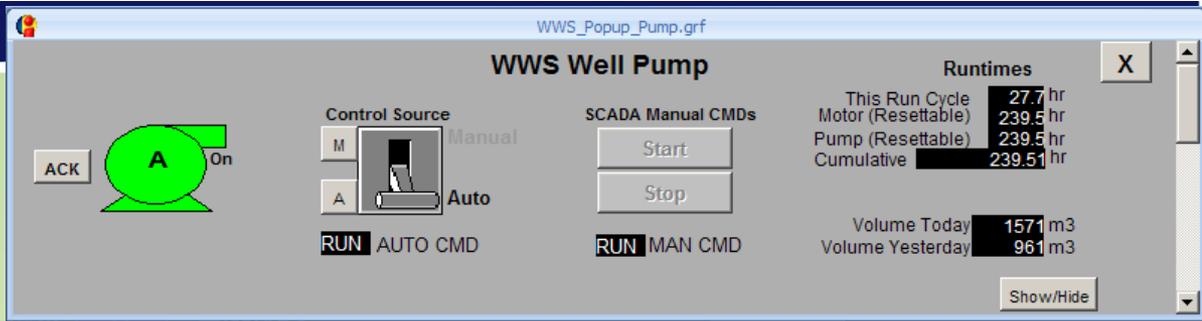
Total Alarms: 0 Filter: Area In "WWS" AND Tagname = "WWS" Sort: Time In, Descending Run

Station On **27.6** Hrs

Station Off **0.0** Hrs



Better Pop-Up Windows - pumps



WWS_Popup_Pump.grf

WWS Well Pump

Control Source: M Manual, A Auto

SCADA Manual CMDs: Start, Stop

Runtimes: This Run Cycle 27.7 hr, Motor (Resettable) 239.5 hr, Pump (Resettable) 239.5 hr, Cumulative 239.51 hr

Volume Today 1571 m3, Volume Yesterday 961 m3

Buttons: ACK, On, RUN AUTO CMD, RUN MAN CMD, Show/Hide

Permissives

- Facility Power OK
- Well Pump Starter Power OK

Interlocks (Reset Required)

01	OK	Well Level Below MPL
02	OK	Well Pump Flow Rate Above Permit
		Well Pump Daily Flow Above Permit
		Well Pump Starter Fault
		Well Pump Low Flow (< 5L/s, 30s)
		Global Chlorine Interlock
		Hypo Pump Interlocked
		Hypo Pump Did Not Start In 5 Sec
		Well Level Bad Signal
		UV Lost Warmed Up Status (Mode 2)
		UV Interlocked (Mode 2)
		Well Pump E-Stop Pressed
		Hardwired Low Chlorine Interlock

Man. Auto

01	OK	OK
02	OK	OK
03	OK	OK
04	OK	OK
05		OK
06	OK	OK
07		OK
08		OK
09		OK
10	OK	OK
11	OK	OK
12	OK	OK
13	OK	OK

Alarms

01	OK	(S) Well Pump Fail to Start Alarm
02	OK	(S) Well Pump Fail to Stop Alarm
03	OK	(S) Well Pump Uncommanded Start Alarm
04	OK	(S) Well Pump Uncommanded Stop Alarm
05	OK	Well Pump Starter No Power
06	OK	Well Pump Left In Local For 30 min
07	OK	Well Pump Starter Fault Alarm
08	OK	Well Level Near MPL Alarm
09	OK	Well Pump Daily Flow Near Permit Alarm
10	OK	Well Pump Flow Near Permit Alarm
11	OK	Well Pump Shutdown on Interlock Alarm
12	OK	Well Pump E-Stop Pressed Alarm

Legend:
● Enabled
● Disabled

(S) = Special Case: Virtual alarms masked on power outage. Virtual alarms also act as interlocks & require reset.

Better Pop-Up Windows – motorized valve

Water St. Well - WWS

ADMIN is logged in

MENU

7:10:16 PM
02/10/2018

Auto Control Status PRODUCING

UV Cooling Valve

Control Source

M Manual

A Auto

SCADA Manual CMDs

Open

Close

No Position Feedback

AUTO ACTIVE CMD

MAN ACTIVE CMD

Show/Hide

Building & Security

Well Level 24.16 m

-12.50 m Static

-27.40 m Drawdown

-36.62 m MPL

-39.62 m Intake

-59.40 m Bottom (as of Aug 30, 2017)

UV Cooling Valve NOT WARMED UP

Setpoint **45.00** mJ/cm2

Safety Factor **4.50** mJ/cm2

CV **0.00** mJ/cm2

Hypo Pump On

(0-3.78 L/hr)

Cmd **29.33** %

CV **29.39** %

Speed Adjust

▲ 0.5%

▼ 0.5%

Hypo Tank 73%

535L of 750L

0.902m

UNDERGROUND CONTACT TANK 47 m3

Verney Tower Level ???? m

Clair Tower Level 8.78 m

Station Permissives

Flows & Runtimes

List of Alarms

Hypo Setpoints

Station Setpoints

Interlock Setpoints

CT Calculator

Online CT Calculator

CT Minimum **4.00**

CT Achieved **27.88**

Valid **YES** CT Met **YES**

Chlorine Residual

High Interlock **2.50** mg/L

POE Target **1.00** mg/L

Low Interlock **0.50** mg/L

Last 2 Hours

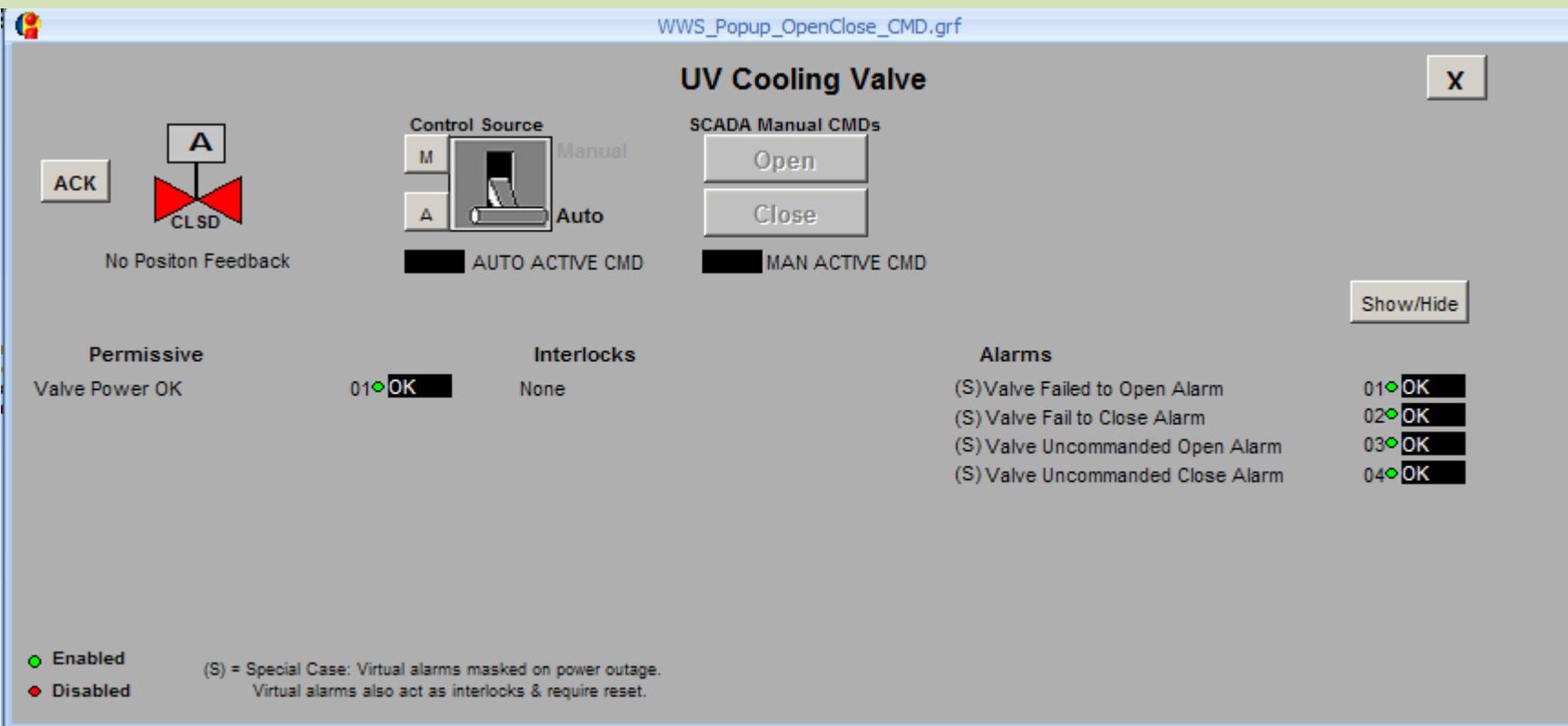
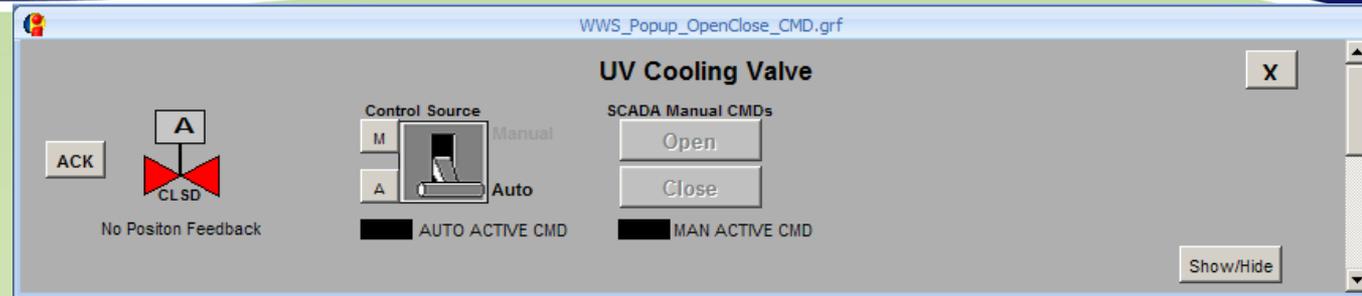
Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description

Total Alarms: 0
Filter: Area In "WWS" AND Tagname = "WWS"
Sort: Time In, Descending
Run

SCADA Current Trends & Opportunities
 Halton Region SCADA Seminar - June 21, 2019 - Oakville, ON, Canada

72

Better Pop-Up Windows - Motorized Valves



Better Pop-Up Windows – hypo dosing pump

Water St. Well - WWS

7:11:35 PM
02/10/2018

Auto Control Status **PRODUCING**

Station OK to Auto Run **READY**

Auto Run Mode **JUST RUN**

Control Mode **MODE 1**
Mode 1: Treatment by c
Mode 2: Treatment by c

Station Auto Enable **ENABLED**

WWS Hypo Pump

Cmd **29.44** %
 CV **29.47** %

Control Source
 Manual
 Auto

SCADA Manual CMDs

Runtimes
 This Cycle **27.7** hr
 Tube (Resettable) **2227.4** hr
 Pump (Resettable) **239.5** hr
 Cumulative **239.4** hr

Tube HI Setpoint hr

Tube HIHI Setpoint hr

Permissives

Facility Power OK

Hypo Pump Power OK

Interlocks (Reset Required)

01 OK Hypo Pump Fault

02 OK Hypo Pump Tube Leak Fault

Man. Auto

01 OK OK

02 OK OK

Alarms

(S) Hypo Pump Fail to Start Alarm OK

(S) Hypo Pump Fail to Stop Alarm OK

(S) Hypo Pump Uncommanded Start Alarm OK

(S) Hypo Pump Uncommanded Stop Alarm OK

Hypo Pump No Power Alarm OK

Hypo Pump Left in Local (5 min) Alarm OK

Hypo Pump Fault Alarm OK

(S) Hypo Pump Speed Deviation Alarm OK

Hypo Pump Tube Runtime HIHI Alarm OK

Hypo Pump Tube Runtime HI Alarm OK

Hypo Pump Left in Man. 10 min Alarm OK

Hypo Pump Tube Leak Fault Alarm OK

Hypo Pump Shutdown on Interlock Alarm OK

Hypo Pump Speed Bad Signal Alarm OK

Building & Security

Security Armed **ARMED**

Intrusion Alarm **OK**

Trouble Status **OK**

Door Status **CLOSED**

Building Temp **22.4** DegC

Station Power **OK**

Building Amps **33.2** A **35.0** kW

Station Permissives

Flows & Runtimes

List of Alarms

Hypo Setpoints

Station Setpoints

Interlock Setpoints

CT Calculator

Zone 1

Level **?????** m

Level **8.72** m

Online CT Calculator

CT Minimum **4.00**

CT Achieved **27.93**

Valid **YES** CT Met **YES**

Chlorine Residual

High Interlock **2.50** mg/L

POE Target **1.00** mg/L

Low Interlock **0.50** mg/L

Last 2 Hours

Well Pump

Column tube solenoid opens for 60 sec on startup

7.75 psi Not Yet Installed

-517 kPa

50 HP

On

0.00

38%

-38.80

-24.18 m

-12.50 m Static

-27.40 m Drawdown

-36.62 m MPL

-38.62 m Intake

-58.40 m Bottom (as of Aug 30, 2017)

Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description

Total Alarms: 0 | Filter: Area In "WWS" AND Tagname = "WWS*" | Sort: Time In, Descending | Run

Station On **27.6** Hrs

Station Off **0.0** Hrs

Pen

- Well Level
- Discharge Flow
- Post Chlorine Residual
- Pre Chlorine Residual
- Verney Tower Level
- Clair Tower Level

Better Pop-Up Windows – UV System



Water St. Well - WWS

ADMIN

is logged in

MENU

7:10:51 PM
02/10/2018

Auto Control Status **PRODUCING**

Water St. Well UV

UV System

NOT WARMED UP

A

Control Source: Manual / Auto

STOP AUTO CMD / STOP MAN CMD

SCADA Manual CMDs: Start / Stop

Runtimes

This Run Cycle: 0.0 hr

Lamp 1 Runtime: 824.0 hr

Lamp 2 Runtime: 824.0 hr

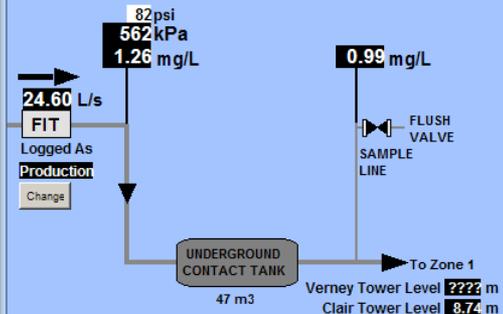
Lamp 3 Runtime: 2186.0 hr

Lamp 4 Runtime: 2186.0 hr

UV Dose CV: 0.05 mJ/cm²

Permissives	Interlocks (Reset Required)	Man. Auto	Alarms
Facility Power OK	01 OK UV Critical Alarm Interlock	01 OK OK (S) UV Fail to Start Alarm	01 OK
UV System Power OK	02 OK UV Major Alarm Interlock	02 OK OK (S) UV Fail to Stop Alarm	02 OK
	UV PLC-to-PLC Comms Loss Interlock	03 OK OK (S) UV Uncommanded Start Alarm	03 OK
Cooling Valve in Auto	04 OK UV Low Dose Interlock	04 OK OK (S) UV Uncommanded Stop Alarm	04 OK
	UV Lamp 1 Runtime Interlock	05 OK OK UV System No Power	05 OK
	UV Lamp 2 Runtime Interlock	06 OK OK UV Left In Local For 30 min	06 OK
	UV Lamp 3 Runtime Interlock	07 OK OK UV Shutdown on Interlock Alarm	07 OK
	UV Lamp 4 Runtime Interlock	08 OK OK UV Dose Bad Signal Alarm	08 OK
	UV Dose Bad Signal Interlock	09 OK OK UV Minor Alarm	09 OK

(S) = Special Case: Virtual alarms masked on power outage. Virtual alarms also act as interlocks & require reset.



Building & Security

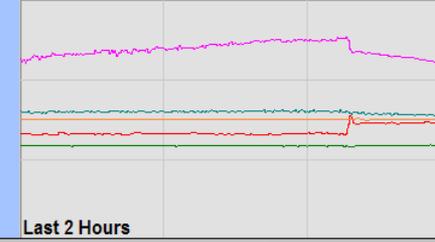
- Security Armed **ARMED**
- Intrusion Alarm **OK**
- Trouble Status **OK**
- Door Status **CLOSED**
- Building Temp **22.4** DegC
- Station Power **OK**
- Building Amps **33.3** A **34.9** kW

- Station Permissives
- Flows & Runtimes
- List of Alarms
- Hypo Setpoints
- Station Setpoints
- Interlock Setpoints
- CT Calculator

Online CT Calculator

Chlorine Residual

- CT Minimum **4.00**
- CT Achieved **28.11**
- Valid **YES** CT Met **YES**
- High Interlock **2.50** mg/L
- POE Target **1.00** mg/L
- Low Interlock **0.50** mg/L



PLC Reset

Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description
Total Alarms: 0								
Filter: Area In "WWS" AND Tagname = "WWS"					Sort: Time In, Descending		Run	

Station On **27.6** Hrs

Station Off **0.0** Hrs



Better Pop-Up Windows – UV System specific alarms



Water St. Well - WWS

ADMIN

is logged in

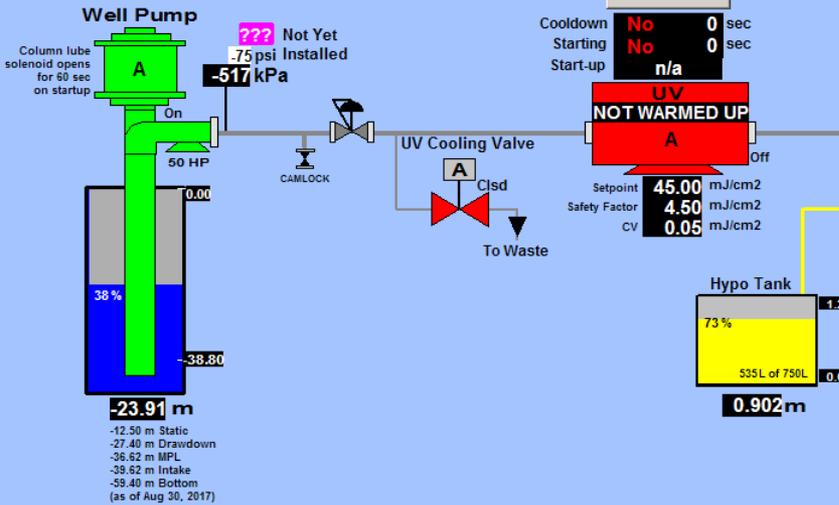
MENU

7:11:10 PM
02/10/2018

Auto Control Status **PRODUCING**
 Station OK to Auto Run **READY**
 Auto Run Mode **JUST RUN**
 Control Mode **MODE 1** Mode 1: Treatment by contact only
 Mode 2: Treatment by contact and UV
 Station Auto Enable **ENABLED**

EN DIS

Building & Security
 Security Armed **ARMED**
 Intrusion Alarm **OK**
 Trouble Status **OK**



Water St. UV Alarms

Critical Alarms		Major Alarms		Minor Alarms	
Ballast Temperature High	01 (UV) N/A	UV Low Dose	01 OK	UV Sensor 1 Signal Saturation	01 OK
Low Water Level	02 OK	Lamp 1 Failure	02 OK	UV Sensor 2 Signal Saturation	02 OK
Reactor Temperature High	03 OK	Lamp 2 Failure	03 OK	UV Sensor 3 Signal Saturation	03 OK
Wiper Revolution Sensor Fault	04 OK	Lamp 3 Failure	04 OK	UV Sensor 4 Signal Saturation	04 OK
Wiper Travel Time Exceeded	05 OK	Lamp 4 Failure	05 OK	UV Sensor 1 Calibration Required	05 OK
Wiper Home Limit Fault	06 (UV) N/A	Ballast 1 Failure	06 OK	UV Sensor 2 Calibration Required	06 OK
Multiple Ballast Failure	07 OK	Ballast 2 Failure	07 OK	UV Sensor 3 Calibration Required	07 OK
Multiple Lamp Failure	08 OK	Ballast 3 Failure	08 OK	UV Sensor 4 Calibration Required	08 OK
Dust Cap Off Alarm	09 OK	Ballast 4 Failure	09 OK	Note: The UV will report a grouped minor alarm if there is an unacknowledged alarm on the UV panel.	
UV E-Stop Active	10 OK	UV Sensor 1 Signal Loss	10 OK		
Low Flow Rate	11 (UV) N/A	UV Sensor 2 Signal Loss	11 OK		
Board Comms Time Out	12 (UV) N/A	UV Sensor 3 Signal Loss	12 OK		
		UV Sensor 4 Signal Loss	13 OK		

UV = Alarm appears on UV Control Panel only

Lamps	Runtimes	Warning (1s)	Shutdown (1s)	Limit
	CURRENT VALUE	STATUS	SETPOINT	MAX FROM PERMIT
Lamp 1	824 Hrs	●	4500	5000
Lamp 2	824 Hrs	●	4995	5000
Lamp 3	2186 Hrs	●		
Lamp 4	2186 Hrs	●		

LEGEND

- ENABLE DISABLE BUTTON
- ENABLE DISABLE STATUS
- SETPOINT
- IF SPECIAL TIME DELAY
- INTERLOCK/ALARM STATUS (PINK = ACTIVE)
- Enabled ● Disabled

PLC Reset

Last 2 Hours

Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description
Total Alarms: 0								
Filter: Area In "WWS" AND Tagname = "WWS"						Sort: Time In, Descending		
Run								

Pen

- Well Level
- Discharge Flow
- Post Chlorine Residual
- Pre Chlorine Residual
- Verney Tower Level
- Clair Tower Level

Station On **27.6 Hrs**
 Station Off **0.0 Hrs**

Pump Runtimes

Auto Control Status
Station OK to Auto Run
Auto Run Mode
Control Mode
Station Auto Enable

Water St. Well Daily Flow & Runtime Data

MENU
7:06:46 PM
02/10/2018

Well Pump

Run Cycle Runtime	27.6 hr
Cumulative Runtime	239.4 hr
Motor Runtime Resettable	239.4 hr <input type="button" value="Reset"/>
Pump Runtime Resettable	239.4 hr <input type="button" value="Reset"/>

Volume Pumped - Today	1568 m3
Volume Pumped - Yesterday	961 m3
Volume Reverse - Today	0 m3
Volume Reverse - Yesterday	47 m3
Volume Net - Today	1568 m3
Volume Net - Yesterday	915 m3

Hypo Pump

Run Cycle Runtime	27.6 hr
Cumulative Runtime	239.3 hr
Pump Runtime Resettable	239.4 hr <input type="button" value="Reset"/>
Tube Runtime Resettable	2227.4 hr <input type="button" value="Reset"/>

Run Cycle Runtime	0.0 hr
Cumulative Runtime	210.5 hr
System Runtime Resettable	210.6 hr <input type="button" value="Reset"/>

UV System

Lamp 1 (resettable on UV)	824.0 hr
Lamp 2 (resettable on UV)	824.0 hr
Lamp 3 (resettable on UV)	2186.0 hr
Lamp 4 (resettable on UV)	2186.0 hr

Well Pump

Column lube solenoid opens for 60 sec on startup

50 HP

0.00

38%

-38.80

-24.11 m

-12.50 m Static
-27.40 m Drawdown
-56.62 m MPL
-39.62 m Intake
-59.40 m Bottom (as of Aug 30, 2017)

Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description

Total Alarms: 0

Filter: Area In "WWS" AND Tagname = "WWS"

Sort: Time In, Descending

Building & Security

Security Armed **ARMED**

Fire Alarm **OK**

Door Status **OK**

Door Status **CLOSED**

Room Temp **22.4** DegC

Room Power **OK**

Room Amps **33.3** A **35.0** kW

Chlorine Residual

High Interlock **2.50** mg/L

POE Target **1.00** mg/L

Low Interlock **0.50** mg/L

Last 2 Hours

Station On **27.5** Hrs

Station Off **0.0** Hrs

Status Information on Sequences

Auto Control Status **PRODUCING**

Station OK to Auto Run **READY**

Auto Run Mode **JUST RUN**

Control Mode **MODE 1** Mode 1: Mode 2:

Station Auto Enable **ENABLED**

EN DIS

WWS_Setpoints.grf

Station Setpoints X

Station Mode Select

Just Run

ENABLED

Control Mode

MODE 1 Mode 1 Mode 2

Mode 1: Treatment by contact only
Mode 2: Treatment by contact and UV

Start Up Sequence

	Time Delay	Time Elapsed	Pre Contact Min	Post Contact Min
Idle 00	00	0.0		
Flushing 01	<input type="text" value="1.0"/> minutes	<input type="text" value="0.0"/> minutes		
Cl Check+ Flush 02	<input type="text" value="30"/> sec	<input type="text" value="0"/> sec	<input type="text" value="0.50"/> mg/L	<input type="text" value="0.50"/> mg/L
UV Warming Up 03	Only Applies to Mode 2			
Producing 04				
Wait/No Permissive 05				

Note: Well Pump Starter opens water lube solenoid for 60sec before start.

	Time Delay	Time Elapsed
Allowable Startup Time	<input type="text" value="20.0"/> minutes	<input type="text" value="0.0"/> minutes

If allowable startup time expires while in States 1, 2, 3, or 4, it will auto shutdown by going to state 0. To restart it, click Station Auto Enable "EN" button.

Current Time From PLC

19:14

Current Day From PLC

TUESDAY

7:06:46 PM
02/10/2018

Building & Security

Security Armed **ARMED**

Intrusion Alarm **OK**

Trouble Status **OK**

Door Status **CLOSED**

Building Temp **22.4** DegC

Station Power **OK**

Building Amps **33.3** A **35.0** kW

Station Permissives

Flows & Runtimes

List of Alarms

Hypo Setpoints

Station Setpoints

Interlock Setpoints

CT Calculator

Online CT Calculator

Chlorine Residual

CT Minimum **4.00**

CT Achieved **27.60**

Valid **YES** CT Met **YES**

High Interlock **2.50** mg/L

POE Target **1.00** mg/L

Low Interlock **0.50** mg/L

2 Hours

Pen

- Well Level
- Discharge Flow
- Post Chlorine Residual
- Pre Chlorine Residual
- Verney Tower Level
- Clair Tower Level

Station On **27.5** Hrs

Station Off **0.0** Hrs

Well Pump A

Column lube solenoid opens for 60 sec on startup

50 HP

0.00

38%

-38.80

-24.11 m

-12.50 m Static

-27.40 m Drawdown

-36.82 m MPL

-39.82 m Intake

-59.40 m Bottom (as of Aug 30, 2017)

PLC Reset

Total Alarms: 0

Filter: Area In "WWS" AND Tagname = "WWS"

Sort: Time In, Descending

Run

Building & Security Information

Water St. Well - WWS

GUEST is logged in

MENU

7:06:46 PM
02/10/2018

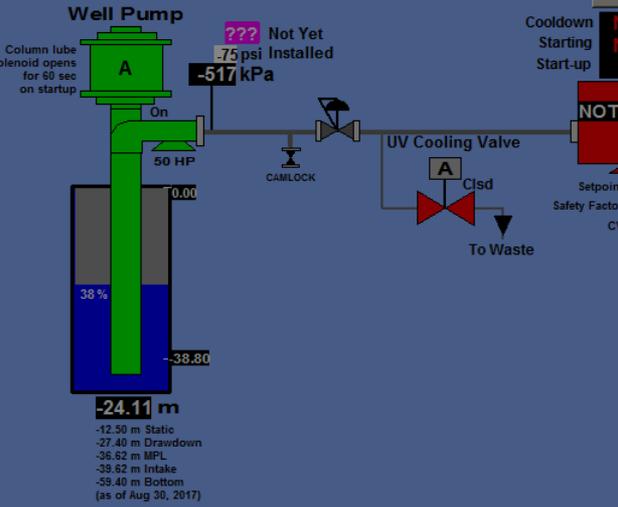
Auto Control Status **PRODUCING**
 Station OK to Auto Run **READY**
 Auto Run Mode **JUST RUN**
 Control Mode **MODE 1** Mode 1: Treatment by contact only
 Mode 2: Treatment by contact and UV
 Station Auto Enable **ENABLED**

Building & Security
 Security Armed **ARMED**
 Intrusion Alarm **OK**
 Trouble Status **OK**
 Door Status **CLOSED**
 Building Temp **22.4** DegC
 Station Power **OK**
 Building Amps **33.3** A **35.0** kW

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02/10/2018

Building & Security
 Security Armed **ARMED**
 Intrusion Alarm **OK**
 Trouble Status **OK**
 Door Status **CLOSED**
 Building Temp **22.4** DegC
 Station Power **OK**
 Building Amps **33.2** A **34.9** kW

Station Permissives



Station Permissives

Flows & Runtimes

List of Alarms

Hypo Setpoints

Station Setpoints

Interlock Setpoints

CT Calculator

Online CT Calculator

Chlorine Residual

CT Minimum **4.00**
 CT Achieved **27.60**
 Valid **YES** CT Met **YES**

High Interlock **2.50** mg/L
 POE Target **1.00** mg/L
 Low Interlock **0.50** mg/L

-To Zone 1
 Level **???** m
 Level **8.88** m

Last 2 Hours

PLC Reset

Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description
Total Alarms: 0								
Filter: Area In "WWS" AND Tagname = "WWS"					Sort: Time In, Descending		Run	

Pen

- Well Level
- Discharge Flow
- Post Chlorine Residual
- Pre Chlorine Residual
- Verney Tower Level
- Clair Tower Level

Station On **27.5** Hrs
 Station Off **0.0** Hrs

Online CT Calculator – drinking water treatment

Water St. Well - WWS

GUEST is logged in
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Auto Control Status: **PRODUCING**

Station OK to Auto Run: **READY**

Auto Run Mode: **JUST RUN**

Control Mode: **MODE 1** (Mode 1: Treatment, Mode 2: Treatment)

Station Auto Enable: **ENABLED** (EN | DIS)

PLC Reset

Water St. Well CT Calculator

Temperature: **8.00** (deg C) Constant

pH: **7.00** (pH) Constant

CT Required (2log): **3.52** (min * mg/L) (From Table)

CT Required (4log): **7.04** (min * mg/L) (From Table)

CT Required: **4.00** (min * mg/L) (Guelph Standard)

CT Minimum: **4.00** (min * mg/L)

Current Volume: **47.00** (m3)

Residual: **1.25** (mg/L)

Flow: **24.57** (L/S)

Baffle Factor: **0.70** (Ratio, From Table)

CT Achieved: **27.90** (min * mg/L)

CT Valid: **YES**

CT Met: **YES**

X

Building & Security

Security Armed: **ARMED**

Intrusion Alarm: **OK**

Trouble Status: **OK**

Door Status: **CLOSED**

Building Temp: **22.4** DegC

Station Power: **OK**

Building Amps: **33.3** A 35.0 kW

Station Permissives

Flows & Runtimes

List of Alarms

Hypo Setpoints

Station Setpoints

Interlock Setpoints

CT Calculator

Zone 1

Level: **2.222** m

Level: **8.88** m

Online CT Calculator

CT Minimum: **4.00**

CT Achieved: **27.60**

Valid: **YES** CT Met: **YES**

Chlorine Residual

High Interlock: **2.50** mg/L

POE Target: **1.00** mg/L

Low Interlock: **0.50** mg/L

Last 2 Hours

Station On: **27.5** Hrs

Station Off: **0.0** Hrs

Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description

Total Alarms: 0 | Filter: Area In "WWS" AND Tagname = "WWS" | Sort: Time In, Descending | Run

Station Permissives

Auto Control Status **PRODUC**
 Station OK to Auto Run **READY**
 Auto Run Mode **JUST RUN**
 Control Mode **MODE 1**
 Station Auto Enable **ENABLED**

Well Pump
 Column lube solenoid opens for 60 sec on startup
 ??? Not Yet Installed
 -75 psi
 -517 kPa
 50 HP
 CAMLOCK
 0.00
 38%
 -38.80
 -24.11 m
 -12.50 m Static
 -27.40 m Drawdown
 -56.62 m MPL
 -39.62 m Intake
 -59.40 m Bottom (as of Aug 30, 2017)

PLC Reset

Ack	Date In	Time In	Time Last

Total Alarms: 0

WWS_Permissives.grf

Water St. Well Station Auto Permissives

Station Auto Control Permissives

Facility Power OK for 60sec	01	OK
Pre Contact Chlorine Analyzer No Bad Signal	02	OK
Well Pump Flow No Bad Signal	03	OK
UV Cooling Valve in Auto	04	OK
UV System in Auto	05	OK
Discharge Pressure No Bad Signal	06	OK
UV Dose Feedback No Bad Signal	07	OK
Post Contact Chlorine Analyzer No Bad Signal	08	OK
Hypo Pump in Auto	09	OK
Hypo Pump Speed Feedback No Bad Signal	10	OK
Well Level No Bad Signal	11	OK
Well Pump Not Interlocked	12	OK
Hypo Pump Not Interlocked	13	OK
UV System Not Interlocked	14	OK
UV Cooling Valve Not Interlocked	15	OK
Well Pump In Auto and Starter Has Power	16	OK

Global Chlorine Interlocks (Reset Required)

Interlock	Grouped	Setpoint
Post Contact Chlorine Low Interlock	01	0.50 mg/L
Post Contact Chlorine High Interlock	02	2.50 mg/L
Post Contact Chlorine Analyzer Bad Signal Interlock	03	
Post Contact Chlorine Analyzer Fault Interlock	04	
Pre Contact Chlorine Low Interlock	05	0.50 mg/L
Pre Contact Chlorine High Interlock	06	2.50 mg/L
Pre Contact Chlorine Analyzer Bad Signal Interlock	07	
Pre Contact Chlorine Analyzer Fault Interlock	08	
Pre Contact Chlorine Hardwired Interlock	09	

logged in MENU 7:06:46 PM 02/10/2018

Building & Security

Security Armed	ARMED
Intrusion Alarm	OK
Trouble Status	OK
Door Status	CLOSED
Building Temp	22.4 DegC
Station Power	OK
Building Amps	33.3 A 35.0 kW

Station Permissives
 Flows & Runtimes
 List of Alarms
 Hypo Setpoints
 Station Setpoints
 Interlock Setpoints
 CT Calculator

mg/L
 FLUSH VALVE
 MPLE
 To Zone 1
 wer Level 2.22 m
 wer Level 8.88 m

Online CT Calculator
 CT Minimum 4.00
 CT Achieved 27.60
 Valid YES CT Met YES

Chlorine Residual
 High Interlock 2.50 mg/L
 POE Target 1.00 mg/L
 Low Interlock 0.50 mg/L

Last 2 Hours

Pen
 Well Level
 Discharge Flow
 Post Chlorine Residual
 Pre Chlorine Residual
 Verney Tower Level
 Clair Tower Level

Station On 27.5 Hrs
 Station Off 0.0 Hrs

Well Permit Values, Warnings and Interlocks

Auto Control Status
Station OK to Auto Run
Auto Run Mode
Control Mode
Station Auto Enable

Well Pump A

Column lube solenoid opens for 60 sec on startup

On

50 HP

0.00

38%

-38.80

-24.11 m

-12.50 m Static

-27.40 m Drawdown

-36.82 m MPL

-39.62 m Intake

-59.40 m Bottom

(as of Aug 30, 2017)

PLC Reset

Ack	Date In	Time In

Total Alarms: 0

WWS_ILCK_Setpoints.grf

Water St. Well Interlock Setpoints

Well Permits

	CURRENT VALUE	Warning (60s) STATUS SETPOINT	Shutdown (60s) STATUS SETPOINT	Limit MPL FOR WELL	PROBE DEPTH
Well Level - Max Pumping Level (MPL)	-23.88 m	34.00	35.00	36.62	38.80

Note: If the MPL shutdown interlock is disabled, it also disables the well level bad signal interlock.

	CURRENT VALUE	Warning (60s) STATUS SETPOINT	Shutdown (60s) STATUS SETPOINT	Limit PERMIT / 24 hrs
Well Pump - Max Flow Rate (FH)	24.62 L/s	34.0	37.88	37.88

	CURRENT VALUE	Warning (60s) STATUS SETPOINT	Shutdown (1s) STATUS SETPOINT	Limit FROM PERMIT
Well Pump - Max Daily Flow (FQH)	1579 m3	6500	6546	6546

Chlorine Interlock

PRE CONTACT CURRENT VALUE	LOW INTERLOCK	HIGH INTERLOCK
1.25 mg/L	0.50 mg/L	2.50 mg/L

POST CONTACT CURRENT VALUE: 0.99 mg/L

UV Dose Interlock

CURRENT VALUE	LOW INTERLOCK
0.00 mJ/cm2	42.00 mJ/cm2

The UV has a built in automatic shutdown for low dose. This interlock is an extra shutdown just in case.

HOW TO RESET THE SHUTDOWN ALARMS

- 1) Well Level MPL shutdown: reset on pump screen
- 2) Well Max Flow Rate shutdown: pump reset or midnight
- 3) Well Max Daily Flow: resets at midnight

LEGEND

- ENABLE DISABLE BUTTON
- ENABLE DISABLE STATUS
- SETPOINT
- IF SPECIAL TIME DELAY INTERLOCK/ALARM STATUS (PINK = ACTIVE)
- Enabled (Green dot) Disabled (Red dot)

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02/10/2018

Building & Security

Security Armed	ARMED
Intrusion Alarm	OK
Door Status	OK
Door Status	CLOSED
Building Temp	22.4 DegC
Generator Power	OK
Building Amps	33.3 A 35.0 kW

Station Permissives

Flows & Runtimes

List of Alarms

Hypo Setpoints

Station Setpoints

Interlock Setpoints

CT Calculator

Chlorine Residual

High Interlock	2.50 mg/L
POE Target	1.00 mg/L
Low Interlock	0.50 mg/L

Pen

- Well Level
- Discharge Flow
- Post Chlorine Residual
- Pre Chlorine Residual
- Vernay Tower Level
- Clair Tower Level

Station On: 27.5 Hrs
Station Off: 0.0 Hrs

Well Permits – for all sites

Well Warnings/Limits

ADMIN

is logged in

MENU

7:18:52 PM
02/10/2018

Wells	Well Level - Max Pumping Level (MPL)				Well Pump - Max Flow Rate (FH)				Well Pump - Max Daily Flow (FQH)				POE / Booster Pumps - Max Daily Flow (FQH)			
	Well Level CURRENT VALUE	Warning (60s) STATUS SETPOINT	Shutdown (60s) STATUS SETPOINT	Limit MPL FOR WELL	Flow Rate CURRENT VALUE	Warning (60s) STATUS SETPOINT	Shutdown (60s) STATUS SETPOINT	Ops Limit (PERMIT / 24 Hrs)	Flow Total Today CURRENT VALUE	Warning (60s) STATUS SETPOINT	Shutdown (1s) STATUS SETPOINT	Limit FROM PERMIT	Flow Total Today CURRENT VALUE	Warning (60s) STATUS SETPOINT	Shutdown (1s) STATUS SETPOINT	Limit FROM PERMIT
Calico	-35.00 m	● -32.00	● -33.00	-33.50	0.00 L/s	● 55	● 61	61	0 m3	● 5000	● 5237	5237	0 m3	● 5000	● 5237	5237
Helmar	-42.18 m	● -44.00	● -45.00	-45.00	11.80 L/s	● 35	● 38	38	637 m3	● 3000	● 3273	3273	654 m3	● 3000	● 3273	3273
Burke	???? m	● ????	● ????	????	???? L/s	● ????	● ????	????	???? m3	● ????	● ????	????	???? m3	● ????	● ????	????
Downey	-14.92 m	● -34.00	● -35.60	-35.60	0.00 L/s	● 58	● 61	61	0 m3	● 5000	● 5237	5237	0 m3	● 5000	● 5237	5237
Dean	-26.13 m	● -45.00	● -46.50	-46.50	0.00 L/s	● 22	● 27	27	1057 m3	● 2200	● 2300	2300	1069 m3	● 2200	● 2300	2300
Emma	???? m	● ????	● ????	????	???? L/s	● ????	● ????	????	???? m3	● ????	● ????	????	???? m3	● ????	● ????	????
Membro	-16.92 m	● -31.00	● -32.80	-32.80	0.00 L/s	● 60	● 70	70	0 m3	● 5500	● 6050	6050	0 m3	● 5500	● 6050	6050
Park 1	NOT INSTALLED	● -48.00	● -45.70	-45.70	56.30 L/s	● 59	● 60	60	3892 m3	● 5000	● 5150	5150	PARK WELLS FEED ONE RESERVOIR			
Park 2	-29.83 m	● -48.00	● -45.70	-45.70	0.00 L/s	● 59	● 60	60	1240 m3	● 5000	● 5150	5150	PARK HAS ONLY ONE POE (FEED BY TWO BOOSTER PUMPS)			
Park 1+2					56.27 L/s	● 110	● 119	119	5131 m3	● 9000	● 10000	10000	5225 m3	● 9000	● 10300	10300
Water Street	-24.01 m	● -34.00	● -35.00	-34.00	24.57 L/s	● 34	● 38	34	1585 m3	● 6500	● 6546	6500	WATER ST WELL PUMP GOES DIRECT TO SYSTEM. NO BOOSTER PUMP.			
Queensdale	-42.56 m	● -48.00	● -50.30	-50.30	0.00 L/s	● 55	● 61	61	735 m3	● 5000	● 5237	5237	713 m3	● 5000	● 5237	5237
Paisley	-22.88 m	● -28.00	● -30.20	-30.20	9.84 L/s	● 30	● 37	37	686 m3	● 3000	● 3200	3200	3810 m3	● 11000	● 12000	13738
University	-30.48 m	● -42.00	● -44.70	-54.10	0.00 L/s	● 0	● 0	38	1641 m3	● 3000	● 3300	3300	1627 m3	● 5000	● 5108	5108
Carter 1	-5.39 m	● -7.00	● -8.40	-8.40	41.27 L/s	● 48	● 49	50	2869 m3	● 3000	● 3273	3273	WoodsPOE			
Carter 2	-3.77 m	● -8.00	● -9.10	-9.10	27.19 L/s	● 38	● 45	50	1890 m3	● 3000	● 3273	3273	28094 m3	● 60000	● 65000	65000
Carter 1+2					68.46 L/s	● 76	● 76	76	4759 m3	● 6200	● 6546	6546	HOW TO RESET THE SHUTDOWN ALARMS			
Arkell 1	-6.04 m	● -9.00	● -10.00	-10.00	0.00 L/s	● 35	● 38	38	0 m3	● 3000	● 3273	3273	1) Well Level MPL shutdown: reset on pump screen			
Arkell 6	-19.80 m	● -32.00	● -32.20	-32.20	86.02 L/s	● 100	● 111	111	5797 m3	● 9300	● 9600	9600	2) Well Max Flow Rate shutdown: pump reset or midnight			
Arkell 7	-20.02 m	● -28.00	● -29.90	-29.90	84.17 L/s	● 100	● 111	111	5741 m3	● 9300	● 9600	9600	3) Well Max Daily Flow: resets at midnight			
Arkell 8	-21.22 m	● -28.00	● -29.50	-29.50	0.00 L/s	● 100	● 111	111	1989 m3	● 9300	● 9600	9600	4) POE / Booster Max Daily Flow: resets at midnight			
Arkell 14	-13.00 m	● -28.80	● -29.90	-29.90	0.00 L/s	● 100	● 111	111	795 m3	● 9300	● 9600	9600	LEGEND			
Arkell 15	-8.27 m	● -11.00	● -12.80	-12.80	84.82 L/s	● 100	● 111	111	5830 m3	● 9300	● 9600	9600	 ENABLE DISABLE BUTTON ENABLE DISABLE STATUS SETPOINT IF SPECIAL TIME DELAY INTERLOCK/ALARM STATUS (PINK = ACTIVE)			
6+7+8+14+15					254.96 L/s	● 300	● 333	333	20146 m3	● 25000	● 28800	28800	Note: Arkell total flow interlocks only affect Auto Control			
Glen Collector					119.93 L/s	● 250			Glen	8347 m3	● 25000					

Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description
✓	02/10/2018	10:55:14.273	10:55:14.273	WDSCADA	DOB00100EPP	CFN	ALARM	Downey Well Pump Power Monitor
✓	29/09/2018	12:54:05.987	12:54:05.987	WDSCADA	MEBG00100EPP	CFN	ALARM	Membro Well Pump Disconnect Off
✓	29/09/2018	12:54:05.921	12:54:05.921	WDSCADA	MEBG00100EOL	CFN	ALARM	Membro Well Pump Overload Alarm
✓	29/09/2018	12:54:05.921	12:54:05.921	WDSCADA	MEBG00100EGA	CFN	ALARM	Membro Well Pump General Alarm
✓	29/09/2018	12:54:01.935	12:54:01.935	WDSCADA	MEBG00100EPP	CFN	ALARM	Membro Booster Pump Disconnect Off

Total Alarms: 46 Filter: Off Sort: Time In, Descending Run



Logging flow to System vs. Waste – for water balance calcs.



System VS Waste Flow

ADMIN1

ADMIN is logged in

MENU

7:20:50 PM
02/10/2018

TODAY										YESTERDAY											
Station	Current (L/s)	All Flow (m3)	Going To	System (m3)	Waste (m3)	All Flow (m3)	System (m3)	Waste (m3)		Station	Current (L/s)	All Flow (m3)	Going To	System (m3)	Waste (m3)	Recirc (m3)	All Flow (m3)	System (m3)	Waste (m3)	Recirc (m3)	
Arkell 1	0.00	0	SYSTEM	0	0	338	338	0		Burke Booster	????	????		????	????	????	????	????	????	????	????
Arkell 6	86.01	5807	SYSTEM	5808	0	6486	6486	0		Calico Booster	0.00	0	SYSTEM	0	0	0	0	0	0	0	0
Arkell 7	84.18	5751	SYSTEM	5751	0	7344	7344	0		Dean Booster	16.15	1071	SYSTEM	1071	0	0	1340	1340	0	0	0
Arkell 8	0.00	1989	SYSTEM	1989	0	1573	1573	0		Downey Booster	0.00	0	SYSTEM	0	0	0	0	0	0	0	0
Arkell 14	0.00	795	SYSTEM	795	0	1328	1328	0		Helmar Booster	9.90	655	SYSTEM	655	0	0	814	814	0	0	0
Arkell 15	84.74	5840	SYSTEM	5840	0	7323	7323	0		Membro Booster	0.00	0	SYSTEM	0	0	0	0	0	0	0	0
Burke Well	????	????		????	????	????	????	????		Park Booster	62.20	5232	SYSTEM	5232	0	0	6558	6558	0	0	0
Carter Wells	41.26	4766	WASTE	0	4763	5910	0	5908		Queensdale Booster	12.58	714	SYSTEM	714	0	0	888	888	0	0	0
Calico Well	0.00	0	SYSTEM	0	0	0	0	0		University Booster	25.05	1630	SYSTEM	1630	0	0	1992	1993	0	0	0
Dean Well	0.00	1057	SYSTEM	1057	0	1336	1336	0		Woods Booster	373.32	28139	SYSTEM	28139	0	N/A	35677	35677	0	N/A	0
Downey Well	0.00	0	SYSTEM	0	0	0	0	0													
Emma Well	????	????		????	????	????	????	????													
Helmar Well	11.70	638	SYSTEM	638	0	799	0	0													
Membro Well	0.00	0	SYSTEM	0	0	0	0	0		System	Current (L/s)	All Flow (m3)	Going To	System (m3)	Waste (m3)	Recirc (m3)	All Flow (m3)	System (m3)	Waste (m3)	Recirc (m3)	
Paisley Well	9.87	687	SYSTEM	687	0	851	851	0		System Well*	401.11	43184	N/A	38420	4760	N/A	54360	47653	5908	N/A	0
Park Well #1	56.40	3897	SYSTEM	1240	0	4862	1541	0		System Booster*	694.09	37413	N/A	37413	0	0	47270	46456	0	0	0
Park Well #2	0.00	1240	SYSTEM	3898	0	1541	4862	0													
Queensdale Well	0.00	735	SYSTEM	735	0	873	873	0													
University Well	0.00	1641	SYSTEM	1641	0	1836	1836	0													
Water St. Well	24.62	1587	WASTE	1588	0	961	961	0													
Glen Collector	119.81	8358	SYSTEM	8358	0	10309	10309	0													

*Note: Burkes is currently not included in the System Totals

W - To Waste, S - To System, R - To Recirculation

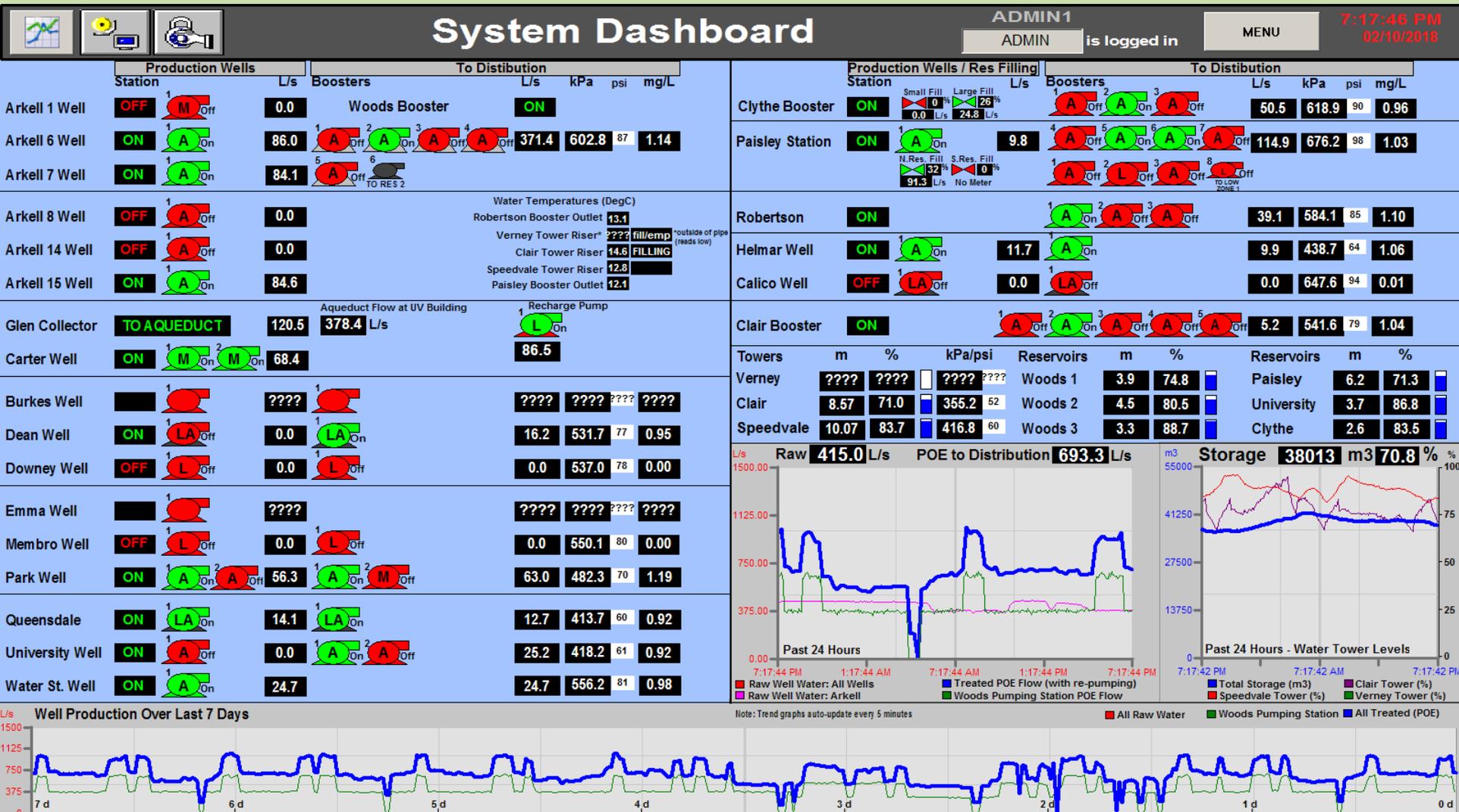
Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description
✓	02/10/2018	10:55:14.273	10:55:14.273	WDSCADA	DOBG00100EPF	CFN	ALARM	Downey Well Pump Power Monitor
✓	29/09/2018	12:54:05.987	12:54:05.987	WDSCADA	MEBG00100EPF	CFN	ALARM	Membro Well Pump Disconnect Off
✓	29/09/2018	12:54:05.921	12:54:05.921	WDSCADA	MEBG00100EOL	CFN	ALARM	Membro Well Pump Overload Alarm

Total Alarms: 46 Filter: Off Sort: Time In, Descending

Run



Dash Board Displays – entire system status at a glance



Dash Board Displays - Weather



Water Temperature and Weather

ADMIN1

ADMIN is logged in

MENU

7:21:51 PM
02/10/2018

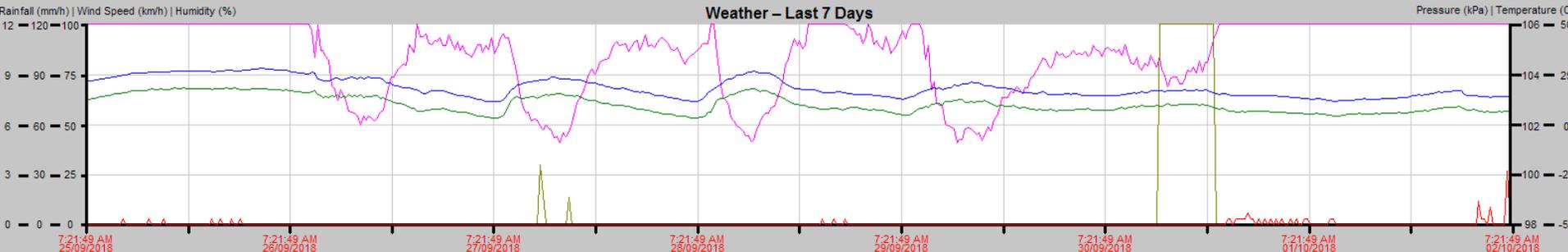
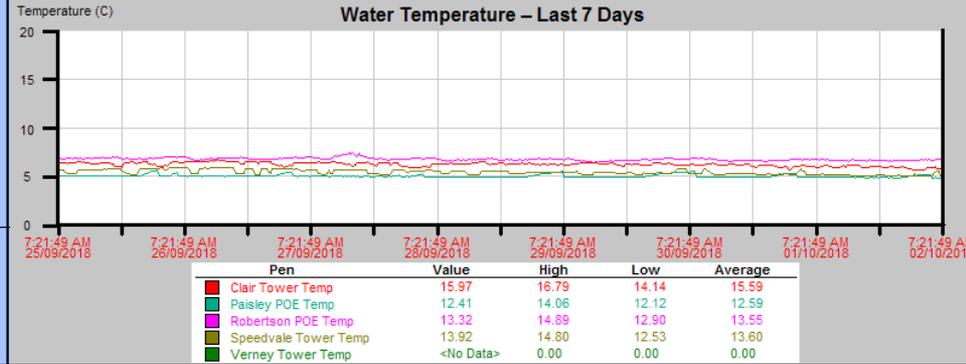
Station Weather		Current	Days Ago							
		Today	1	2	3	4	5	6	7	
Arkell 6	Barometric Pressure	101.7 kPa	102.2	102.9	102.9	102.8	102.2	102.3	102.1	102.3
			Max 101.5	102.2	102.4	102.1	101.6	101.7	102.1	101.3
Arkell 8	Outside Temperature	11.68 DegC	13.63	9.98	10.41	14.20	19.84	16.49	19.45	19.28
			Max 7.25	5.73	6.54	5.30	3.66	3.46	7.35	14.20
	Rainfall	0.00 mm/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Total 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arkell 15	Barometric Pressure	92.7 kPa	94.2	92.5	91.7	96.1	97.0	94.4	91.2	91.8
			Max 91.4	90.0	88.4	86.9	85.5	84.0	83.8	89.5
	Humidity	100.0 %	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
			Max 91.53	100.0	68.50	40.23	39.47	39.13	49.00	100.0
	Outside Temperature	11.35 DegC	14.31	8.71	10.52	13.02	18.30	15.81	18.38	18.47
			Max 5.95	4.23	6.17	4.64	2.88	3.05	6.56	12.15
	Rainfall	0.00 mm/h	18.50	13.25	5.50	0.75	3.25	0.00	1.75	9.75
			Total 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Wind Speed	0.0 km/h	104.9	58.3	177.0	0.0	0.0	177.0	177.0	177.0
			Max 0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Woods	Barometric Pressure	97.6 kPa	100.3	102.3	100.8	100.2	100.9	100.3	98.5	98.9
			Max 0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Outside Temperature	20.53 DegC	22.78	16.75	21.47	21.47	27.02	24.05	28.08	27.12
			Max 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Rainfall	0.00 mm/h	17.50	12.50	1.75	1.00	3.25	0.00	1.75	7.50
			Total 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Water Temperatures

Clair Tower Temp	14.64	DegC
Paisley POE Temp	12.19	DegC
Robertson POE Temp	13.22	DegC
Speedvale Tower Temp	12.80	DegC
Verney Tower Temp	????	DegC

Frozen Services Alarms

Name	Status/Setpoint	Delay	Elapsed
Robertson LO Alarm	6.00 DegC	60.0 min	0.0
Robertson LOLO Alarm	4.00 DegC	60.0 min	0.0



Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description
✓	02/10/2018	10:55:14.273	10:55:14.273	WDESCADA	DOBG00100EPF	CFN	ALARM	Downey Well Pump Power Monitor
✓	29/09/2018	12:54:05.987	12:54:05.987	WDESCADA	MEBG00100EPF	CFN	ALARM	Membro Well Pump Disconnect Off
✓	29/09/2018	12:54:05.921	12:54:05.921	WDESCADA	MEBG00100EOL	CFN	ALARM	Membro Well Pump Overload Alarm
✓	29/09/2018	12:54:05.921	12:54:05.921	WDESCADA	MFRS00100FGA	CFN	ALARM	Membro Well Pump General Alarm

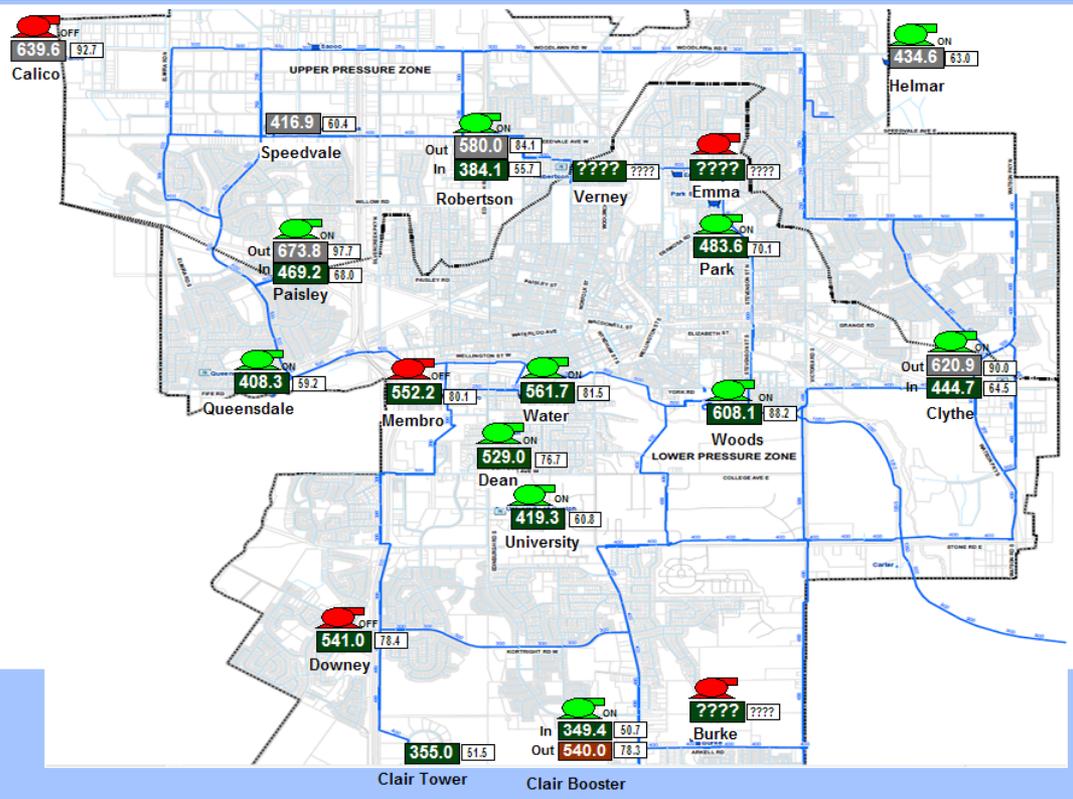
Total Alarms: 39 Filter: Area In "A01,A06,A07,A08,A14,A15,ADV,AKS,AKW,BK" (Sort: Time In, Descending) Run



Dash Board Displays – Pressures Across City




Pressure Map
ADMIN1
ADMIN is logged in
MENU
7:21:34 PM
02/10/2018



LEGEND

- Zone 1
- Zone 2
- Zone 3
- psi
- kPa

Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description
✓	02/10/2018	10:55:14.273	10:55:14.273	WDCSCADA	DOB00100EPF	CFN	ALARM	Downey Well Pump Power Monitor
✓	29/09/2018	12:54:05.987	12:54:05.987	WDCSCADA	MEBG00100EPF	CFN	ALARM	Membro Well Pump Disconnect Off
✓	29/09/2018	12:54:05.921	12:54:05.921	WDCSCADA	MEBG00100EOL	CFN	ALARM	Membro Well Pump Overload Alarm
✓	29/09/2018	12:54:05.921	12:54:05.921	WDCSCADA	MEBG00100EGA	CFN	ALARM	Membro Well Pump General Alarm
✓	29/09/2018	12:54:01.935	12:54:01.935	WDCSCADA	MEBGB0100EPF	CFN	ALARM	Membro Booster Pump Disconnect Off

Total Alarms: 46 Filter: Off Sort: Time In, Descending

Run



A More Complex Site: VFDs, Duty Numbers, etc.

Clair Booster Station

ADMIN1

ADMIN is logged in

MENU

7:22:36 PM

02/10/2018

Building & Security

Security Armed **ARMED**
 Intrusion Alarm **NORMAL**
 Trouble Status **OK**
 Door Open Status **CLOSED**
 Building Low Temp **FUTURE**
 Station Power **OK**
 Building Amps **31.4 A** / **30.6 kW**

SYSTEM STATUS

SYSTEM ALARMS

FLOW TOTALS

HYPO DUTY / SETPOINT

PUMP DUTY / SETPOINT

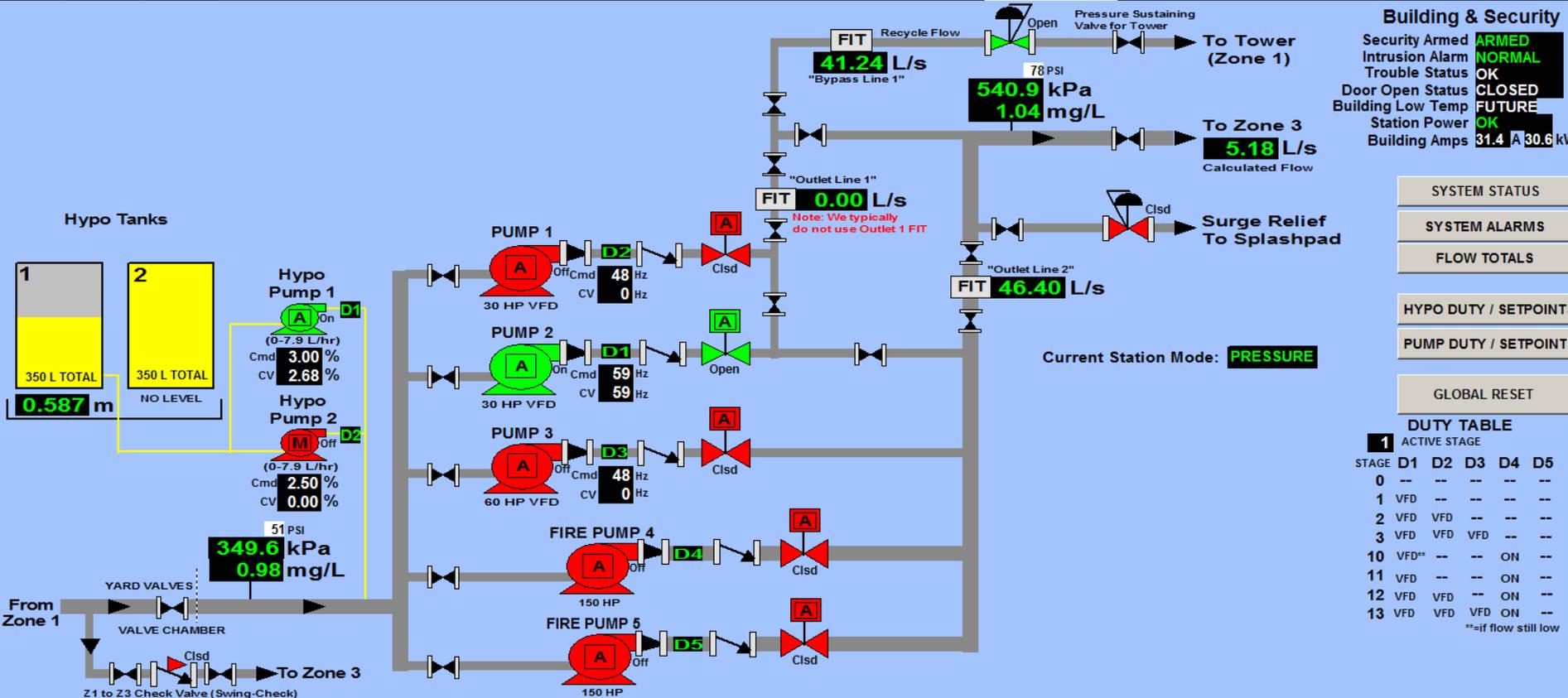
GLOBAL RESET

DUTY TABLE

1 ACTIVE STAGE

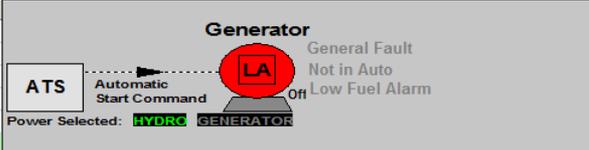
STAGE	D1	D2	D3	D4	D5
0	--	--	--	--	--
1	VFD	--	--	--	--
2	VFD	VFD	--	--	--
3	VFD	VFD	VFD	--	--
10	VFD**	--	--	ON	--
11	VFD	--	--	ON	--
12	VFD	VFD	--	ON	--
13	VFD	VFD	VFD	ON	--

**if flow still low



Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description

Total Alarms: 0 | Filter: Area In "CBS" | Sort: Time In, Descending | Run



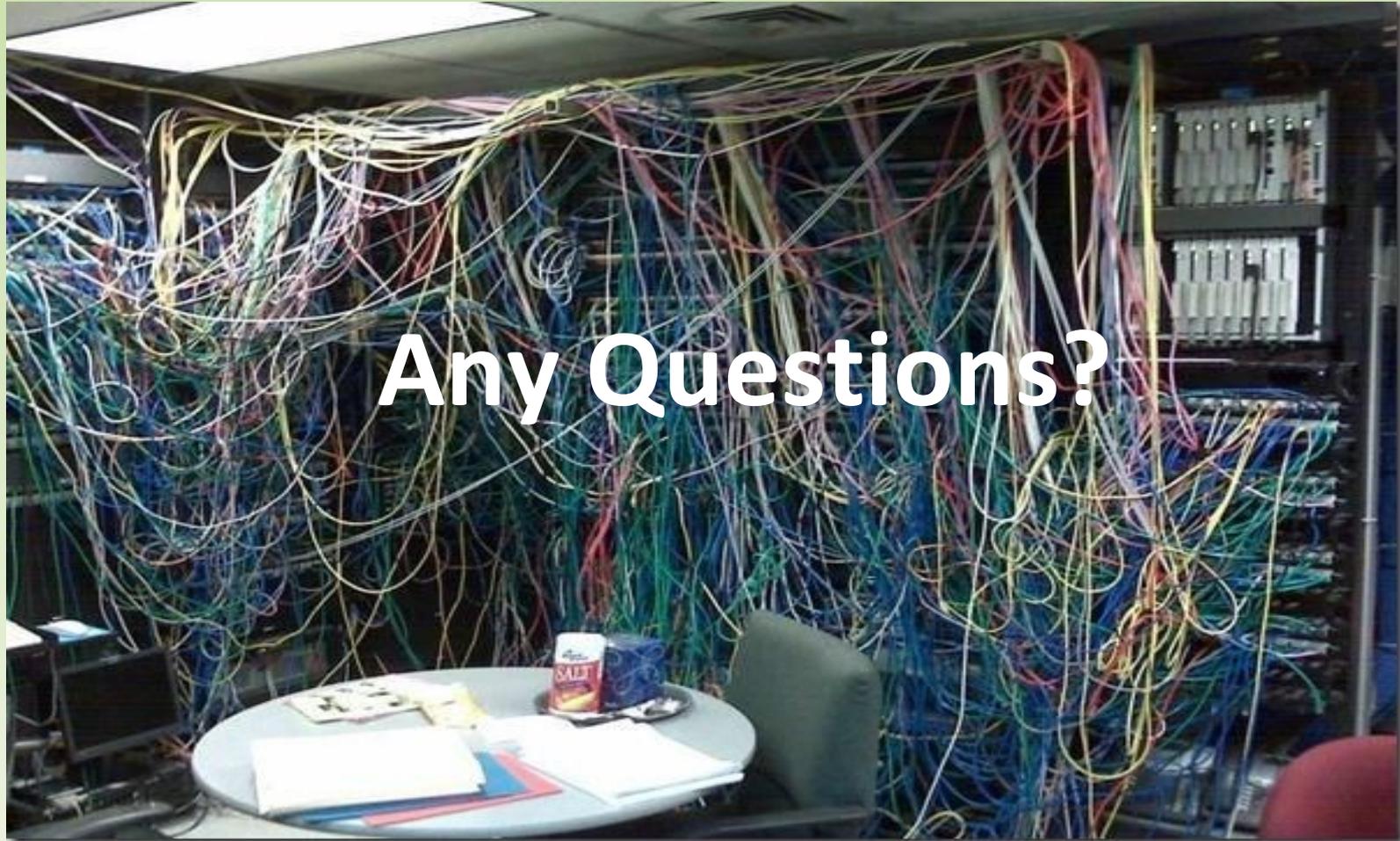
Build on What you Have

- **SCADA is essential for both Operations and Compliance**
- **Operators Need Situational Awareness to Operate Effectively**
- **Use the SCADA HMI to show the whole picture to operators**
- **SCADA Alarms systems must be rationalized/documentated**

- **Pay attention to data integrity by investing in data redundancy**
- **SCADA networks are key to robust SCADA systems**
- **Cyber Security is requires a multi-pronged approach**

- **When upgraded SCADA systems, leverage what you have**
- **Take advantage of new technology and ideas**

Wrap-Up



* Not a high performance SCADA System