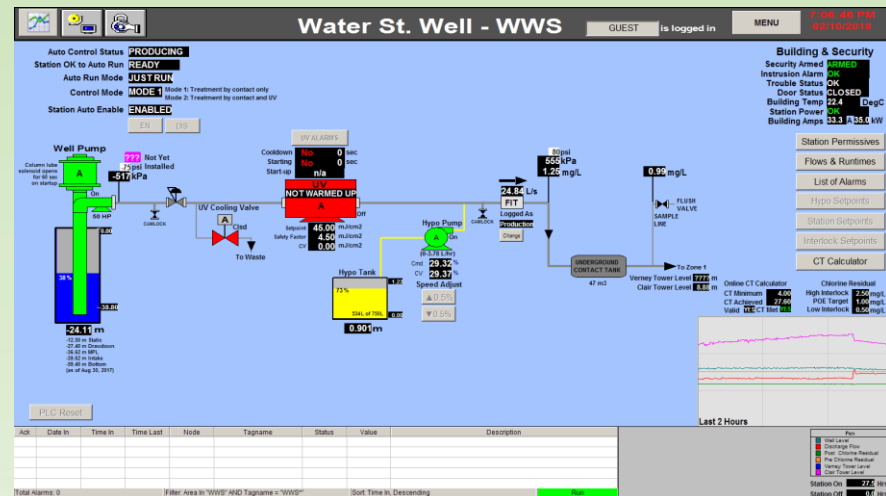


Guelph Water Services

New SCADA Design & Programming Standards

Released July 2018 and now under continuous development



Speaker: Graham Nasby, Water SCADA & Security Specialist

So, what do real engineers do?



Ok...ok..

SCADA is ok too



Goals

- Existing SCADA programming standard had not been updated in 15+ years
 - **An update was sorely needed**
 - SCADA technology has improved since 2002
 - ASM & EPRI Studies on SCADA Screen Effectiveness published 2008/2009
 - EEMUA 201 standard on operator displays published in 2002, revised 2010
 - High Performance HMI Handbook published in 2008
 - ISA101 High Performance HMI standard published in 2015
 - Bring in Best Practices from ISA112 SCADA System standards committee
1. Make SCADA Easier to use
 2. Reduce Screen Clutter
 3. Give operators information to troubleshoot problems (why did it shut down?)
 4. Hide unnecessary information, with “Show Details” buttons to show more
 5. Standard control interfaces for pumps, valves, instruments, and UVs
 6. Make colours, symbols and terminology more consistent
 7. Apply High Performance HMI Ideas (but make look/feel changes gradually)

Timeline

Jan-Dec 2016 – Assessment of Current SCADA System

Jan 2017 – Start of SCADA co-op student program

Jan 2017 – July 2018 (18 months)

Set up SCADA development/test environment (3 servers, 2 desktops, 3 laptops)

Prototype, develop and test new SCADA programming standards

Co-op students provided manpower, under direction of SCADA & Security Specialist

July 3, 2018 – First revision of the New SCADA Programming Standards Released

June 2018 – SCADA standards used for new code at Water Street Well & Emma Well

July 2018 – work starts on new code Helmar, Dean, Queensdale, Calico, Downey, etc.

August 2018 – work begins on new code by a system integrator for Burkes Upgrades

September 2018 – new code Water Street Well commissioned

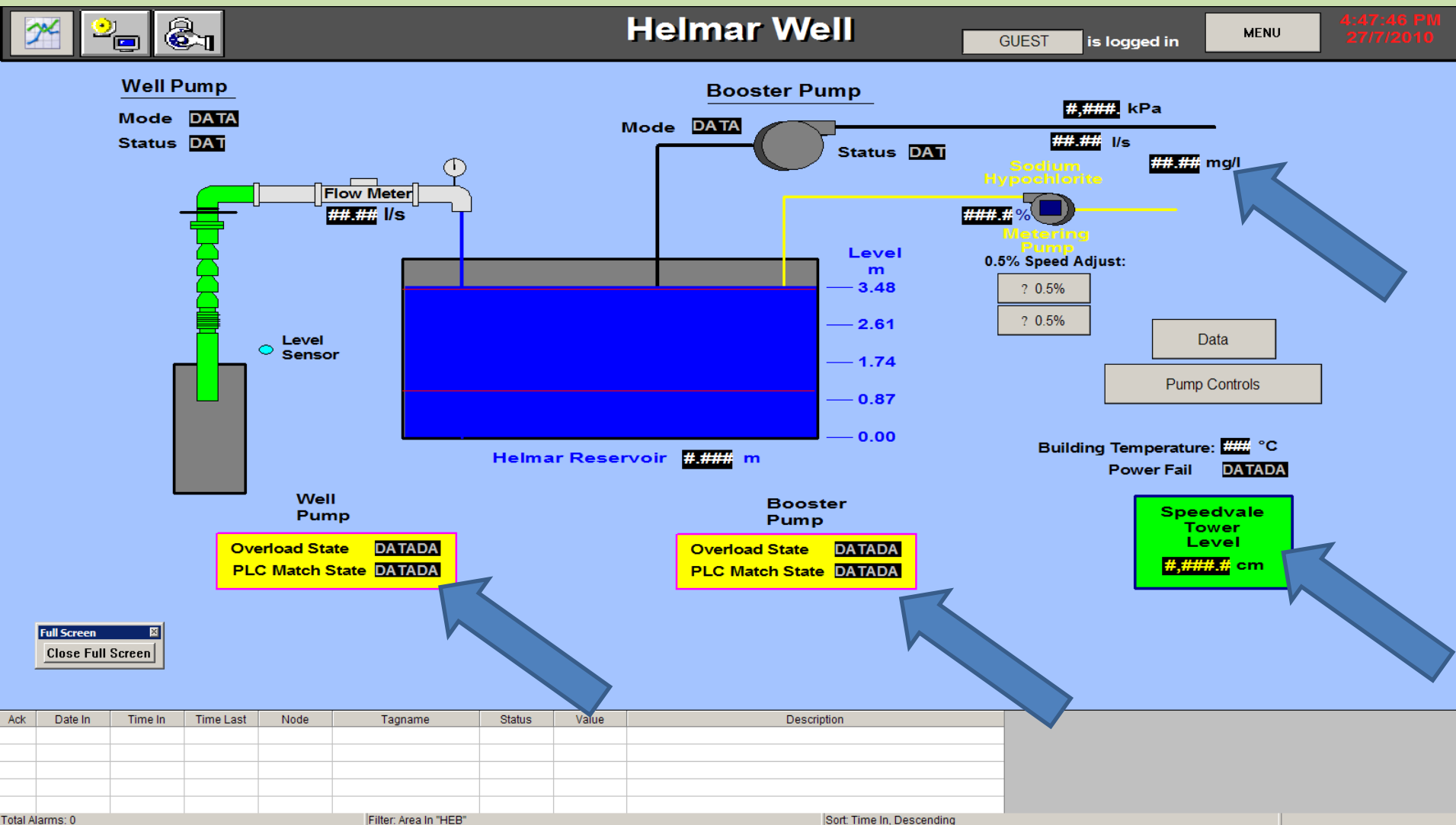
October 2018 – new code at Emma Well being commissioned

Early 2019 – new code to be commissioned at Burkes Well

Mid-2019– new code for Helmar, Dean, Queensdale, Calico, etc. to be rolled out

Old Screens

"Missing information" for operators
Bright colours on unimportant items
Inconsistent placement/display of values



Old Screens

Fire Engine Red!

Hard to see pumps that are off.

Everything on this screen seems to be “shouting” for attention



PUMP SHUTDOWN ON HI HI FLOW

(Will only trigger after 12:00 noon daily) **Enabled**
0 elapsed sec

IF HI HI FLOW ALARM OCCURS:
 SHUTDOWN DUTY PUMP DELAY (sec)

Duty5 **15** Duty3 **415** Duty1 **815**
 Duty4 **215** Duty2 **615** Unlatch

Note: The duty shutdown order is 5,4,3,2,1

So, what is new with SCADA?



SCADA: What Guelph Water is doing

Guelph Water Services

ADMIN1
7:06:18 PM

GUEST
is logged in
02/10/2018

Arkell Diversion Chamber

Arkell Well 6

Arkell Well 7 & Well 1

Arkell Well 8

Arkell Well 14

Arkell Well 15

Arkell - Woods System

Burkes Well

Calico Well

Carter Wells

Clair Tower

Clair Booster

Clythe Booster

Dean Well

Dodds Avenue Valve Chamber

Downey Well

Emma Well

Helmar Well

Membro Well

Paisley Station

Park Wells

Queensdale Well

Robertson Booster

Scout Camp Station

Speedvale Tower

University Well & Reservoir

Verney Tower

Water Street Well

Woods Chlorination

Woods Power

Woods Reservoirs

Woods Hatches

Woods Booster

Woods UV

Alarm System Test

Security Systems & Bldg Temp

Smallfield

Edinburgh

Gazer

Runtime 1 (old)

Runtime 2 (old)

Runtime 3 (old)

Storage Update

Arkell Control

Verney / Clair Control

Yesterday Pumpage

System Overview

Zone 1 Overview

Zone 3 Overview

Zone 2 Overview

Aqueduct Test

Aqueduct Model

Well Levels

Chlorine Residuals

Historian Trends

Teledac Menu

Pump Runtimes

Waste Vs Production

Hydro-UPS-Generators

Power Monitors

Well Limit Warnings/Shutdowns

UV/Gen Runtimes

Pressure Map

PLC Controllers 1

PLC Controllers 2

MAP

Dashboard

Weather/Temp

Woods Fuel Depot

PLC Fault Check

Open SCADA Sync

Alarm History

Rain Fall 0.00 mm/min

Temperature 12.03 °C

Unacknowledged Alarms

2

● **TELEDAC OK**
Storage Indicator (%)

71.1

 Overall

77.5

 Enabled Sites

WDSCADA1

SCADA Node Failover Status: Active

SCADA node SAC Status: RUN

WDSCADA2

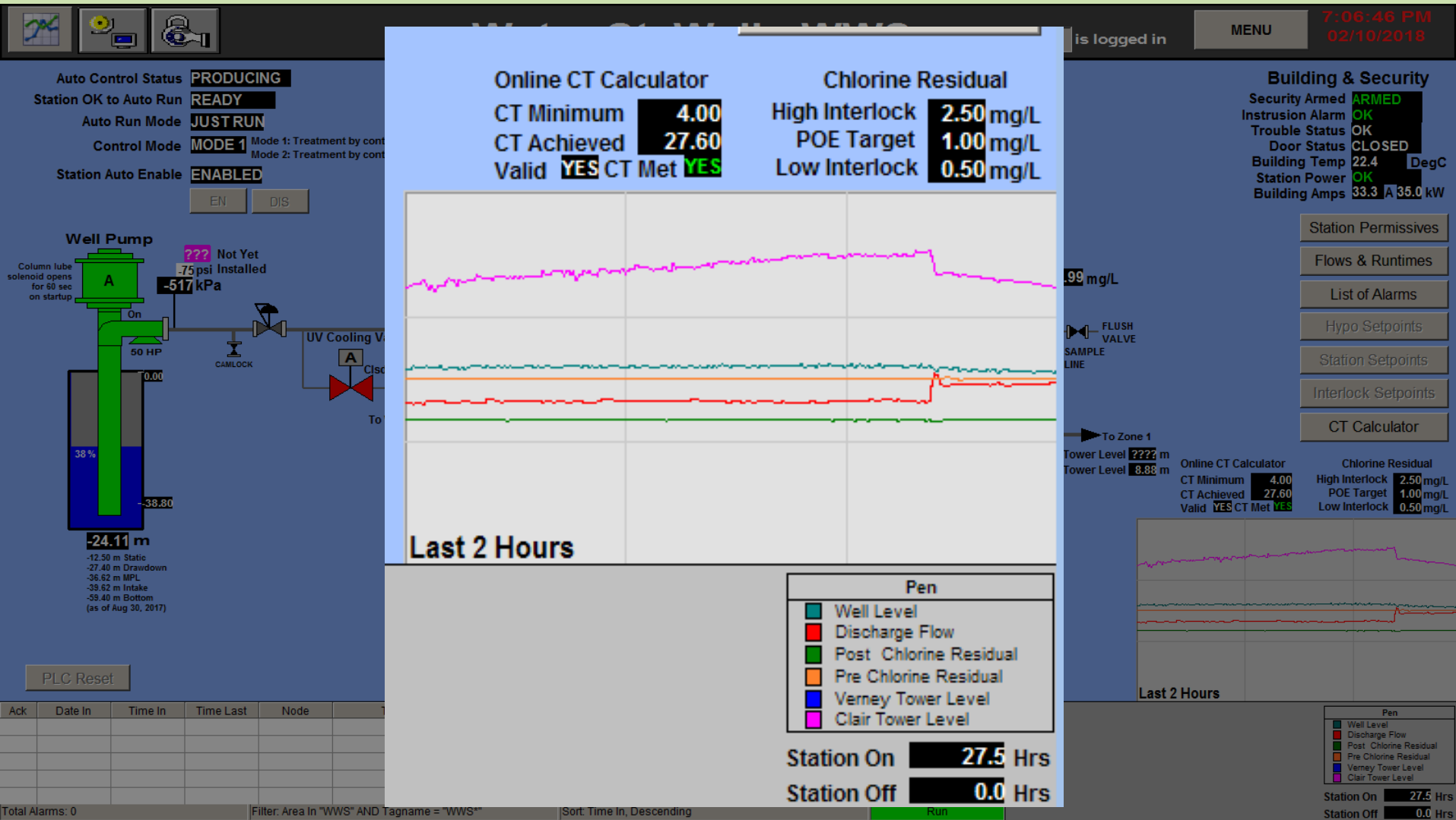
Standby

RUN

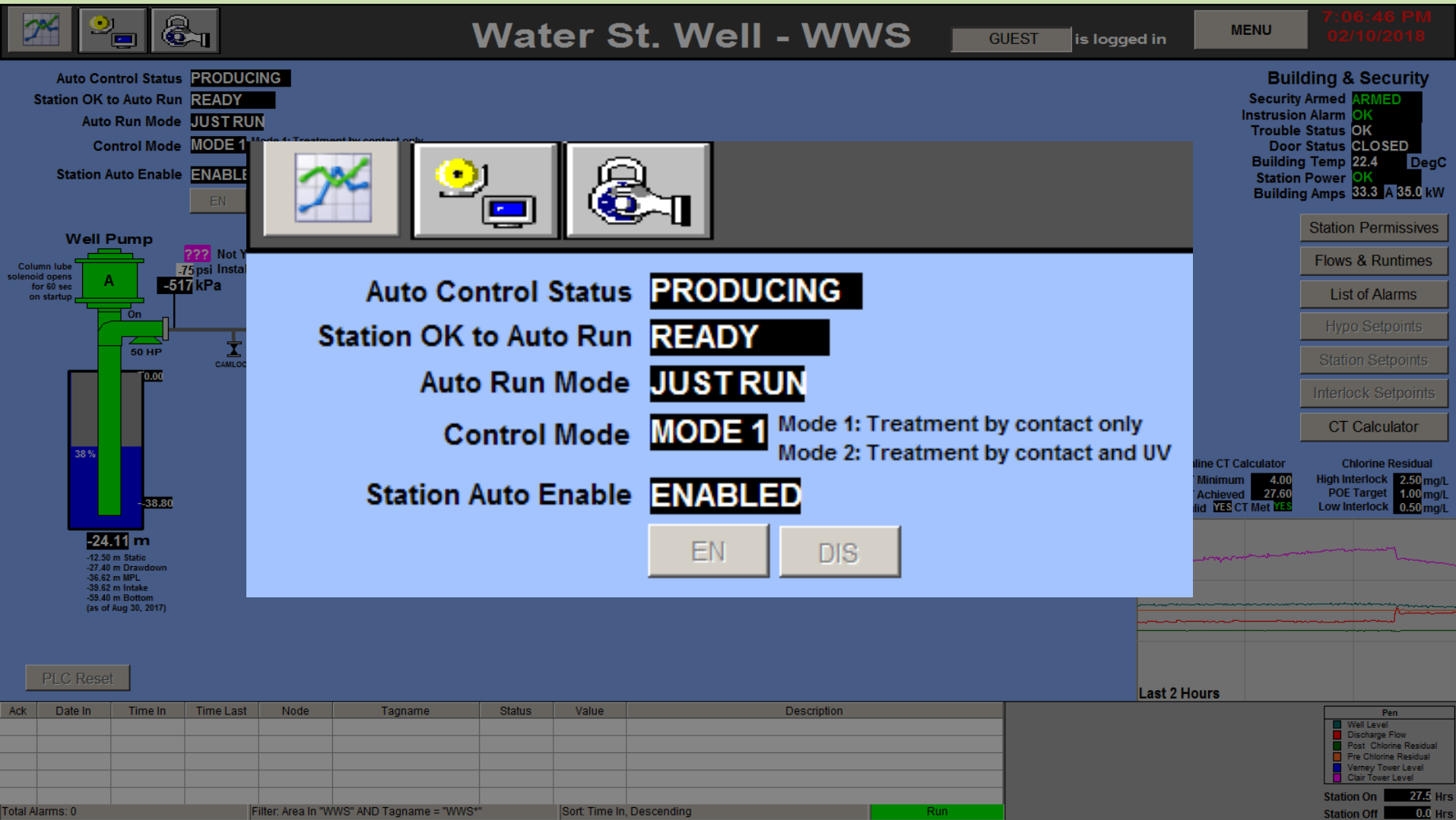
Ack	Date In	Time In	Time Last	Node	Tagname	Status	Value	Description
✓	02/10/2018	10:55:14.273	10:55:14.273	WDSCADA	DOBG00100EPF	CFN	ALARM	Downey Well Pump Power Monitor
✓	29/09/2018	12:54:05.987	12:54:05.987	WDSCADA	MEBG00100EPF	CFN	ALARM	Membro Well Pump Disconnect Off
✓	29/09/2018	12:54:05.921	12:54:05.921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

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

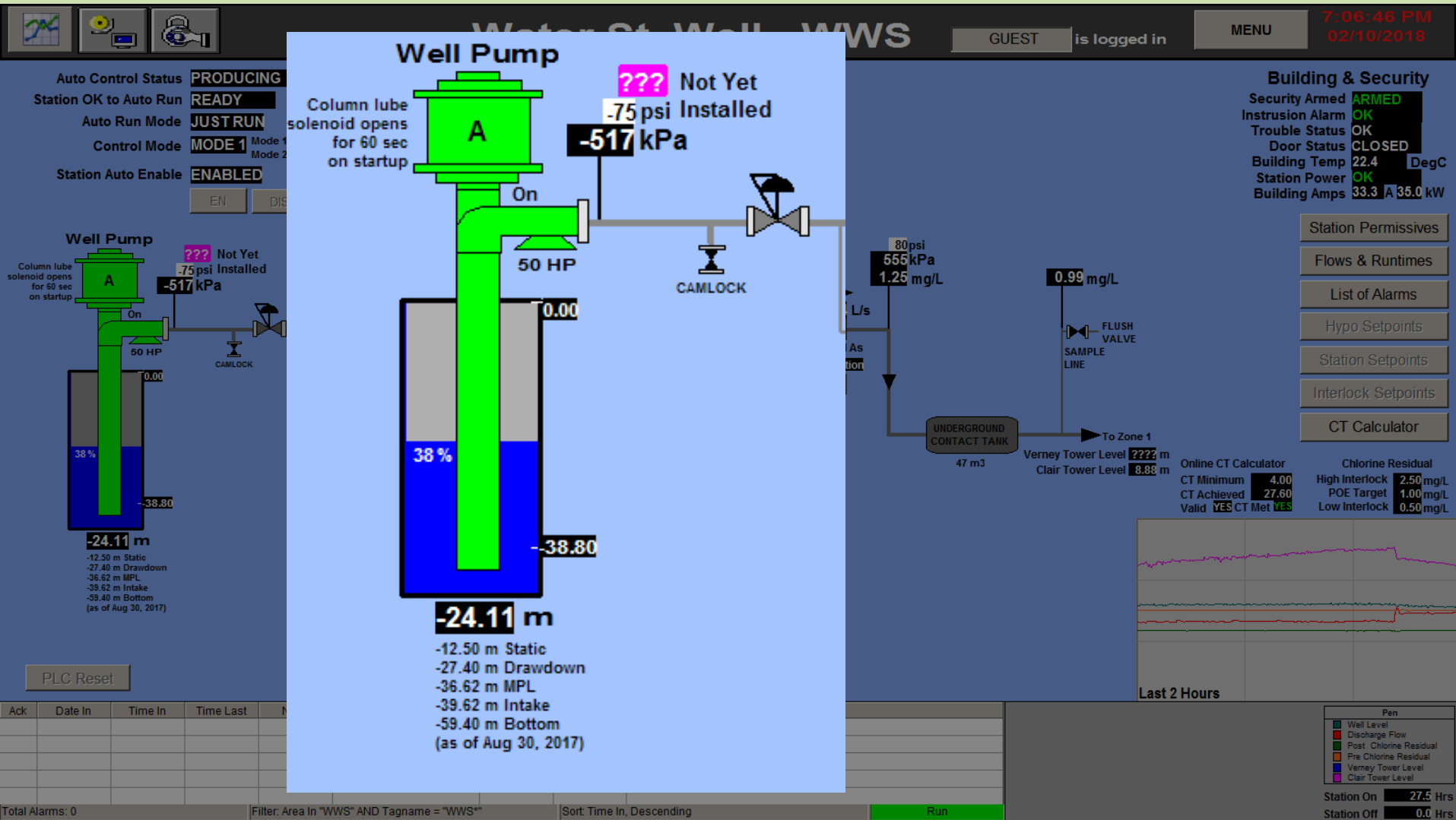
Summary Trends and Key Compliance info at bottom right




Station Control Mode on Top Left



Better Well pump Information



No more mysteries why station won't start



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%
 -24.11 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)

PLC Reset

Ack	Date In	Time In	Time Last

Total Alarms: 0

WWS_Permissives.grf

Water St. Well Station Auto Permissives

X

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)

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

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

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**

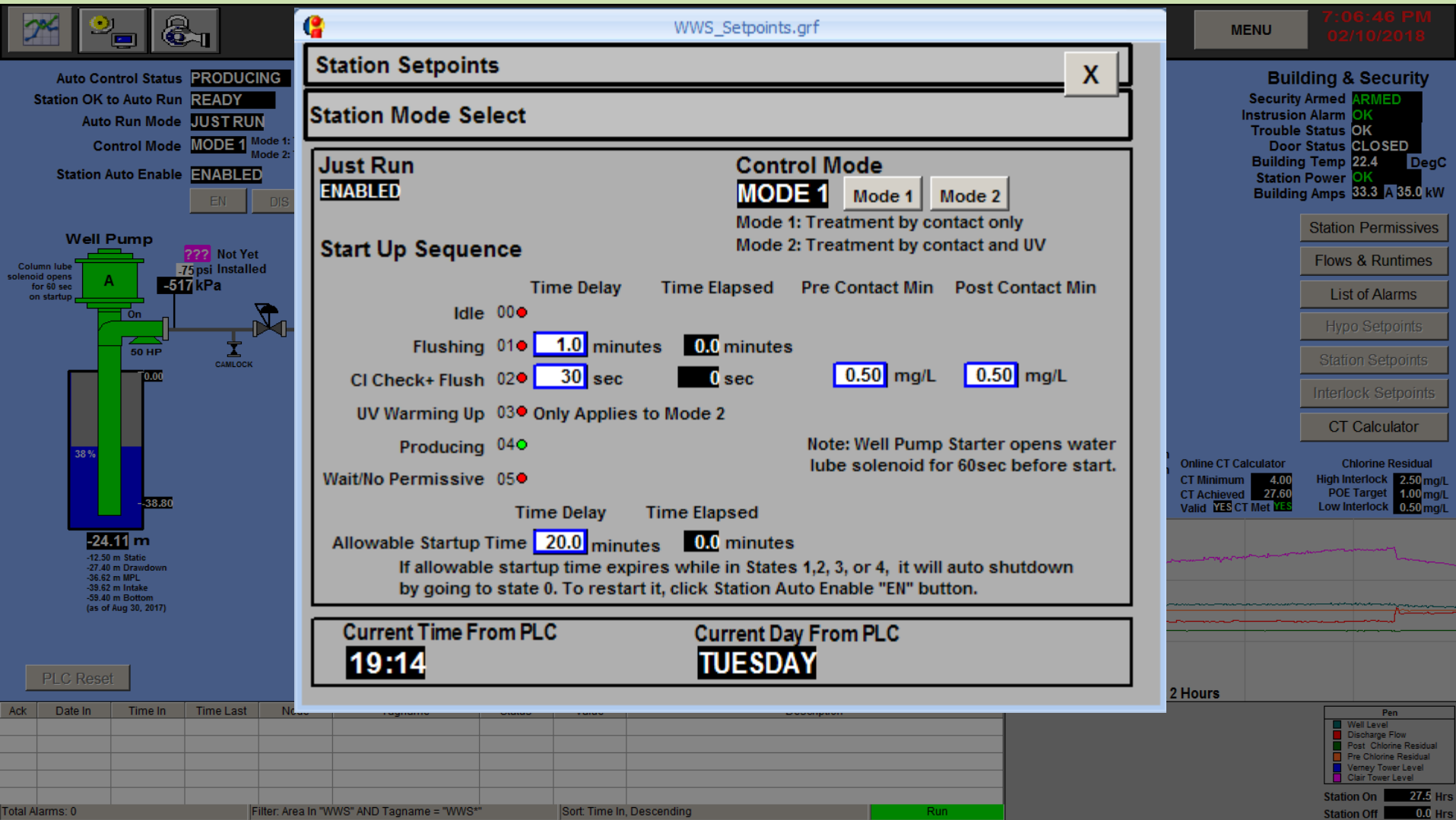
Last 2 Hours

Pen

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

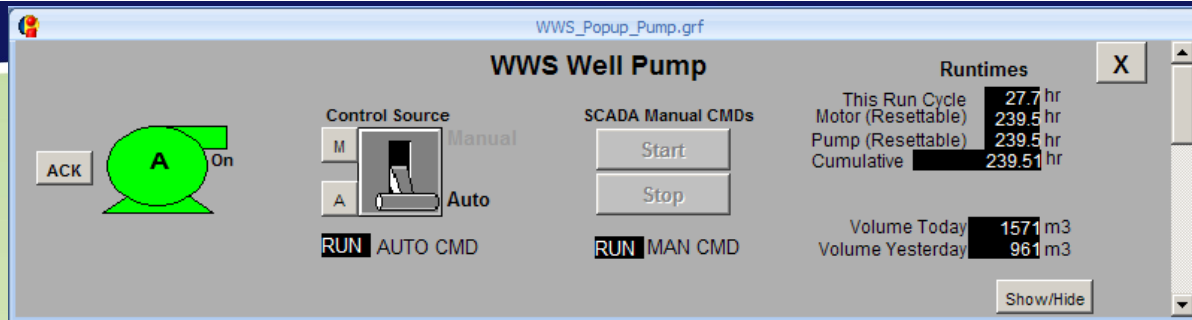
Station On **27.5 Hrs**
 Station Off **0.0 Hrs**

Status Information on Well Start-up Sequence



Better Pop-Up Windows – pump starters

Better Pop-Up Windows - pumps



WWS_Popup_Pump.grf

WWS Well Pump

Control Source: Manual (M), Auto (A)

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

Show/Hide

Permissives

Facility Power OK

Well Pump Starter Power OK

Interlocks (Reset Required)

Man. Auto	Interlocks (Reset Required)
01 OK OK	Well Level Below MPL
02 OK OK	Well Pump Flow Rate Above Permit
03 OK OK	Well Pump Daily Flow Above Permit
04 OK OK	Well Pump Starter Fault
05 OK OK	Well Pump Low Flow (< 5L/s, 30s)
06 OK OK	Global Chlorine Interlock
07 OK OK	Hypo Pump Interlocked
08 OK OK	Hypo Pump Did Not Start In 5 Sec
09 OK OK	Well Level Bad Signal
10 OK OK	UV Lost Warmed Up Status (Mode 2)
11 OK OK	UV Interlocked (Mode 2)
12 OK OK	Well Pump E-Stop Pressed
13 OK OK	Hardwired Low Chlorine Interlock

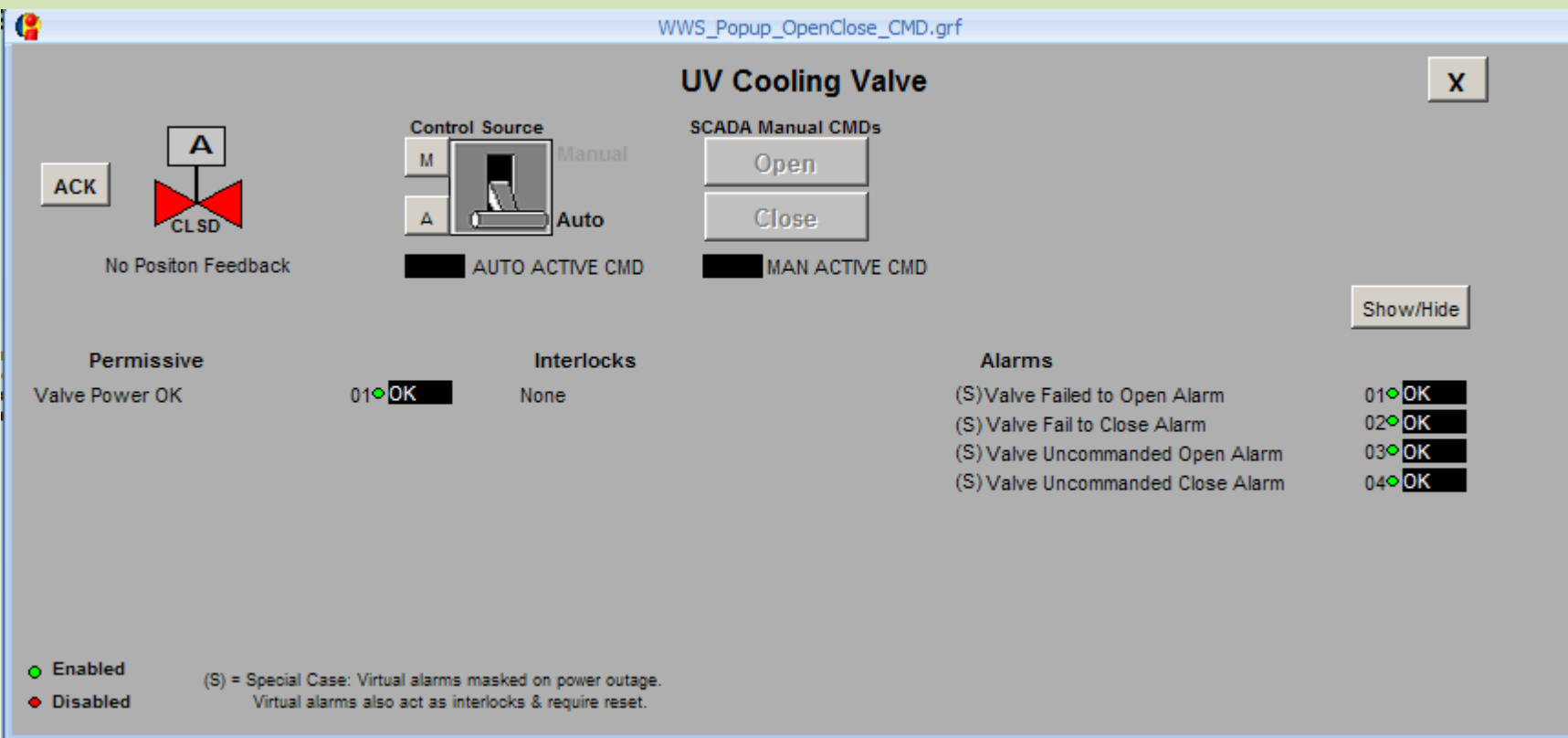
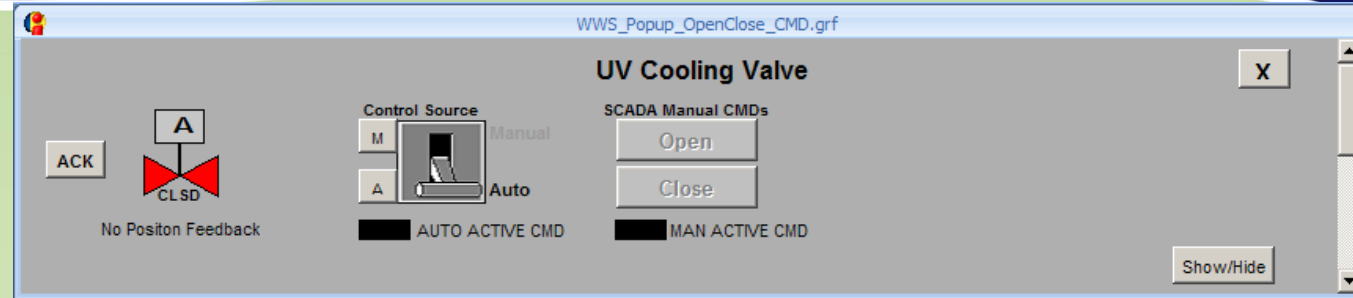
Alarms

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

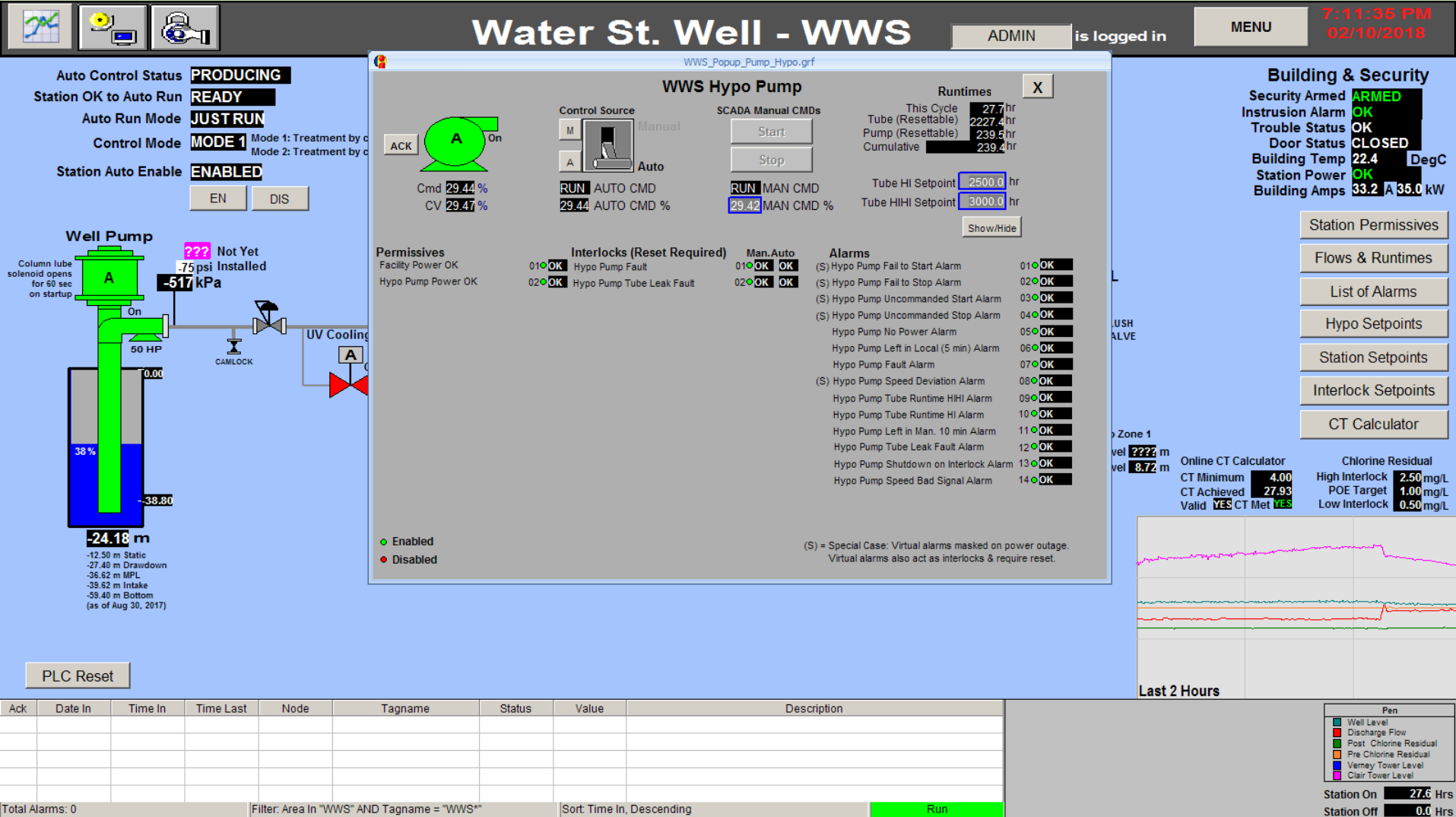
Legend:
● Enabled
● Disabled

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

Better Pop-Up Windows - Motorized Valves



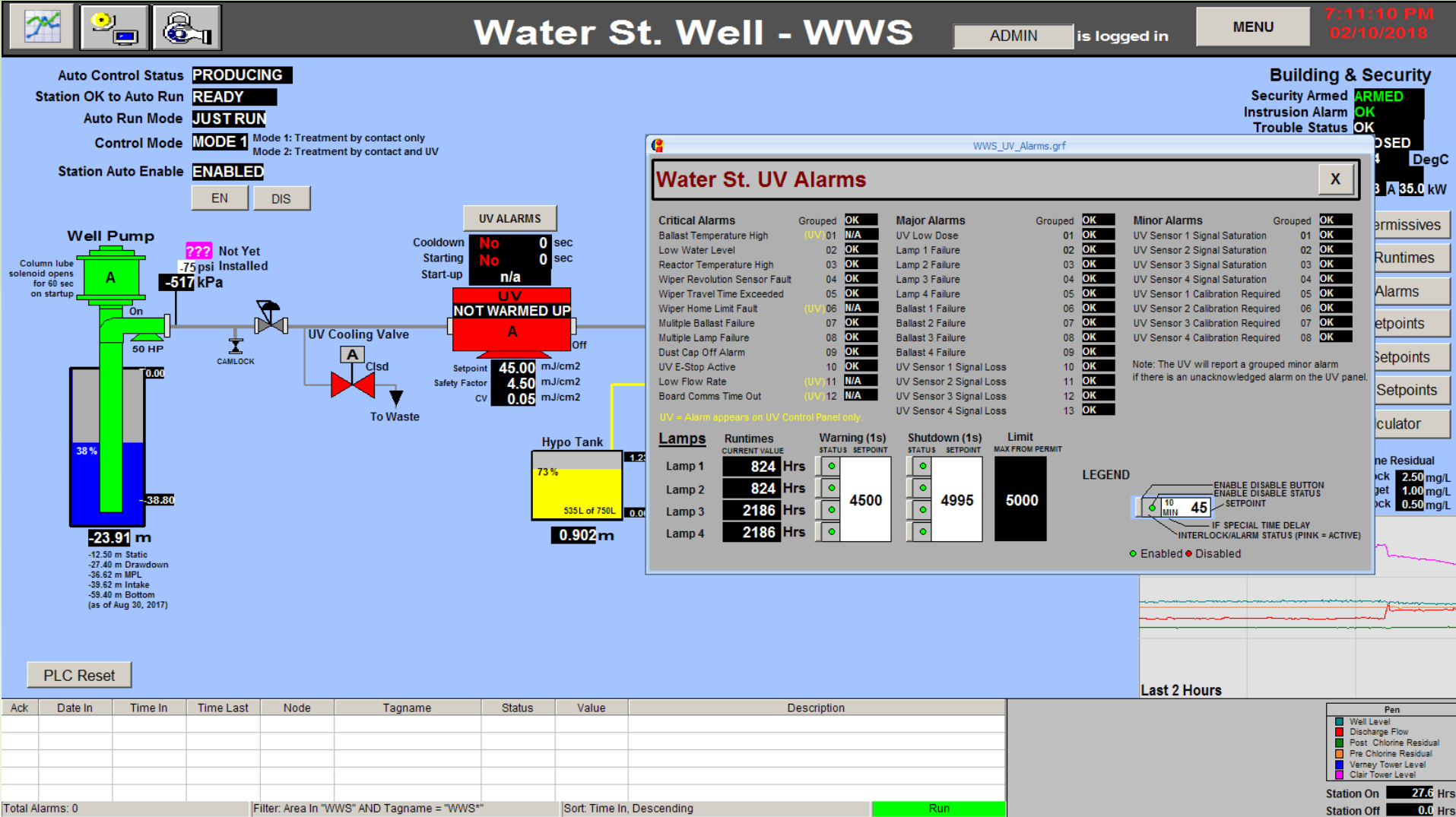
Better Pop-Up Windows – chemical dosing pumps



Better Pop-Up Windows – Packaged UV Systems

[illegible]

Better Pop-Up Windows – UV System specific alarms



Better Pop-Up Windows – analog measurements

WWS_Analog_Popup.grf

7:11:55 PM
02/10/2018

Auto C
Station OK
Aut
C
Station

Well
Column lube
solenoid opens
for 60 sec
on startup

38%
-24.72
-12.5
-27.4
-36.5
-39.6
-59.4
(as c

Well Level

X

Value **-24.01** m (-38.8 to 0)

Raw Signal: **OK**

Alarm Setpoints:

	Value	EN	DIS	Enabled?	ALARM
HIHI:	0.00	EN	DIS	● Disabled	OK
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

Last 24 Hours

	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

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

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

Last 2 Hours

Pen

Well Level

Discharge Flow

Post Chlorine Residual

Pre Chlorine Residual

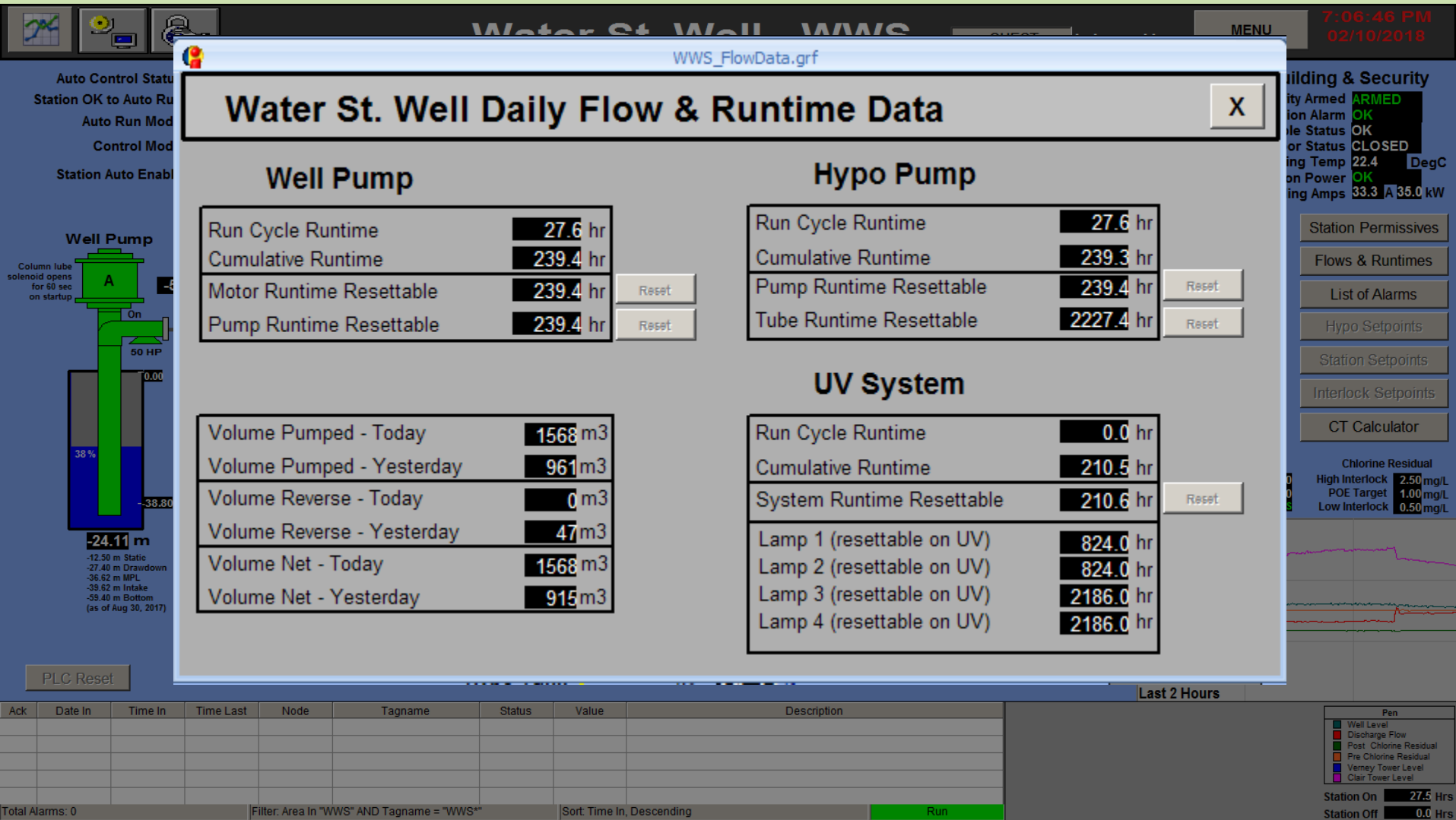
Verney Tower Level

Clair Tower Level

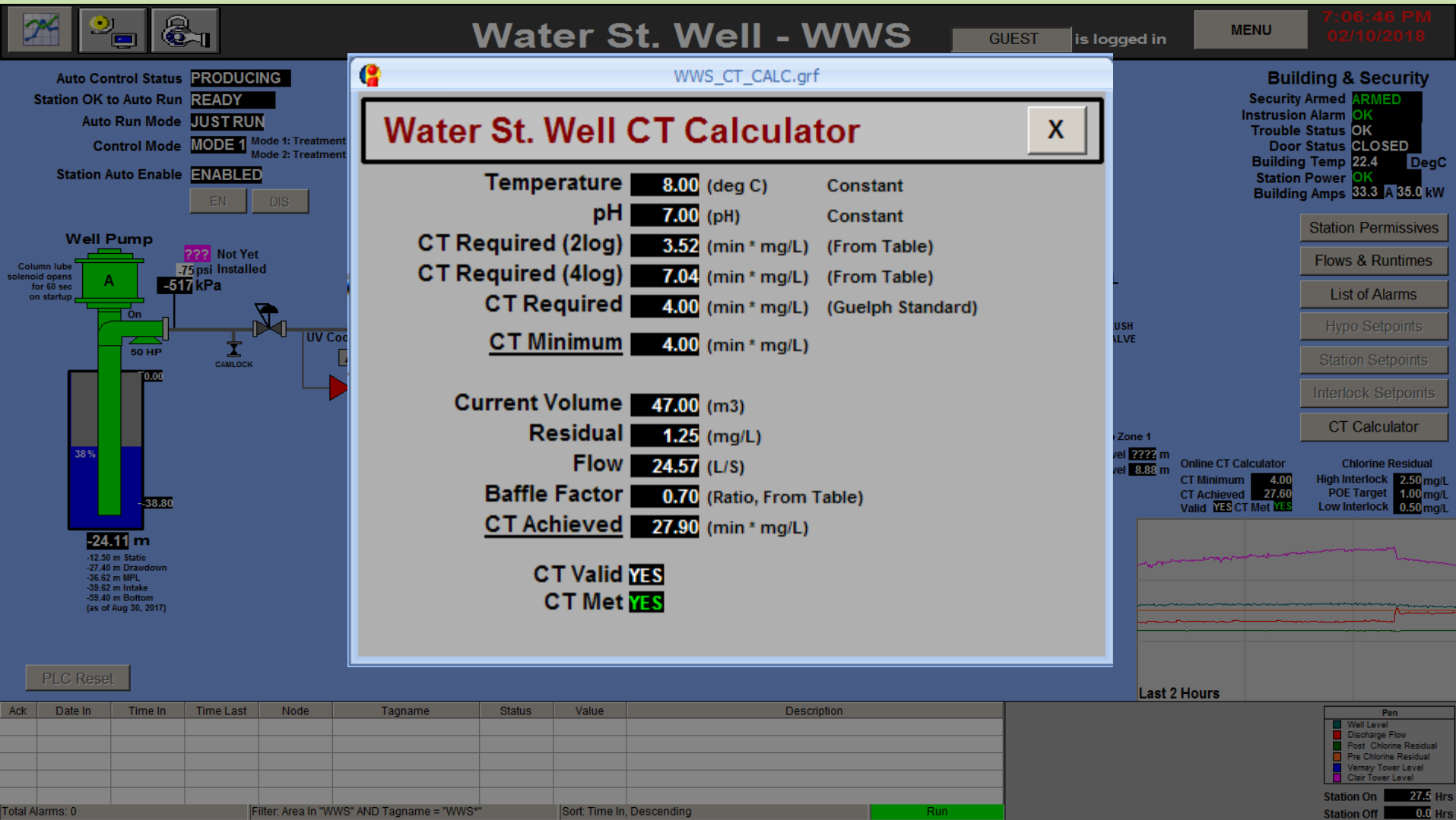
Station On **27.6** Hrs

Station Off **0.0** Hrs

Pump Runtimes



Online CT Calculator – primary disinfection numbers



List of All Configured Alarms for a Site



Well Pump

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
-36.62 m MPL
-36.62 m Intake
-59.40 m Bottom
(as of Aug 30, 2017)

PLC Reset

Ack Date In Time In

Auto Control Status

Station OK to Auto Run

Auto Run Mode

Control Mode

Station Auto Enable

Water St. Well Alarms

Alarm ID	Alarm Description	Status
01	Building Power Failure Alarm	OK
02	Building Security Intrusion Alarm	OK
03	Building Security Trouble Alarm	OK
04	Station Failed to Auto Start Alarm	OK
05	Pre Contact Cl. Residual Bad Signal Alarm	OK
06	Pre Contact Cl. Residual HIHI Alarm	OK
07	Pre Contact Cl. Residual HI Alarm	OK
08	Pre Contact Cl. Residual LO Alarm	OK
09	Pre Contact Cl. Residual LOLO Alarm	OK
10	Pre Contact Cl. Analyzer Fault Alarm	OK
11	Well Pump Flow Rate Bad Signal Alarm	OK
12	Well Pump Flow Rate HIHI Alarm	OK
13	Well Pump Flow Rate HI Alarm	OK
14	Well Pump Flow Rate LO Alarm	OK
15	Well Pump Flow Rate LOLO Alarm	OK
16	Hypo Tank Level Bad Signal Alarm	OK
17	Hypo Tank Level HIHI Alarm	OK
18	Hypo Tank Level HI Alarm	OK
19	Hypo Tank Level LO Alarm	OK
20	Hypo Tank Level LOLO Alarm	OK
21	Hypo Tank Level Loss of Echo Alarm	OK
22	Discharge Pressure Bad Signal Alarm	OK
23	Discharge Pressure HIHI Alarm	OK
24	Discharge Pressure HI Alarm	OK
25	Discharge Pressure LO Alarm	OK
26	Discharge Pressure LOLO Alarm	OK
27	Building Temperature Bad Signal Alarm	OK
28	Building Temperature HIHI Alarm	OK
29	Building Temperature HI Alarm	OK
30	Building Temperature LO Alarm	OK
31	Building Temperature LOLO Alarm	OK
32	Post Contact Cl. Residual Bad Signal Alarm	OK
33	Post Contact Cl. Residual HIHI Alarm	OK
34	Post Contact Cl. Residual HI Alarm	OK
35	Post Contact Cl. Residual LO Alarm	OK
36	Post Contact Cl. Residual LOLO Alarm	OK
37	Post Contact Cl. Analyzer Fault Alarm	OK
38	Well Pump Pressure Bad Signal Alarm	OK
39	Well Pump Pressure HIHI Alarm	OK
40	Well Pump Pressure HI Alarm	OK
41	Well Pump Pressure LO Alarm	OK
42	Well Pump Pressure LOLO Alarm	OK
43	Well Level Bad Signal Alarm	OK
44	Well Level HIHI Alarm	OK
45	Well Level HI Alarm	OK
46	Well Level LO Alarm	OK
47	Well Level LOLO Alarm	OK
48	Well Pump Fail to Start Alarm	OK
49	Well Pump Fail to Stop Alarm	OK
50	Well Pump Uncommanded Start Alarm	OK
51	Well Pump Uncommanded Stop Alarm	OK
52	Well Pump No Power Alarm	OK
53	Well Pump Left in Local (30 min) Alarm	OK
54	Well Pump Starter Fault Alarm	OK
55	Well Pump MPL Warning Alarm	OK
56	Well Pump Flow Rate Max Warning Alarm	OK
57	Well Pump Daily Flow Max Warning Alarm	OK
58	Well Pump Shutdown on Interlock Alarm	OK
59	Well Pump E-Stop Pressed Alarm	OK
60	Hypo Pump Fail to Start Alarm	OK
61	Hypo Pump Fail to Stop Alarm	OK
62	Hypo Pump Uncommanded Start Alarm	OK
63	Hypo Pump Uncommanded Stop Alarm	OK
64	Hypo Pump No Power Alarm	OK
65	Hypo Pump Left in Local (5 min) Alarm	OK
66	Hypo Pump Fault Alarm	OK
67	Hypo Pump Speed Deviation Alarm	OK
68	Hypo Pump Tube Runtime HIHI Alarm	OK
69	Hypo Pump Tube Runtime HI Alarm	OK
70	Hypo Pump Left in Manual (10 min) Alarm	OK
71	Hypo Pump Tube Leak Fault Alarm	OK
72	Hypo Pump Shutdown on Interlock Alarm	OK
73	Hypo Pump Bad Signal Alarm	OK
74	UV Fail to Start Alarm	OK
75	UV Fail to Stop Alarm	OK
76	UV Uncommanded Start Alarm	OK
77	UV Uncommanded Stop Alarm	OK
78	UV No Power Alarm	OK
79	UV Left in Local (30 min) Alarm	OK
80	UV Shutdown on Interlock Alarm	OK
81	UV Dose Bad Signal Alarm	OK
82	UV Minor Alarm	OK
83	UV Major Alarm	OK
84	UV Critical Alarm	OK
85	Cooling Valve Fail to Open Alarm	OK
86	Cooling Valve Fail to Close Alarm	OK
87	Cooling Valve Uncommanded Open Alarm	OK
88	Cooling Valve Uncommanded Close Alarm	OK
89	Cooling Valve No Power Alarm	OK
90	QuickPanel Comms Failure Alarm	OK
91	PLC Comms Failure Alarm 1	OK
92	PLC Comms Failure Alarm 2	OK
93	PLC Major Error Alarm	OK
94	PLC Forces On Alarm	OK
95	PLC Read From UV Comm Fail	OK

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

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

Vernier Tower Level

Clair Tower Level

Station On **27.5** Hrs

Station Off **0.0** Hrs

Total Alarms: 0

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

Sort: Time In, Descending

Run

Guelph Water's New SCADA Design & Programming Standards
Halton Region SCADA Seminar - June 21, 2019 – Oakville, ON, Canada

CITY OF Guelph
Making a Difference

27

Well Permit Values, Warnings, and Interlocks

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

Well Pump
Column lube solenoid opens for 60 sec on startup

On
50 HP

0.00
-38.80
-24.11 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)

PLC Reset

Ack	Date In	Time In

Total Alarms: 0

WWS_ILCK_Setpoints.grf

Water St. Well Interlock Setpoints

Well Permits

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 MPL FOR WELL	PROBE DEPTH
Well Level - Max Pumping Level (MPL)	-23.88 m	● -34.00	● -35.00	-36.62	-38.80
Well Pump - Max Flow Rate (FH)	24.62 L/s	● 34.0	● 37.88	37.88	
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.

LEGEND

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

● Enabled ● Disabled

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

7:06:46 PM
02/10/2018

Building & Security

Security Armed	ARMED
Intrusion Alarm	OK
Door Status	OK
Door Status	CLOSED
Building Temp	22.4 DegC
Generation 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

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

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)				
Wells	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	Calico	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	Helmar	637 m3	● 3000	● 3273	3273	654 m3	● 3000	● 3273	3273		
Burke	???? m	● ????	● ????	????	????? L/s	● ????	● ????	????	Burke	???? m3	● ????	● ????	????	???? m3	● ????	● ????	????		
Downey	-14.92 m	● -34.00	● -35.60	-35.60	0.00 L/s	● 58	● 61	61	Downey	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	Dean	1057 m3	● 2200	● 2300	2300	1069 m3	● 2200	● 2300	2300		
Emma	???? m	● ????	● ????	????	????? L/s	● ????	● ????	????	Emma	???? m3	● ????	● ????	????	EMMA ST WELL PUMP GOES DIRECT TO SYSTEM. NO BOOSTER PUMP.					
Membro	-16.92 m	● -31.00	● -32.80	-32.80	0.00 L/s	● 60	● 70	70	Membro	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	Park1	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	Park2	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	Park1+2	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	Water	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	Queen	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	Paisley	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	Univer	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	10 MIN 49	50	Carter1	2869 m3	● 3000	● 3273	3273	WoodsPOE					
Carter 2	-3.77 m	● -8.00	● -9.10	-9.10	27.19 L/s	● 38	10 MIN 45	50	Carter2	1890 m3	● 3000	● 3273	3273	28094 m3	● 60000	● 65000	65000		
Carter 1+2					68.46 L/s	● 76	10 MIN 76	76	Carters	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	Arkell1	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	Arkell6	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	Arkell7	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	Arkell8	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	Arkell14	795 m3	● 9300	● 9600	9600	LEGEND					
Arkell 15	-8.27 m	● -11.00	● -12.80	-12.80	84.82 L/s	● 100	● 111	111	Arkell15	5830 m3	● 9300	● 9600	9600	10 MIN 45 ENABLE DISABLE BUTTON ENABLE DISABLE STATUS SETPOINT					
6+7+8+14+15					254.96 L/s	● 300	● 333	333	Arkells	20146 m3	● 25000	● 28800	28800	IF SPECIAL TIME DELAY INTERLOCK/ALARM STATUS (PINK = ACTIVE)					
Glen Collector					119.93 L/s	● 250			Glen	8347 m3	● 25000			Note: Arkell total flow Interlocks only affect Auto Control					

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
✓	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	MEBG00100EPF	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			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
Arkell 7	84.18	5751	SYSTEM	5751	0	7344	7344	0	Dean Booster	16.15	1071	SYSTEM	1071	0	0	1340	1340	0	0
Arkell 8	0.00	1989	SYSTEM	1989	0	1575	1575	0	Downey Booster	0.00	0	SYSTEM	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	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
Burke Well	???	???		???	???	???	???	???	Park Booster	62.20	5232	SYSTEM	5232	0	0	6558	6558	0	0
Carter Wells	41.26	4766	WASTE	0	4763	5910	0	5908	Queensdale Booster	12.58	714	SYSTEM	714	0	0	889	889	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
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
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
Park Well #1	56.40	3897	SYSTEM	1240	0	4862	1541	0	System Booster*	594.09	37413	N/A	37413	0	0	47270	46456	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										

*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
✓	29/09/2018	12:54:05	921	12:54:05	921 WDSCADA MEBG00100EOL	CFN	ALARM	Membro Well Pump Overload Alarm

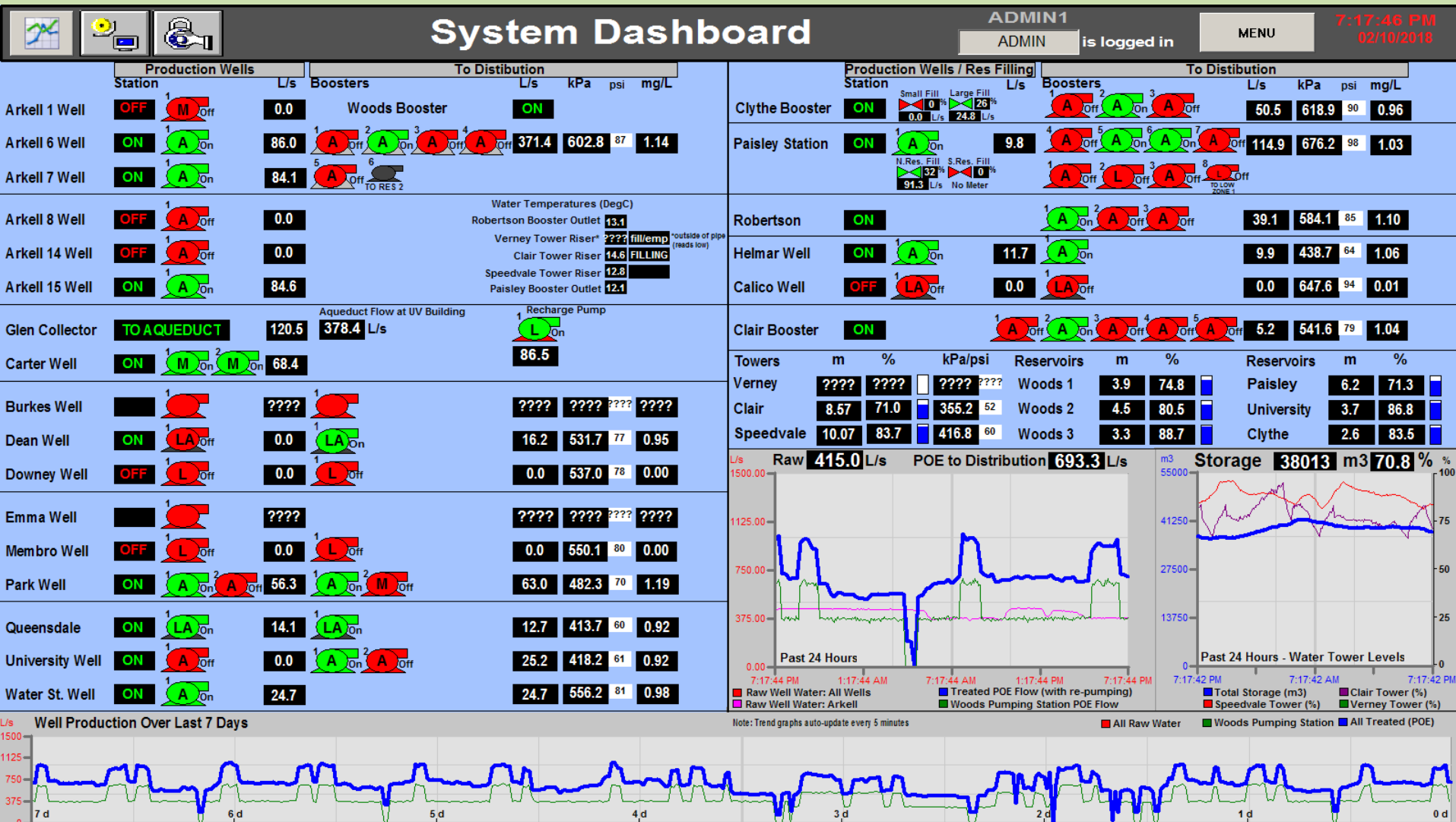
Total Alarms: 46

Filter: Off

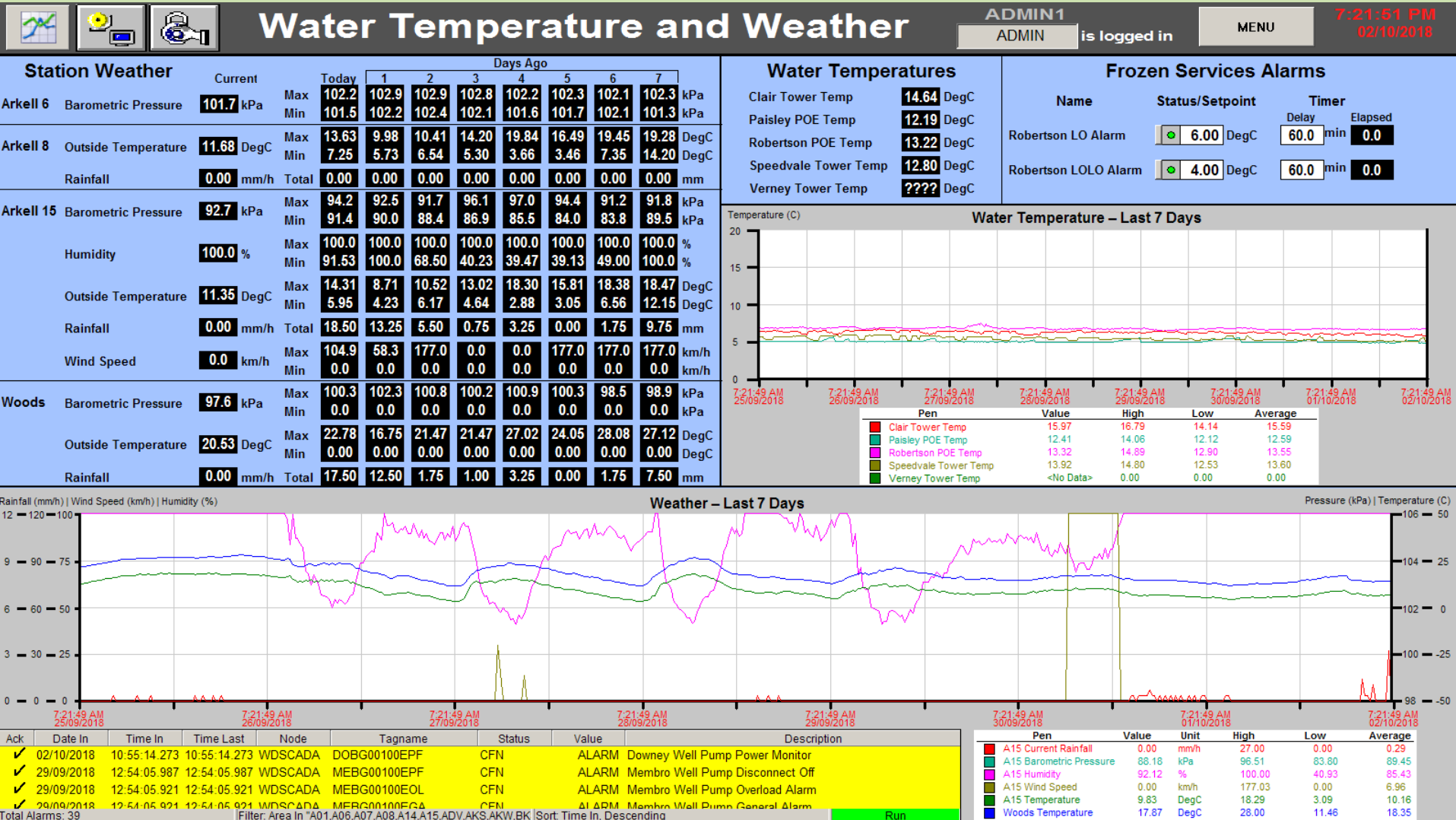
Sort: Time In, Descending

Run

Dash Board Displays – entire system status at a glance



Dash Board Displays - Weather



Dash Board Displays – Which Sites have Power?

<div><div></div><div></div><div></div></div> <div>Hydro Status</div> <div>ADMIN is logged in</div> <div>MENU</div> <div>7:21:05 PM 02/10/2018</div>														
<div><div>Site Name</div><div>Has Power</div><div>ATS</div><div>Panel</div><div>Generator</div><div>PLC UPS</div><div>Secondary UPS</div><div>Site Name</div><div>Has Power</div><div>ATS</div><div>Panel</div><div>Generator</div><div>PLC UPS</div><div>Secondary UPS</div></div>														
<div><div>Arkell Well 6</div><div>ON</div><div>ATS</div><div>Standalone</div><div>ON</div><div>OFF</div><div>AUTO-START AUTO-STOP</div><div>ON HYDRO</div><div>OK 117</div><div>100% Min</div><div>Arkell Well 7 & 1¹</div><div>ON</div><div>ATS</div><div>Standalone</div><div>ON</div><div>OFF</div><div>AUTO-START AUTO-STOP</div><div>ON HYDRO</div><div>OK 135</div><div>100% Min</div><div>Arkell Well 8²</div><div>ON</div><div>MTS</div><div></div><div>ON</div><div>Plug</div><div></div><div>ON HYDRO</div><div>OK 89</div><div>100% Min</div><div>View Node UPS</div><div>ON HYDRO</div><div>OK 129</div><div>100% Min</div></div>														
<div><div>Arkell Well 14</div><div>ON</div><div>ATS</div><div>Standalone</div><div>ON</div><div>OFF</div><div>AUTO-START AUTO-STOP</div><div>ON HYDRO</div><div>OK 161</div><div>100% Min</div><div>Arkell Well 15</div><div>ON</div><div>ATS</div><div>Standalone</div><div>ON</div><div>OFF</div><div>AUTO-START AUTO-STOP</div><div>ON HYDRO</div><div>OK 91</div><div>100% Min</div><div>Arkell Diversion¹³</div><div>ON</div><div>n/a</div><div></div><div>ON</div><div>Powered by Well 15 Generator</div><div>ON HYDRO</div><div>OK 136</div><div>100% Min</div><div>Queensdale Well</div><div>ON</div><div>n/a</div><div></div><div>ON</div><div>n/a</div><div>ON HYDRO</div><div>OK 76</div><div>100% Min</div><div>Robertson Station</div><div>ON</div><div>ATS</div><div>Standalone</div><div>ON</div><div>Plug</div><div>ON HYDRO</div><div>OK 91</div><div>100% Min</div><div>University Well⁹</div><div>ON</div><div>ATS</div><div>ON HYDRO</div><div>ON</div><div>OFF</div><div>AUTO-START MAN-STOP</div><div>ON HYDRO</div><div>OK 29</div><div>100% Min</div></div>														
<div><div>Carter Wells³</div><div>ON</div><div>MTS</div><div></div><div>ON</div><div>Plug</div><div>ON HYDRO</div><div>OK 117</div><div>100% Min</div><div>Burkes Well⁴</div><div></div><div>MTS</div><div></div><div>Standalone</div><div>MAN-START MAN-STOP</div><div>???</div><div>???</div><div>0% Min</div><div>Calico Well</div><div>ON</div><div>n/a</div><div></div><div>ON</div><div>n/a</div><div>ON HYDRO</div><div>OK 53</div><div>100% Min</div><div>Woods St. Well¹⁰</div><div>ON</div><div>MTS</div><div></div><div>ON</div><div>Plug</div><div>ON HYDRO</div><div>OK 90</div><div>100% Min</div><div>Dodds Valve Chamber</div><div>ON</div><div>n/a</div><div></div><div>ON</div><div>n/a</div><div>ON HYDRO</div><div>OK 166</div><div>100% Min</div><div>Scout Camp Station</div><div>ON</div><div>n/a</div><div></div><div>ON</div><div>n/a</div><div>ON HYDRO</div><div>OK 81</div><div>100% Min</div></div>														
<div><div>Clythe Booster Station</div><div>ON</div><div>ATS</div><div>ON HYDRO</div><div>ON</div><div>Standalone</div><div>AUTO-START AUTO-STOP</div><div>ON HYDRO</div><div>OK 38</div><div>100% Min</div><div>Dean Well</div><div>ON</div><div>n/a</div><div></div><div>ON</div><div>n/a</div><div>ON HYDRO</div><div>OK 86</div><div>100% Min</div><div>Downey Well</div><div>ON</div><div>ATS</div><div>Standalone</div><div>ON</div><div>Plug</div><div>ON HYDRO</div><div>OK 110</div><div>100% Min</div><div>Woods Booster¹¹</div><div>ON</div><div>ATS</div><div>Standalone</div><div>ON</div><div>MAN-STOP</div><div>ON HYDRO</div><div>OK 751</div><div>100% Min</div><div>Woods Chlorine PLC</div><div>ON</div><div>n/a</div><div></div><div>ON</div><div>Powered By Woods Generator</div><div>ON HYDRO</div><div>OK 75</div><div>100% Min</div><div>Woods Fuel Depot</div><div>ON</div><div>n/a</div><div></div><div>ON</div><div>Powered By Woods Generator</div><div>ON HYDRO</div><div>OK 174</div><div>100% Min</div></div>														
<div><div>Emma Well⁵</div><div></div><div>MTS</div><div></div><div>Plug</div><div>???</div><div>???</div><div>0% Min</div><div>Helmar Well⁶</div><div>ON</div><div>n/a</div><div></div><div>ON</div><div>n/a</div><div>ON HYDRO</div><div>OK 71</div><div>100% Min</div><div>Clair Booster Station</div><div>ON</div><div>ATS</div><div>ON HYDRO</div><div>ON</div><div>OFF</div><div>AUTO-START AUTO-STOP</div><div>ON HYDRO</div><div>OK 69</div><div>100% Min</div><div>View Node UPS</div><div>ON HYDRO</div><div>OK 1440</div><div>100% Min</div><div>View Node UPS</div><div>ON HYDRO</div><div>OK 196</div><div>100% Min</div><div>Woods UV PLC</div><div>ON</div><div>n/a</div><div></div><div>ON</div><div>Powered By Woods Generator</div><div>ON HYDRO</div><div>OK 92</div><div>100% Min</div><div>Woods UV Reactors</div><div>ON HYDRO</div><div>OK 100</div><div>100% Min</div><div>UV Vendor Panels</div><div>ON HYDRO</div><div>OK 133</div><div>100% Min</div><div>ON HYDRO</div><div>OK 350</div><div>100% Min</div><div>ON HYDRO</div><div>OK 183</div><div>100% Min</div></div>														
<div><div>Clair Truck Fill⁷</div><div>ON</div><div>n/a</div><div></div><div>ON</div><div>Powered by Clair Booster Generator</div><div>Eramosa Truck Fill Powered by Clair Booster PLC UPS</div><div>Edinburgh Well</div><div>n/a</div><div>n/a</div><div>n/a</div><div>n/a</div><div>ON HYDRO</div><div>OK 1440</div><div>100% Min</div><div>Gazer Mooney SPS</div><div>n/a</div><div>n/a</div><div>n/a</div><div>n/a</div><div>ON HYDRO</div><div>OK 1440</div><div>100% Min</div><div>Clair Tower¹²</div><div>ON</div><div>n/a</div><div></div><div>ON</div><div>Powered by Clair Booster Generator</div><div>ON HYDRO</div><div>OK 64</div><div>100% Min</div><div>Speedvale Tower</div><div>ON</div><div>n/a</div><div></div><div>ON</div><div>n/a</div><div>ON HYDRO</div><div>OK 118</div><div>100% Min</div><div>Verney Tower</div><div></div><div>n/a</div><div></div><div></div><div>???</div><div>???</div><div>0% Min</div><div>Smallfield Well Bldg.</div><div>ON HYDRO</div><div>OK 1440</div><div>100% Min</div></div>														
<div><div>1. Arkell Well 7 generator running status is the ATS emergency power selected status</div><div>2. Arkell Well 8 hydro status is the PLC Panel power status, downstream of the MTS</div><div>3. Carter Wells hydro status is the PLC Panel power status, downstream of the MTS</div><div>4. Burkes Well hydro status is the PLC Panel power status, downstream of the MTS</div><div>5. Emma Well hydro status is the PLC Panel power status, downstream of the MTS</div><div>6. Helmar Well PLC panel and Hydro power status comes from Power Monitor relay</div><div>7. Clair Truck Fill PLC Panel power is fed from the Clair Booster PLC Panel UPS</div><div>8. Paisley Station pumps 1 & 7 are upstream of ATS. Generator coverage for pumps 2-3-4-5-6.</div><div>9. University generator running status is the ATS emergency power selected status</div><div>10. Water St. Well hydro status is the PLC Panel power status, downstream of the MTS</div><div>11. Woods Booster ATS and Generator feeds the entire Woods site (Main Bldg, Chlorine, Bldg, UV Bldg, Trailers)</div><div>12. Clair Tower is powered from Clair Booster Station (which has an auto-starting generator)</div><div>13. Arkell Diversion is powered by Well 15.</div><div>SCADA Server Racks</div><div>Clair Server Rack</div><div>ON HYDRO</div><div>OK 133</div><div>100% Min</div><div>Woods Server Rack</div><div>ON HYDRO</div><div>OK 751</div><div>100% Min</div><div>Legend</div><div>Hydro OK</div><div>ON HYDRO</div><div>OK</div><div>???</div><div>%</div><div>Charge left</div><div>UPS on Battery</div><div>???</div><div>%</div><div>Runtime left</div></div>														
<div><div>Ack</div><div>Date In</div><div>Time In</div><div>Time Last</div><div>Node</div><div>Tagname</div><div>Status</div><div>Value</div><div>Description</div></div>														
<div><div>✓</div><div>02/10/2018</div><div>10:55:14.273</div><div>10:55:14.273</div><div>WDSCADA</div><div>DOBG00100EPF</div><div>CFN</div><div>ALARM</div><div>Downey Well Pump Power Monitor</div></div>														
<div><div>✓</div><div>29/09/2018</div><div>12:54:05.987</div><div>12:54:05.987</div><div>WDSCADA</div><div>MEBG00100EPF</div><div>CFN</div><div>ALARM</div><div>Membro Well Pump Disconnect Off</div></div>														
<div><div>✓</div><div>29/09/2018</div><div>12:54:05.921</div><div>12:54:05.921</div><div>WDSCADA</div><div>MEBG00100EOL</div><div>CFN</div><div>ALARM</div><div>Membro Well Pump Overload Alarm</div></div>														
<div><div>✓</div><div>29/09/2018</div><div>12:54:05.921</div><div>12:54:05.921</div><div>WDSCADA</div><div>MEBG00100EGA</div><div>CFN</div><div>ALARM</div><div>Membro Well Pump General Alarm</div></div>														
<div><div>✓</div><div>29/09/2018</div><div>12:54:01.935</div><div>12:54:01.935</div><div>WDSCADA</div><div>MEBG00100EPF</div><div>CFN</div><div>ALARM</div><div>Membro Booster Pump Disconnect Off</div></div>														
<div><div>Total Alarms: 46</div><div>Filter: Off</div><div>Sort: Time In, Descending</div><div>Run</div></div>														

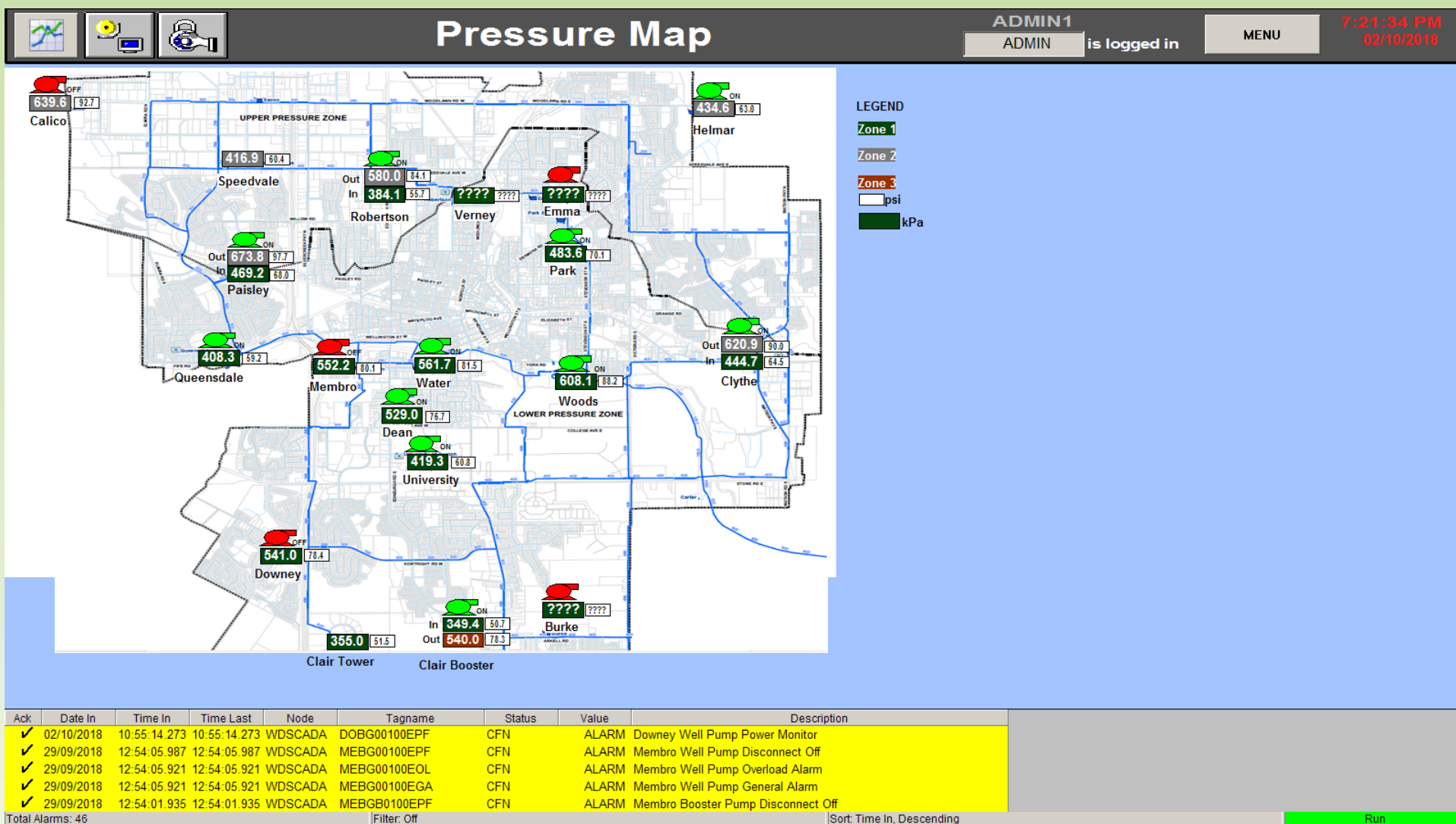
1. Arkell Well 7 generator running status is the ATS emergency power selected status
2. Arkell Well 8 hydro status is the PLC Panel power status, downstream of the MTS
3. Carter Wells hydro status is the PLC Panel power status, downstream of the MTS
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11. Woods Booster ATS and Generator feeds the entire Woods site (Main Bldg, Chlorine, Bldg, UV Bldg, Trailers)
12. Clair Tower is powered from Clair Booster Station (which has an auto-starting generator)
13. Arkell Diversion is powered by Well 15.

SCADA Server Racks
Clair Server Rack
ON HYDRO OK 100%
Rack 23 DegC 40 Humid
Room 21 DegC 40 Humid
Woods Server Rack
ON HYDRO OK 100%
Rack 28 DegC 13 Humid
Room 25 DegC 30 Humid

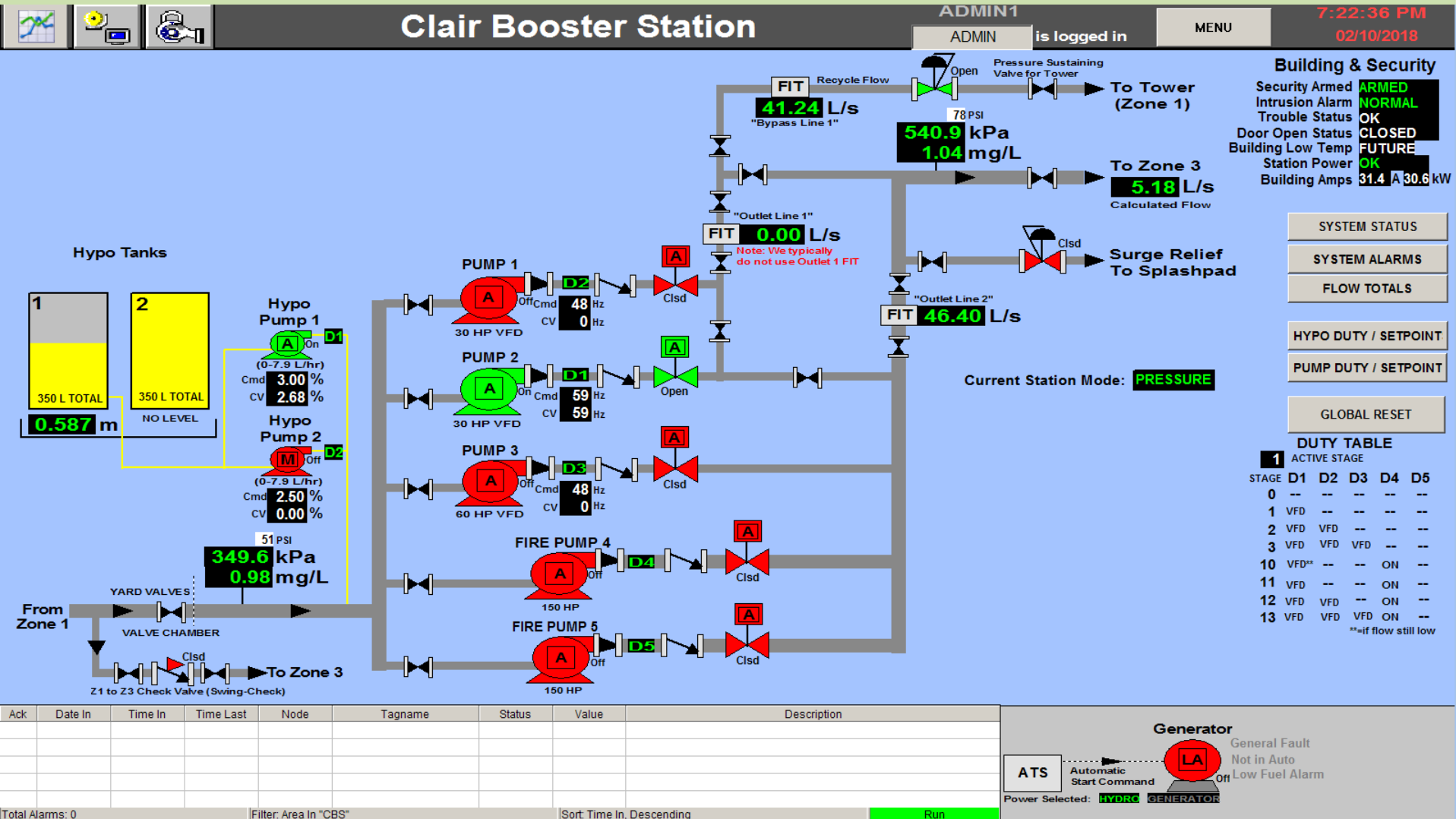
Legend
Hydro OK — ON HYDRO OK ###%
UPS on Hydro — ON BATT ###%
UPS on Battery — Runtime left

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	MEBGG0100EPF	CFN	ALARM	Membro Well Pump Disconnect Off
✓	29/09/2018	12:54:05.921	12:54:05.921	WDSCADA	MEBGG0100EOL	CFN	ALARM	Membro Well Pump Overload Alarm
✓	29/09/2018	12:54:05.921	12:54:05.921	WDSCADA	MEBGG0100EGA	CFN	ALARM	Membro Well Pump General Alarm
✓	29/09/2018	12:54:01.935	12:54:01.935	WDSCADA	MEBGG0100EPF	CFN	ALARM	Membro Booster Pump Disconnect Off
Total Alarms: 46								
Filter: Off								
Sort: Time In, Descending								
Run								

Dash Board Displays – Pressures Across City



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



Next Stop – Emma Well

