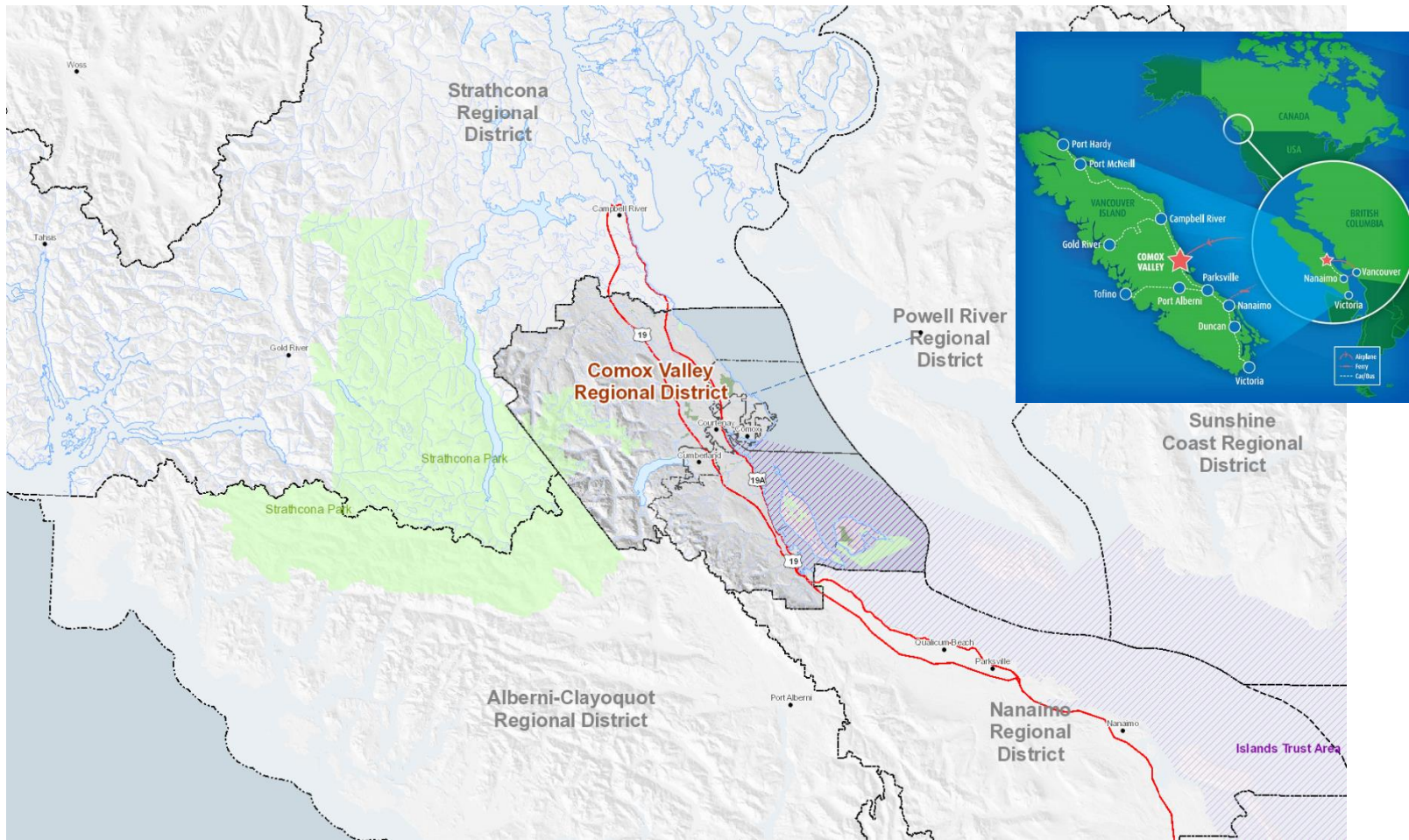




SCADA Data Across the Enterprise

Presented by **Brian Pearson**
Senior Manager of Information Systems & GIS





Comox Valley Regional District

- Local regional government for 3 municipalities and 3 rural areas
- Manage major utilities – Water, Sewer, Solid Waste
- Population of 65,000
- 27 remote sites throughout the Comox Valley



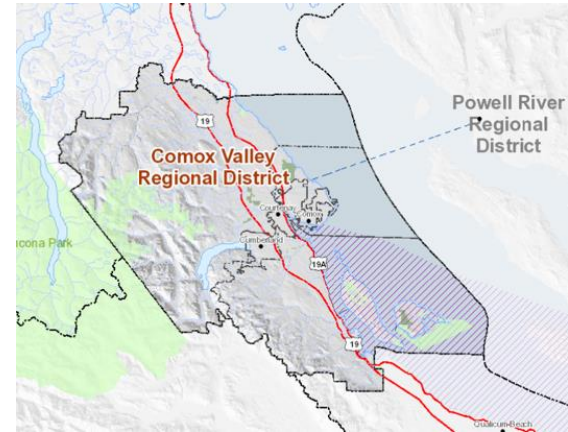
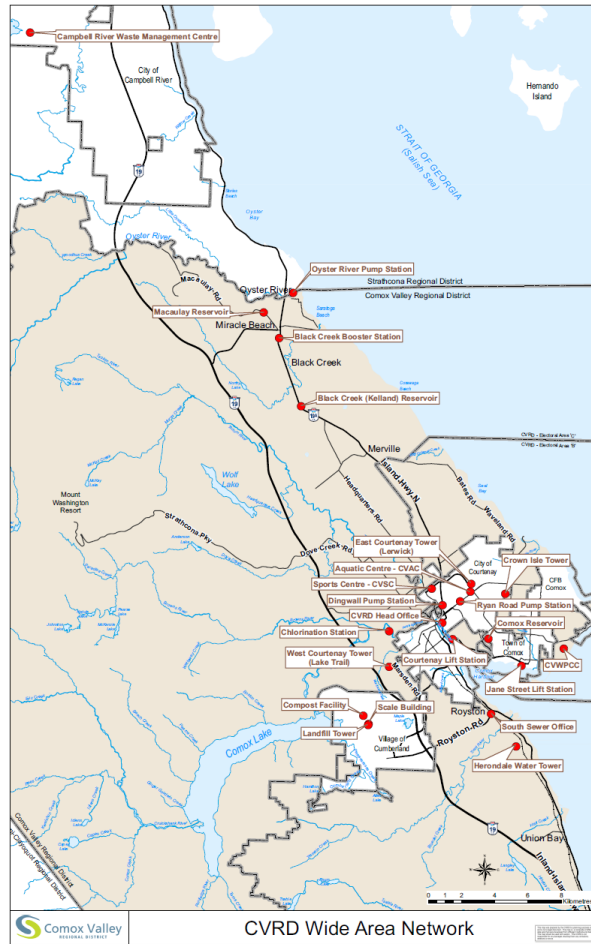
Overview

- Business Challenges
- Existing systems and how data collection worked in past
- Implementation of network and data connections
- Integration of the PI System®
- Integration of PI Coresight™ and PI ProcessBook®
- Changes to systems and how staff work
- Outcomes and future directions with data integration

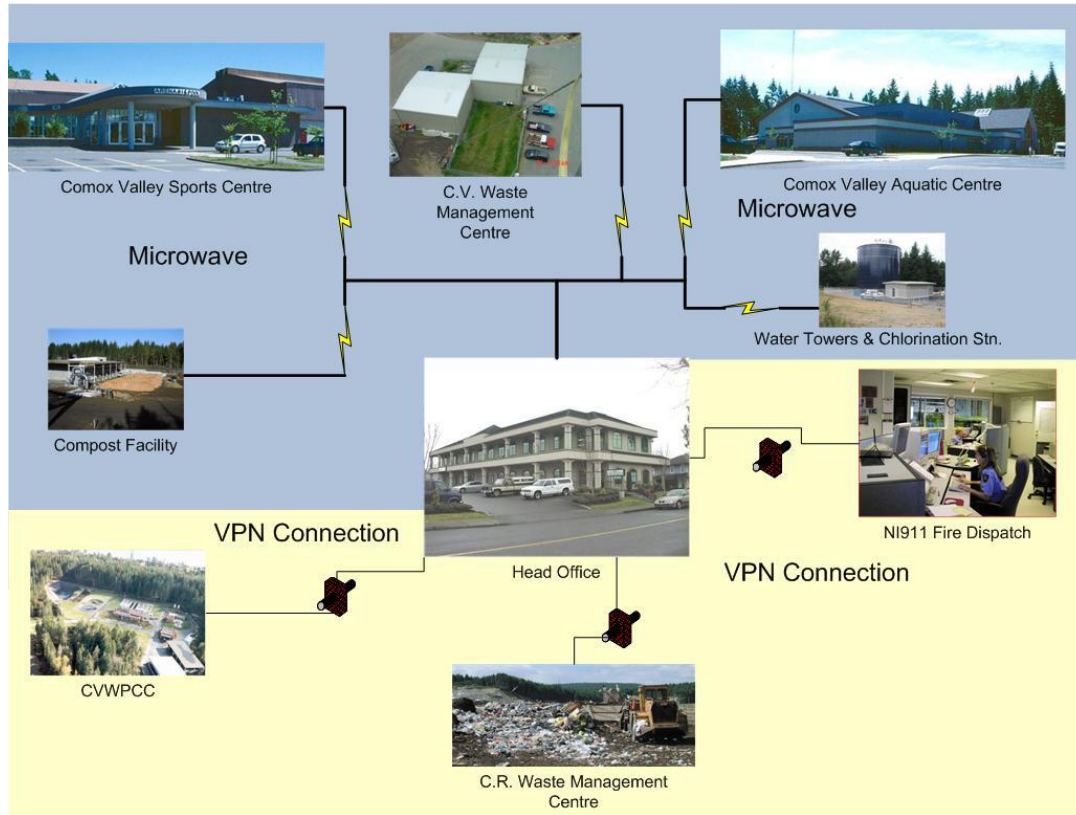
Business Challenge

- Bring all data from remote water, sewer and Solid waste stations to central office
- Large distances between sites makes local data analysis impossible
- Need to centrally store and analyze data from remote sites in real time
- Many staff members in several departments need to view and monitor collected data and systems
- Increase efficiencies in time, labour and costs to access data and to control remote systems

27 remote sites throughout the Comox Valley

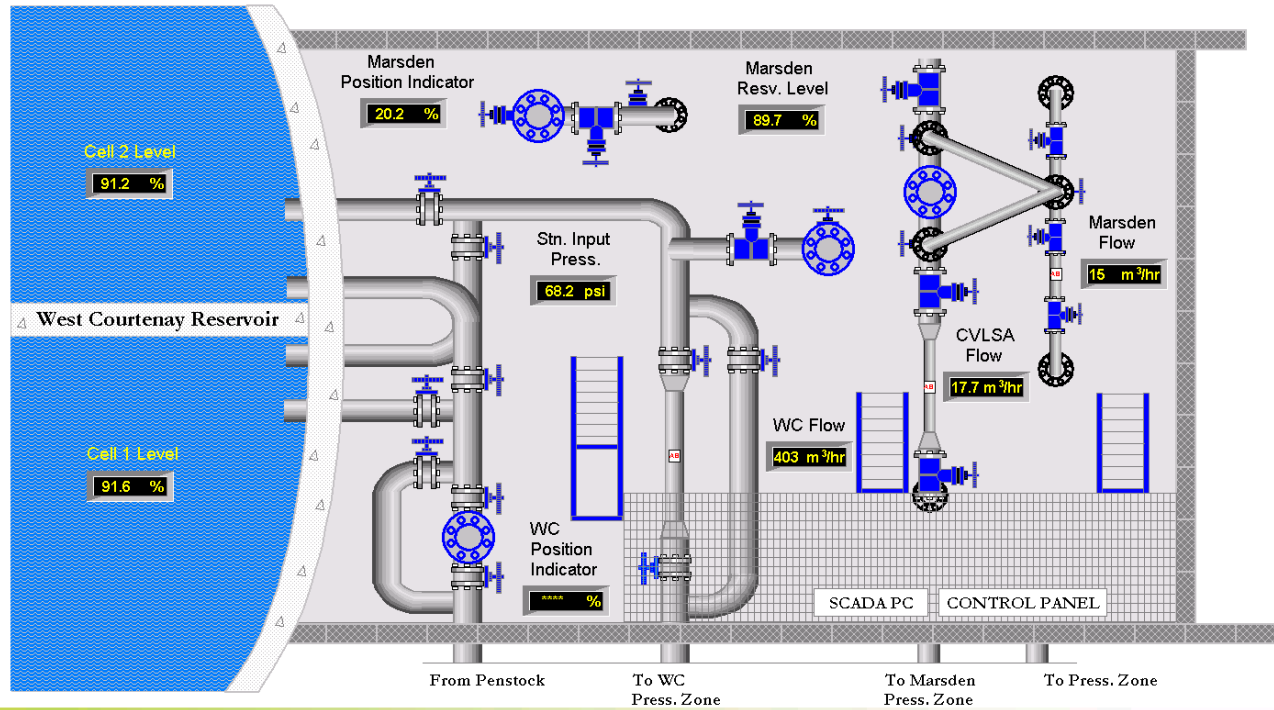


CVRD Wide Area Network









User Logged In : JAMES

SCADA Selection Screen

West Courtenay Trending

West Courtenay Alarm Summary

HELP!

Please Logout

West Courtenay Setpoints

West Courtenay Timers

- psi WC Low Input Pressure Alarm
- m³/hr WC Low Flow Alarm
- % WC Position Indicator Max. open before Alarm
- % WC Position Indicator Min. open before Alarm

hold the alt valve position on marsden

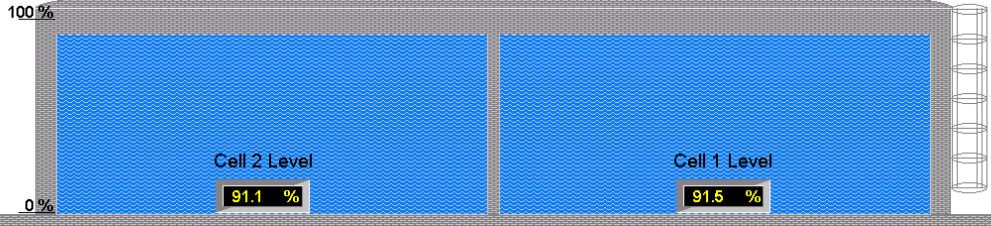
- | | |
|--|--|
| <input type="text" value="98"/> % Cell 2 - Hi Level Alarm | <input type="text" value="98"/> % Cell 1 - Hi Level Alarm |
| <input type="text" value="95"/> % Cell 2 - Stop Fill | <input type="text" value="95"/> % Cell 1 - Stop Fill |
| <input type="text" value="87"/> % Cell 2 - Start Fill | <input type="text" value="87"/> % Cell 1 - Start Fill |
| <input type="text" value="50"/> % Cell 2 - Low Level Alarm | <input type="text" value="50"/> % Cell 1 - Low Level Alarm |

- % Alarm - Hi Reservoir Level
- % Marsden Stop Fill
- % Marsden Start Fill
- % Alarm - Low Reservoir Level

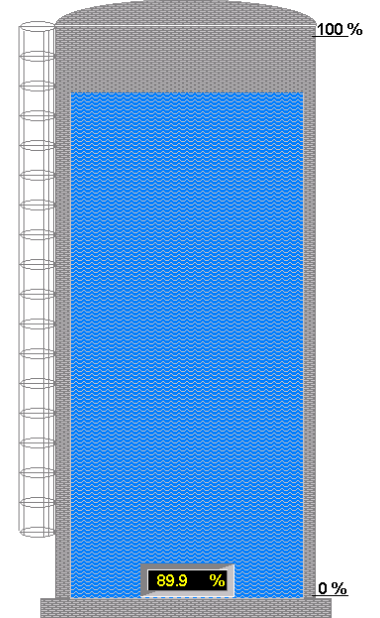
- Marsden Hi Pressure Shutdown
- Marsden Low Pressure Alarm

- % Marsden Position Indicator Max. open before Alarm
- % Marsden Position Indicator Min. open before Alarm

West Courtenay Reservoir

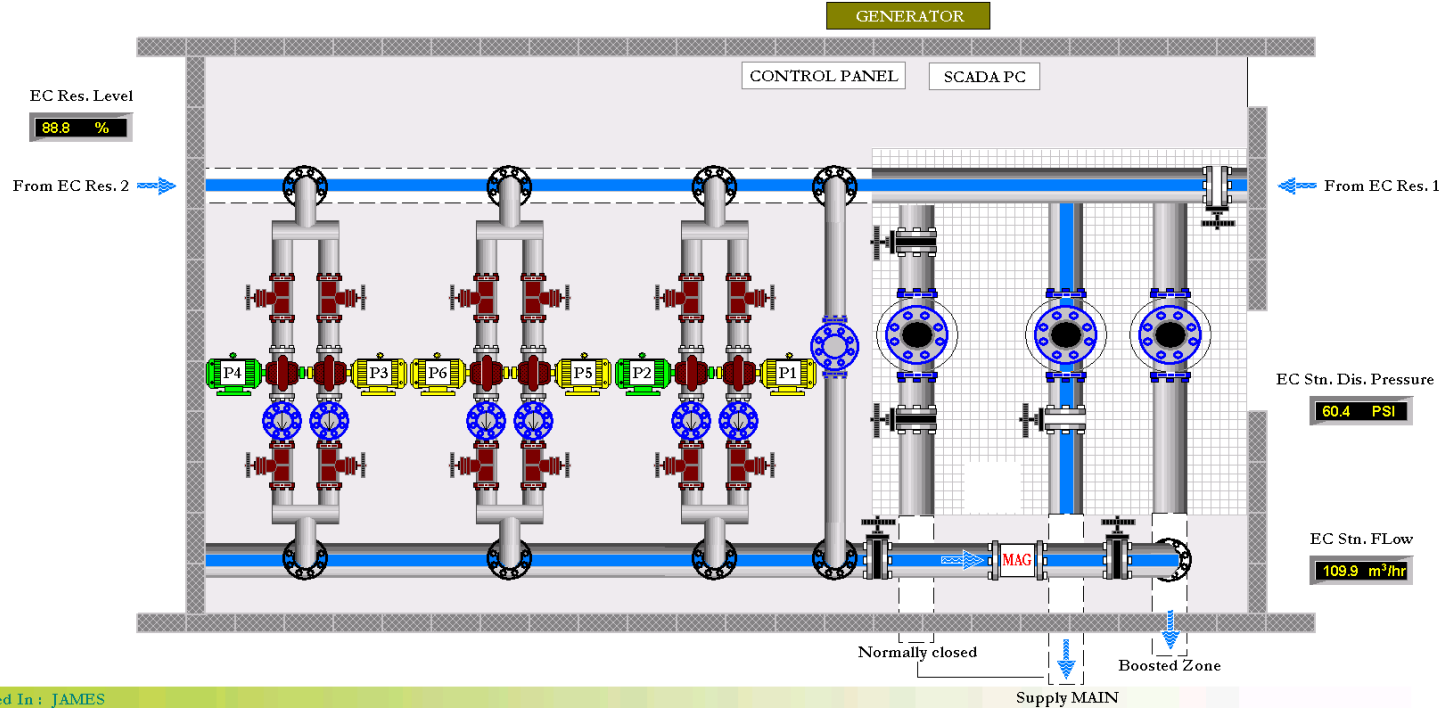


Marsden Reservoir



Close Setpoints





User Logged In : JAMES

SCADA Selection Screen

East Courtenay Trending

East Courtenay Alarm Summary

Please Logout

Idle in 9:56

East Courtenay Pumps Data

East Courtenay Setpoints

East Courtenay Timer

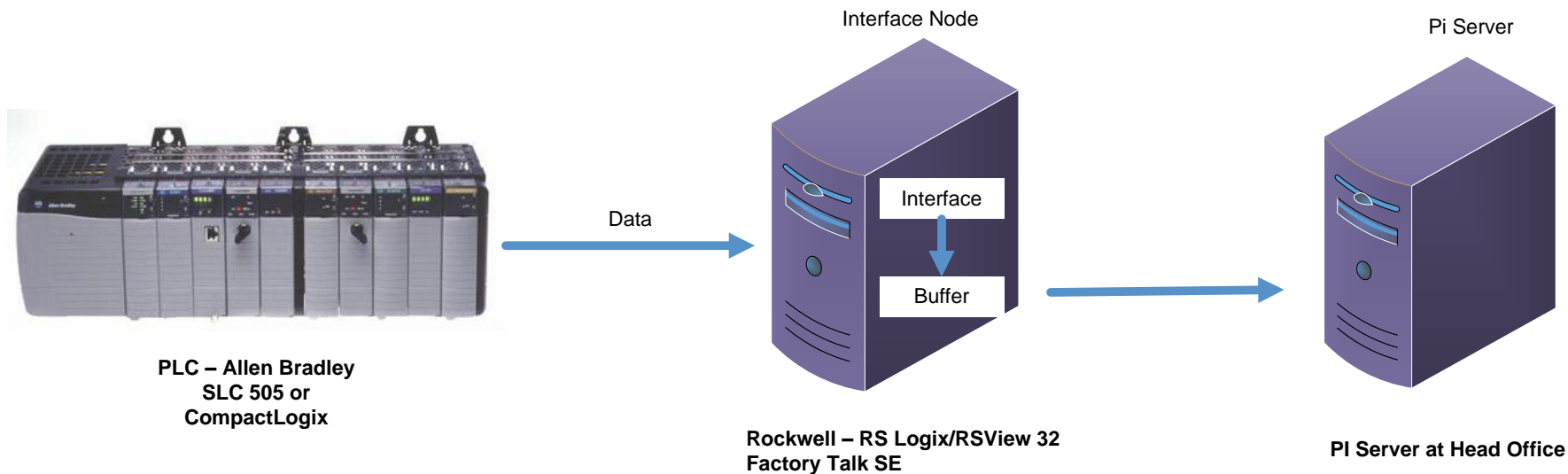
HELP !

Original chart recorders for data collection



PI System® – PI Server™

Standard Configuration at Remote Sites



Servers

Search

Servers

System Management Tools

Search

- Alarms
- Batch
- Data
- Interfaces
- IT Points
- Operation
- Points
- Security
 - Database Security
 - Firewall
 - Identities, Users & Groups
 - Mappings & Trusts**
 - Security Settings

Trust	Server	Collective	Description	PI User	Domain	OS User	Application Name	Network Path	IP Address	NetMask	Enabled
(Proxy_127)				piadmin						255.255.255.255	True
Black Creek RSView OPC				PI_OPICnt			OPCpE			255.255.255.255	True
Buffering Black Creek				PI_OPICnt			pibufss.exe			255.255.255.255	True
Buffering Chlointation Service				PI_OPICnt			pibufss.exe			255.255.255.255	True
Buffering ComoxRes Service				PI_OPICnt			pibufss.exe			255.255.255.255	True
Buffering Courtenay Station Service				PI_OPICnt			pibufss.exe			255.255.255.255	True
Buffering Crown Isle				PI_OPICnt			pibufss.exe			255.255.255.255	True
Buffering Dingwall				PI_OPICnt			pibufss.exe			255.255.255.255	True
Buffering East Courtenay				PI_OPICnt			pibufss.exe			255.255.255.255	True
Buffering Flare				PI_OPICnt			pibufss.exe			255.255.255.255	True
Buffering Marsden Service				PI_OPICnt			pibufss.exe			255.255.255.255	True
Buffering Oyster River				PI_OPICnt			pibufss.exe			255.255.255.255	True
Buffering Treatment Plant				PI_OPICnt			pibufss.exe			255.255.255.255	True
Buffering Treatment Plant New				PI_OPICnt			pibufss.exe			255.255.255.255	True
Buffering West Courtenay				PI_OPICnt			pibufss.exe			255.255.255.255	True
BufferingTrust				PI_OPICnt			pibufss.exe			255.255.255.0	True
BufferingTrust(2nd[P]				PI_OPICnt			pibufss.exe			255.255.255.255	True
Chlointation RSView OPC				PI_OPICnt			OPCpE			255.255.255.255	True
Comox Res RSView OPC				PI_OPICnt			OPCpE			255.255.255.255	True
Courtenay Station RSView OPC				PI_OPICnt			OPCpE			255.255.255.255	True
Crown Isle RSView OPC				PI_OPICnt			OPCpE			255.255.255.255	True
CVRDCoresight_hostname				piadmin				Coresight	0.0.0.0		True
CVRDCoresight_IP				piadmin						255.255.255.255	True
ewetNet				piadmin						255.255.255.255	True
Dingwall RSView OPC				PI_OPICnt			OPCpE			255.255.255.255	True
EastCourtenay RSView OPC				PI_OPICnt			OPCpE			255.255.255.255	True
Flare OPC				PI_OPICnt			OPCpe			255.255.255.255	True
Historian connection				PI_OPICnt						255.255.255.255	True
Historian connection server				PI_ICUEditor			PHCU.exe			255.255.255.255	True
Marsden RSView OPC				PI_OPICnt			OPCpE			255.255.255.255	True
Oyster River RSView OPC				PI_OPICnt			OPCpE			255.255.255.255	True
PI ICU Black Creek		Black Creek		PI_ICUEditor			PHCU.exe			255.255.255.255	True
PI ICU Chlointation				PI_ICUEditor			PHCU.exe			255.255.255.255	True
PI ICU ComoxRes				PI_ICUEditor			PHCU.exe			255.255.255.255	True
PI ICU Courtenay Station			Communication from the remote node to the server	PI_ICUEditor			PHCU.exe			255.255.255.255	True
PI ICU Crown Isle				PI_ICUEditor			PHCU.exe			255.255.255.255	True
PI ICU Dingwall				PI_ICUEditor			PHCU.exe			255.255.255.255	True
PI ICU EastCourtenay				PI_ICUEditor			PHCU.exe			255.255.255.255	True
PI ICU Flare				PI_ICUEditor			PHCU.exe			255.255.255.255	True
PI ICU Marsden				PI_ICUEditor			PHCU.exe			255.255.255.255	True
PI ICU Oyster River		Oyster River Station		PI_ICUEditor			PHCU.exe			255.255.255.255	True
PI ICU Ryan				PI_ICUEditor			PHCU.exe			255.255.255.255	True
PI ICU Treatment Plant				PI_ICUEditor			PHCU.exe			255.255.255.255	True
PI ICU Treatment Plant New				PI_ICUEditor			PHCU.exe			255.255.255.255	True
PI ICU West Courtenay				PI_ICUEditor			PHCU.exe			255.255.255.255	True
PI SDK Trust Oyster River				PI_ICUEditor			PISDKUtility.exe			255.255.255.255	True
PI SDK Trust Treatment Plant				PI_ICUEditor			PISDKUtility.exe			255.255.255.255	True
PI SDK Trust Treatment Plant New				PI_ICUEditor			PISDKUtility.exe			255.255.255.255	True
PI SDK Trust Treatment Plant New				piadmin			rsantF			255.255.255.255	True

piadmin, piadmins, PIWorld

PI System Interface Failover

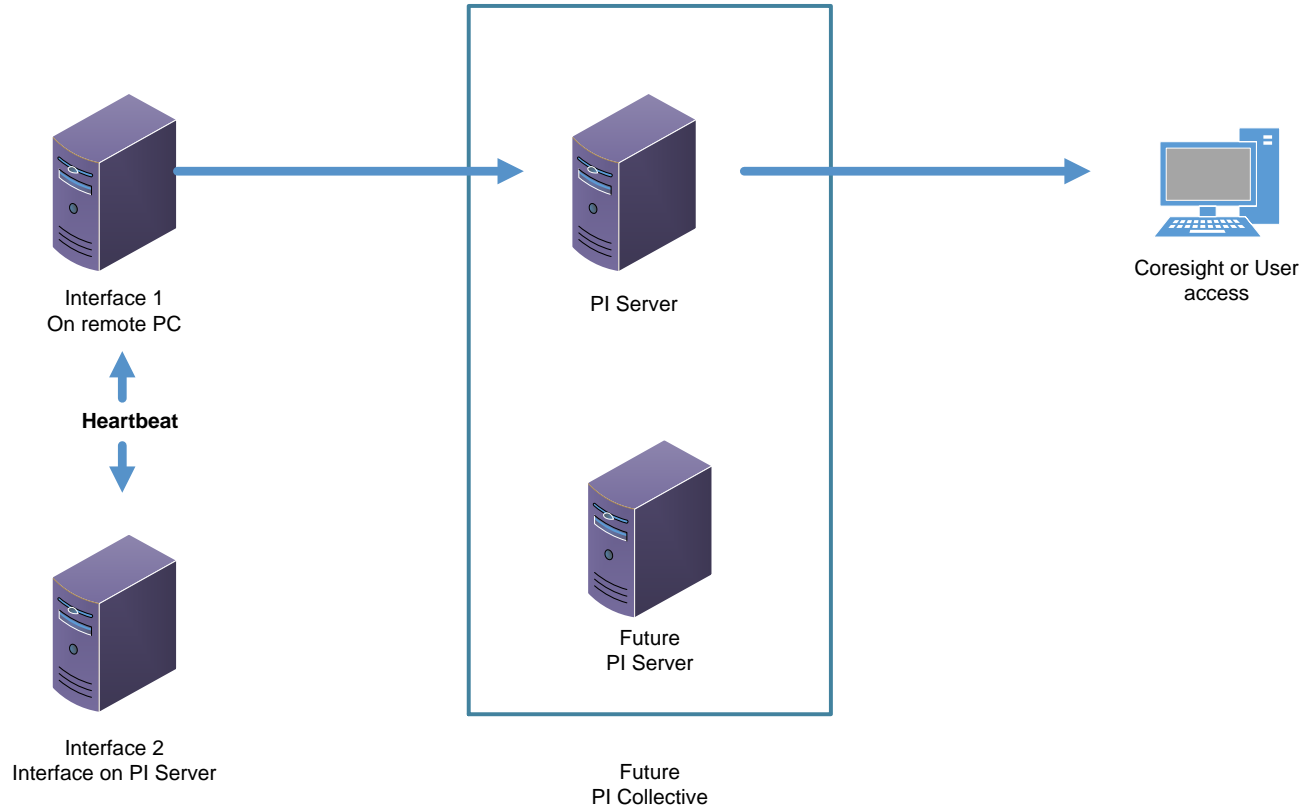
The screenshot shows the 'PI Interface Configuration Utility - opcint3' window. The 'Interface' is 'FailOver Chlorination 31 (opcint3)'. The 'Type' is 'OPCint'. The 'Description' is 'FailOver Chlorination 31'. The 'Versions' are 'opcint.exe version 2.5.1.3' and 'Unintnt version 4.5.5.22'. The 'PI Data server Connection Status' is 'Writeable' with a green checkmark.

The 'Unint Failover' section is expanded, showing 'Enable Unint Failover' checked. The 'Phase' is 'Phase 2'. The 'Failover ID# for this instance' is '2' and the 'Failover ID# of the other instance' is '1'. The 'UFO Type' is 'WARM' and the 'Synchronization File Path' is 'ailover\opcint_OPC_31.dat'. The 'Rate at which the heartbeat point is updated/checked' is '5000' milliseconds.

Status	Tag	Exdesc	PointSource	L	^
Created	opcint_31_OPC_UFO2_ActiveID	[UFO2_ActiveID]	OPC	3	
Created	opcint_31_OPC_UFO2_Heartbeat_2	[UFO2_Heartbeat:2]	OPC	3	
Created	opcint_31_OPC_UFO2_Heartbeat_1	[UFO2_Heartbeat:1]	OPC	3	

The status bar at the bottom shows 'Ready', 'Stopped', and 'opcint3 - Installed'.

Failover and High Availability (HA)



Advanced Computing Engine (ACE)

Name	Status/Value	Since	Schedule	Output Tags
Context Summary				
	On	7/12/2016 3:23:38 PM	Clock (5, 0)	1
	On	7/12/2016 3:23:38 PM	Clock (5, 10)	1
	On	7/12/2016 3:23:38 PM	Clock (5, 10)	1
	On	7/12/2016 3:23:38 PM	Clock (5, 10)	1
	On	7/12/2016 3:23:38 PM	Clock (5, 0)	1
	On	7/12/2016 3:23:38 PM	Clock (5, 0)	1
	On	7/12/2016 3:23:38 PM	Clock (5, 0)	1
	On	7/12/2016 3:23:38 PM	Clock (15, 0)	1
	On	7/12/2016 3:23:38 PM	Clock (5, 5)	1
	On	7/12/2016 3:23:38 PM	Clock (5, 0)	1
	On	7/12/2016 3:23:38 PM	Clock (5, 5)	1
	On	7/12/2016 3:23:38 PM	Clock (5, 5)	1

1 Executables; 12 Modules; 12 Contexts (12 Running, 0 Error, 0 Unregistered, 0 OutOfService)

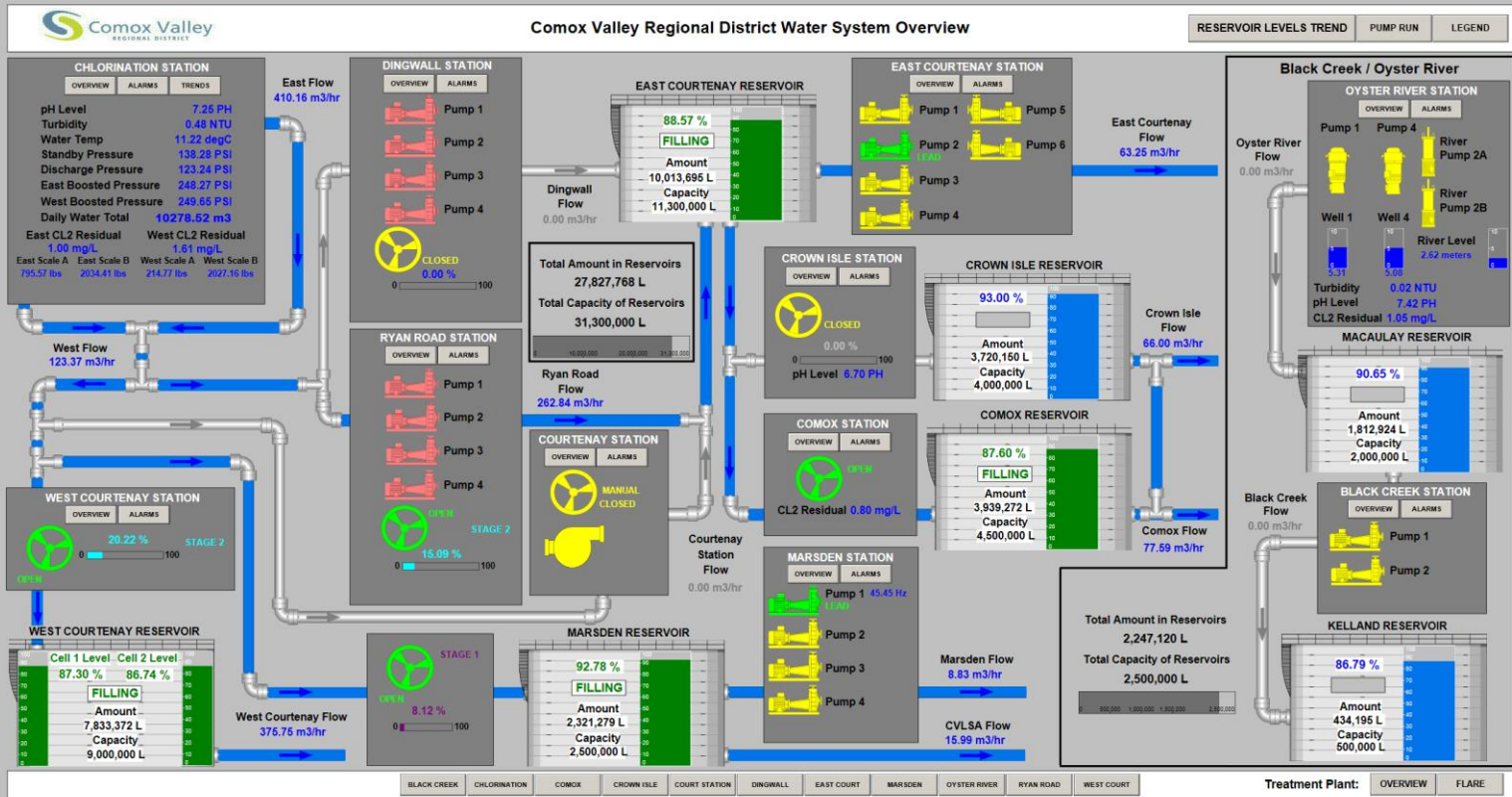
PI Coresight™ and PI ProcessBook® Visualization

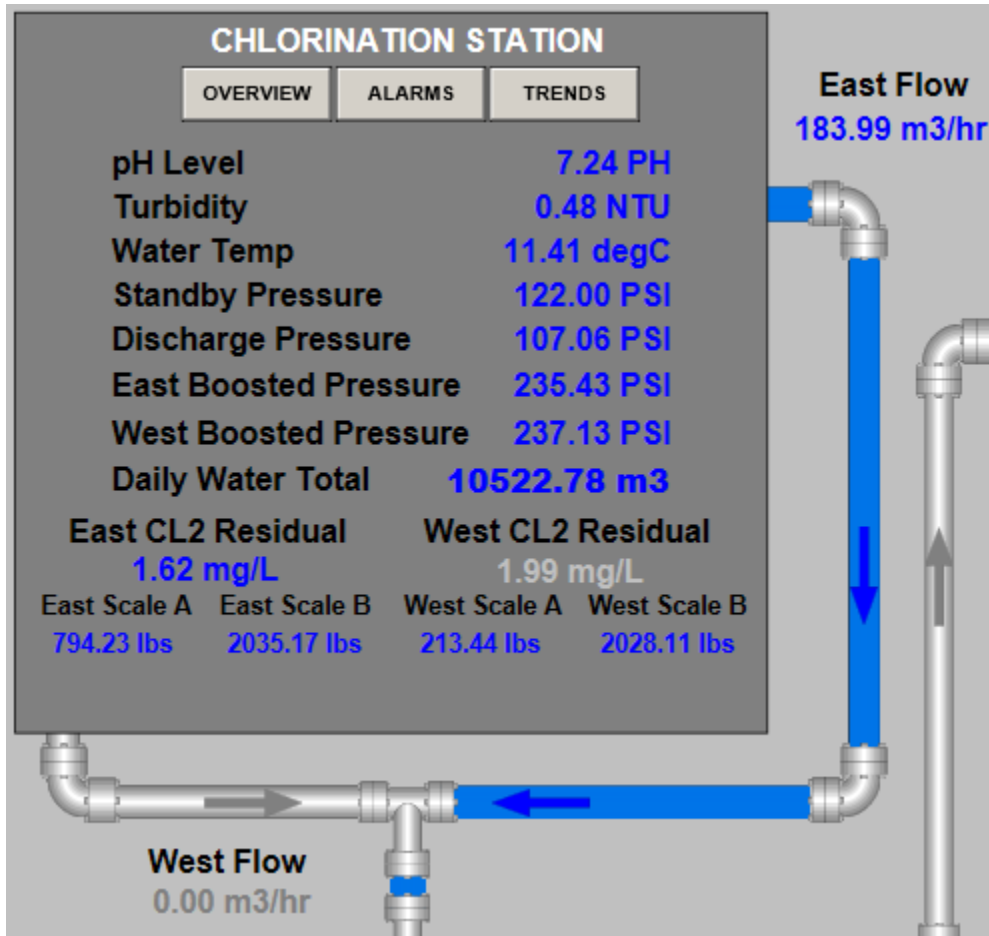
Search All Displays

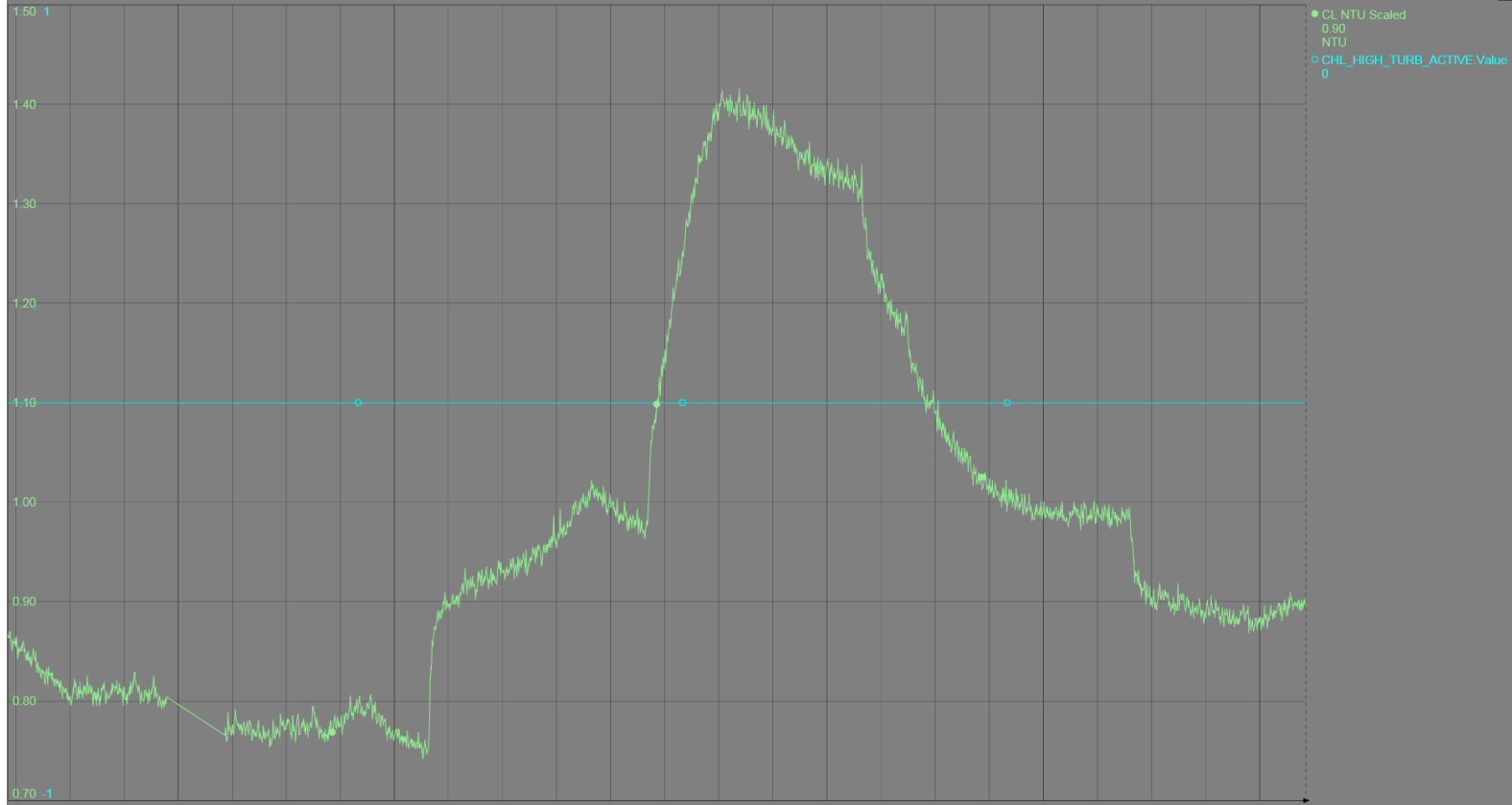
All Displays (27)

- All Displays
- Favorites
- My Displays
- Recent
- ProcessBook

<p>Water System Overview RDCS\dawjam</p>	<p>Black Creek Overview RDCS\dawjam</p>	<p>Flare Overview RDCS\dawjam</p>	<p>Comox Overview RDCS\dawjam</p>	<p>Dingwall Overview RDCS\dawjam</p>	<p>Crown Isle Overview RDCS\dawjam</p>
<p>Oyster River Setpoints RDCS\dawjam</p>	<p>Ryan Road Overview RDCS\dawjam</p>	<p>Chlorination Station Overview RDCS\dawjam</p>	<p>Comox Setpoints RDCS\dawjam</p>	<p>Dashboard RDCS\peabri</p>	<p>East Courtenay Overview RDCS\dawjam</p>
<p>Water Reservoir Levels RDCS\dawjam</p>	<p>West Courtenay Overview RDCS\dawjam</p>	<p>Oyster River Overview RDCS\dawjam</p>	<p>Black Creek RDCS\peabri</p>	<p>Test RDCS\peabri</p>	<p>Crown Isle Setpoints RDCS\dawjam</p>
<p>Oyster River Setpoints RDCS\dawjam</p>	<p>Oyster River Setpoints RDCS\dawjam</p>	<p>Oyster River Setpoints RDCS\dawjam</p>	<p>Oyster River Setpoints RDCS\dawjam</p>	<p>Oyster River Setpoints RDCS\dawjam</p>	<p>Oyster River Setpoints RDCS\dawjam</p>







● Chlorination Stn Water Turbidity ○

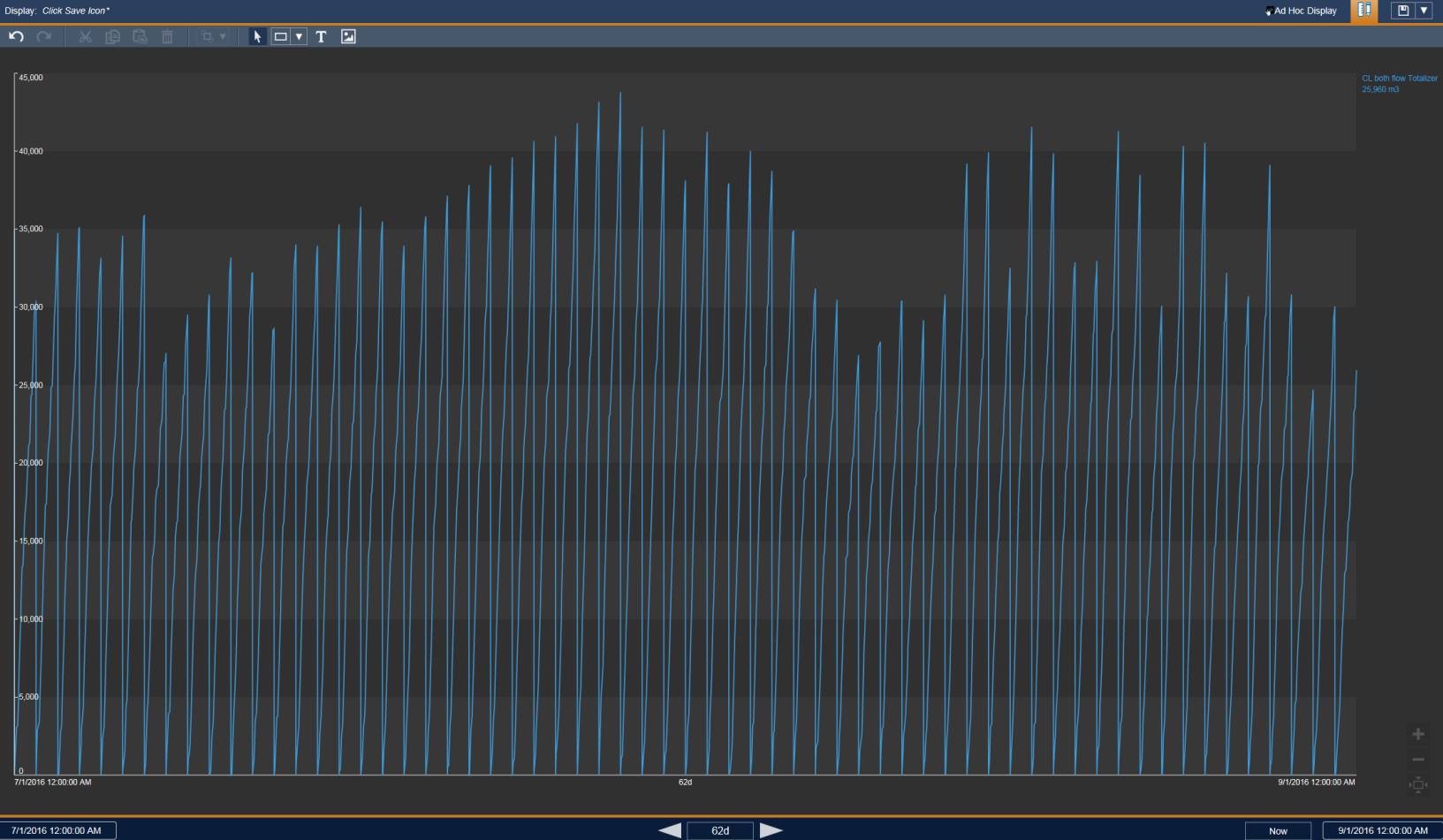
10/16/2016 8:51:04 AM

◀ 1d ▶

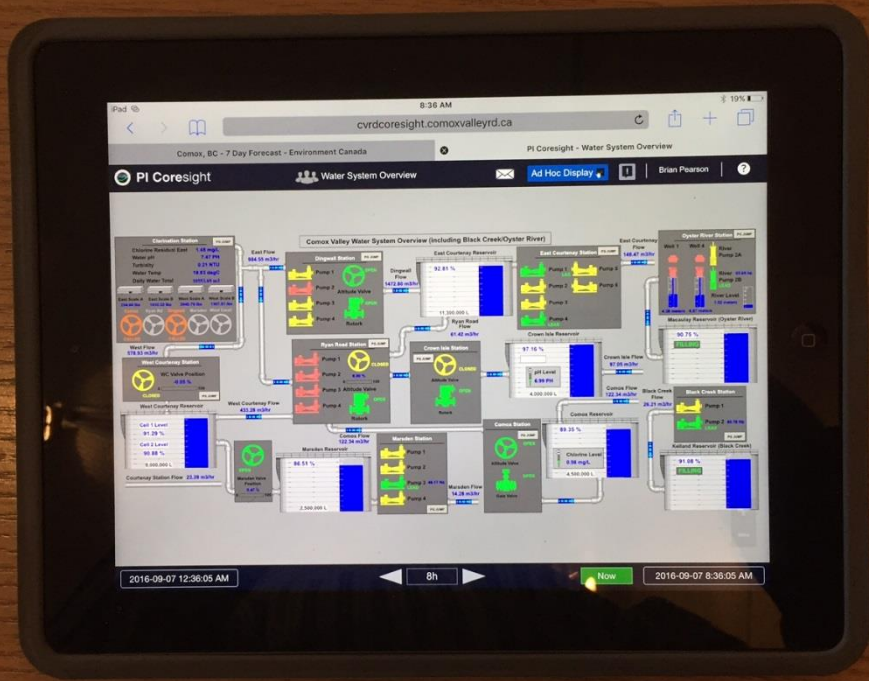
Now

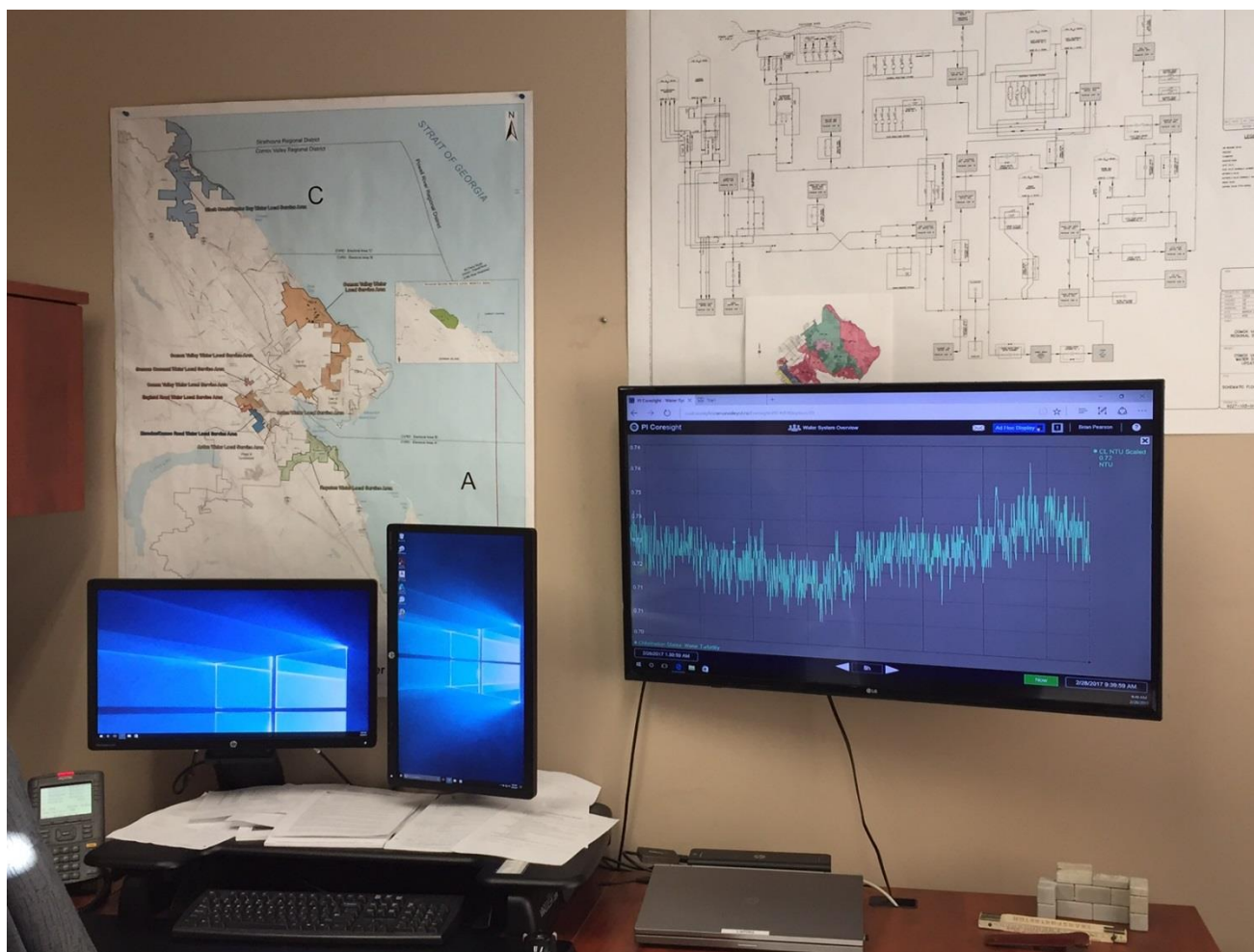
10/17/2016 8:51:04 AM

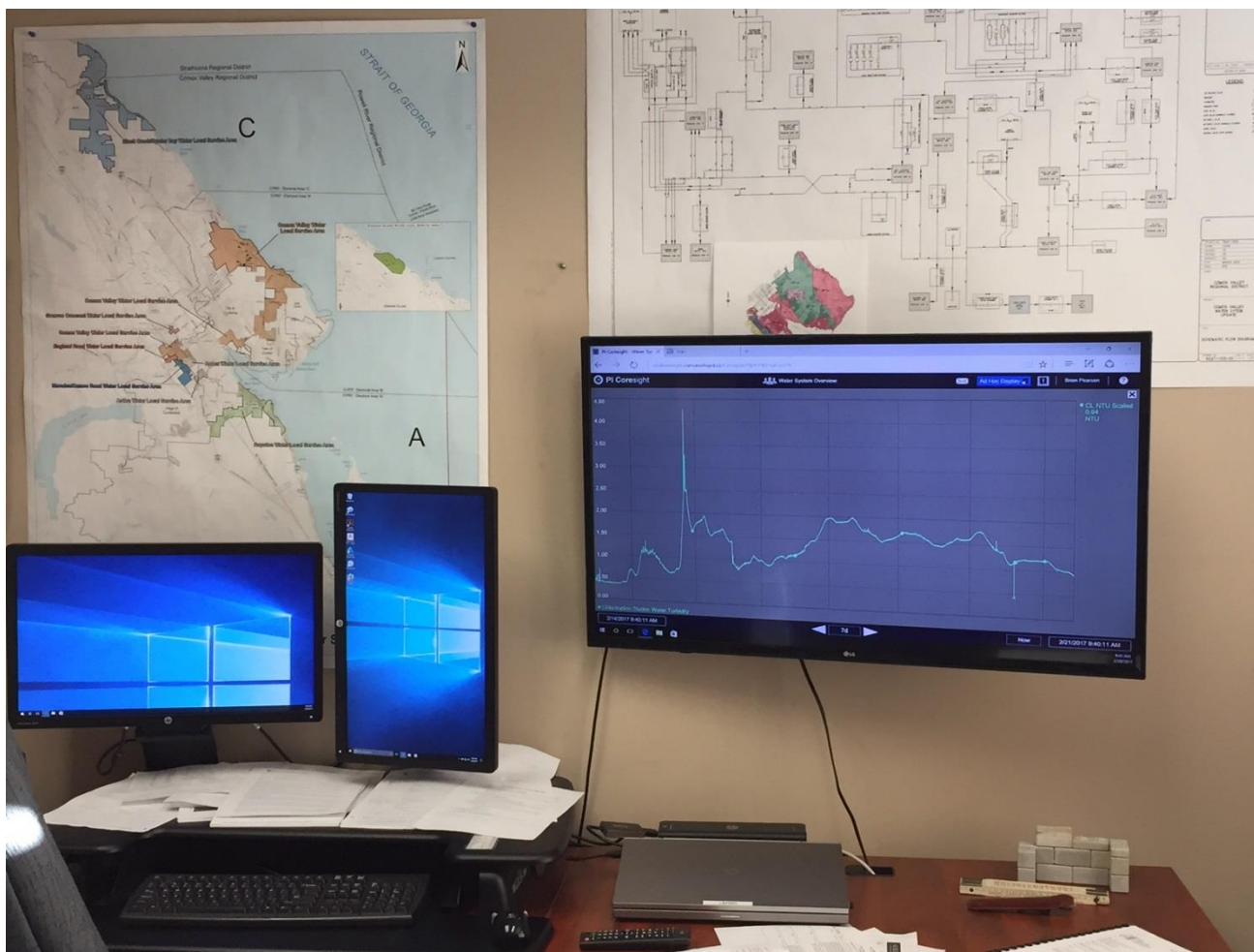
- Assets
- cl*
- CL pH Scaled
 - CL both flow sum
 - CL both flow Totalizer
 - CL CHL_Leak_ALM
 - CL CHL_Room_Flood
 - CL CL_East_Scale_A
 - CL CL_East_Scale_B
 - CL CL_West_Scale_A
 - CL CL_West_Scale_B
 - CL Comm_Fail_ALM
 - CL COMM_FAIL_STBY_STN
 - CL Cx_alt_valve_call
 - CL CX_RES_LVL
 - CL DI_Alt_Valve_Call
 - CL E_CL2_HI_SP
 - CL E_CL2_LO_FLOW_SP
 - CL E_CL2_LO_SP
- Attributes

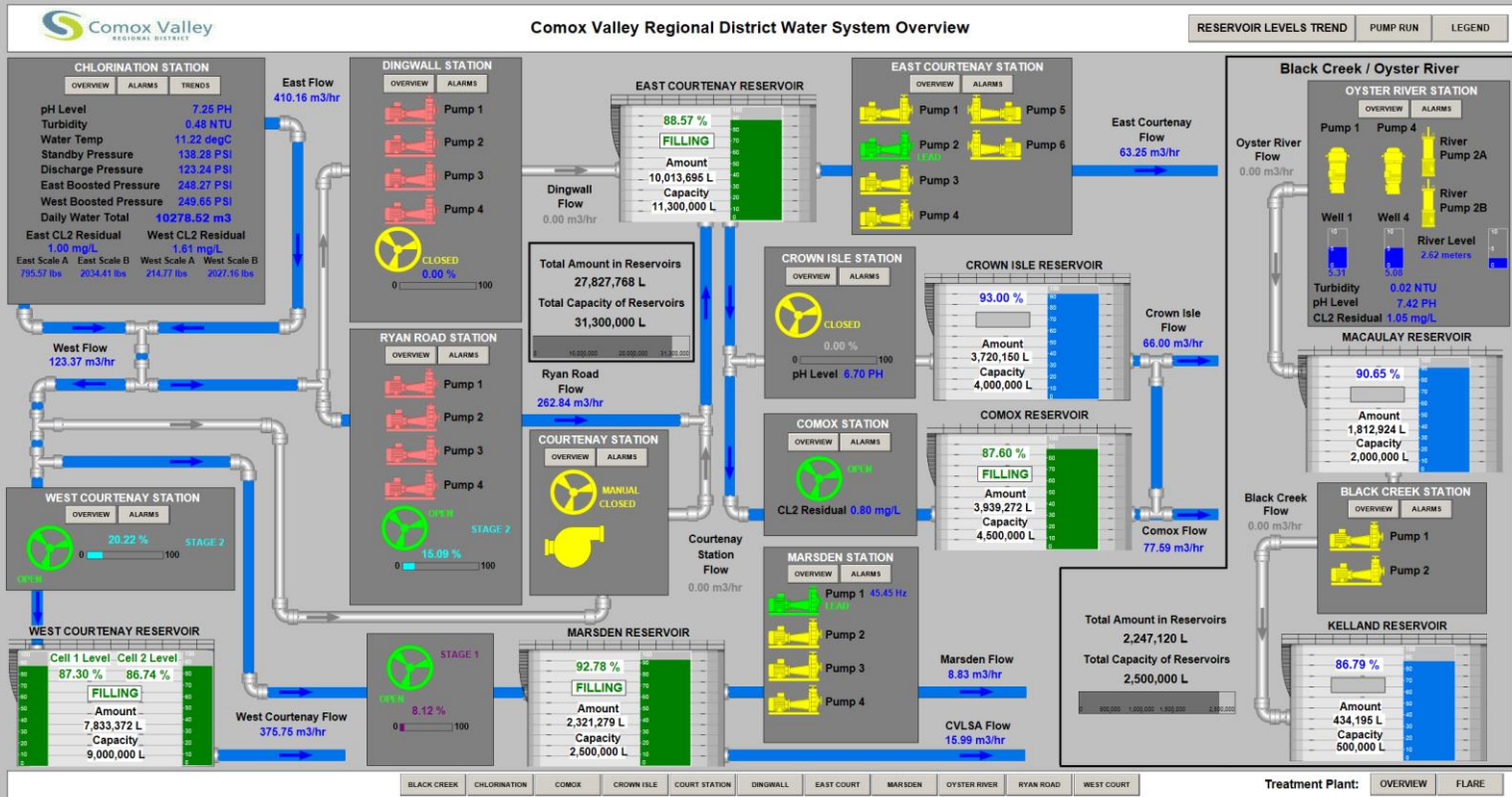














Comox Overview

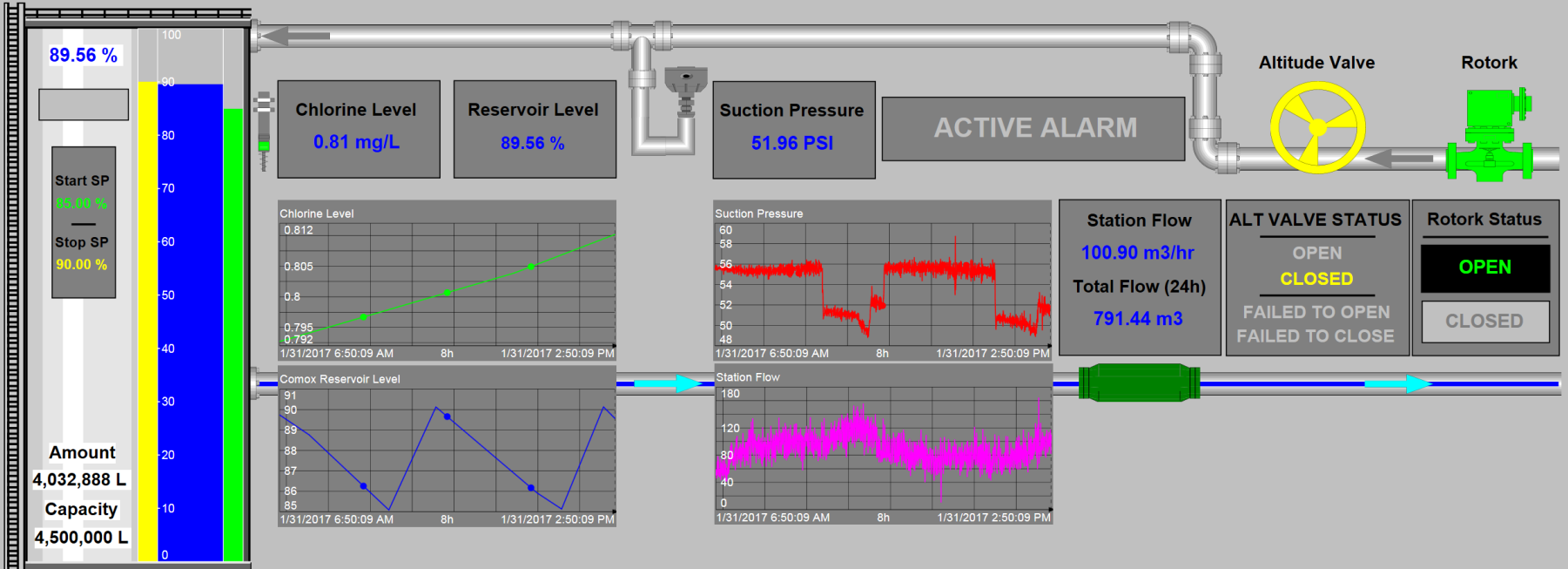
Setpoints

Alarms

Trends

Totals

Comox Reservoir



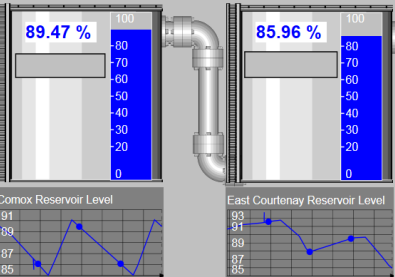
- WS Overview
- Black Creek
- Chlorination
- Comox**
- Crown Isle
- Court Station
- Dingwall
- East Court
- Marsden
- Oyster River
- Ryan Road
- West Court



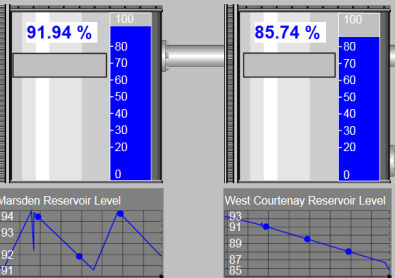
Chlorination Station Overview

- Setpoints
- Alarms
- Trends
- Totals
- Pump Run

Comox Reservoir East Courtenay Reservoir

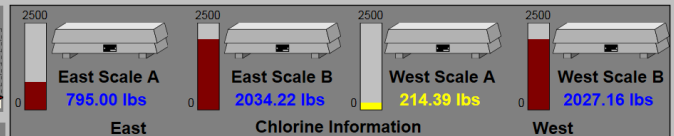
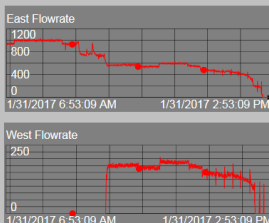


Marsden Reservoir West Courtenay Reservoir



Station Information

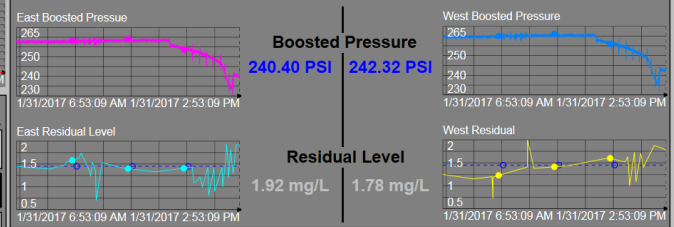
Flowrate (East + West) 0.00 m3/hr
 Total Flow (E+W 24h) 10544.65 m3
 Standby Pressure 128.52 PSI
 Discharge Pressure 114.21 PSI
 Station UVT -25.00
 pH Level 7.26 PH
 Turbidity 0.48 NTU
 Water Temp 11.42 degC



ACTIVE ALARM

Water Temp 11.6, 11.2, 10.8, 10.4, 10.4
 Standby Pressure 115
 Discharge Pressure 110, 110, 110, 110
 pH Level 7.3, 7.2, 7.2, 7.1, 7.1, 6.9
 Turbidity 0.515, 0.5, 0.48, 0.465

Generator	Scrubber
RUNNING	RUNNING
STANDBY	STANDBY
FAULTED	FAULTED



Altitude Valve Status

Comox OPEN CLOSED	Ryan Road OPEN STAGE 1 STAGE 2 STAGE 3 CLOSED	Dingwall OPEN STAGE 1 STAGE 2 STAGE 3 CLOSED	Marsden OPEN STAGE 1 STAGE 2 STAGE 3 CLOSED	West Courtenay OPEN STAGE 1 STAGE 2 STAGE 3 CLOSED
------------------------------------	---	--	---	--

- WS Overview
- Black Creek
- Chlorination
- Comox
- Crown Isle
- Court Station
- Dingwall
- East Court
- Marsden
- Oyster River
- Ryan Road
- West Court

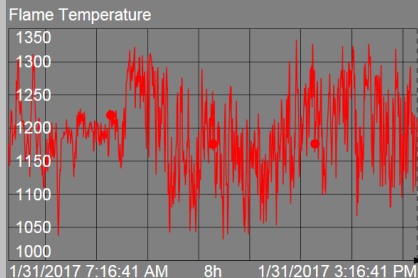


Flare Overview

Alarms



Pilot Light Temp
917 DegF



Flare Information	
Flame Temperature	1196.98 DegF
Total Runtime	7326.00 Hrs
Flow Rate	241.55 SCFM
Flow Total	213279.69 SCFD
Inlet Temperature	43.09 DegF
Inlet Vacuum Pressure	15.25 "WC
CST Level (Sump)	6.68 in

Blower 301

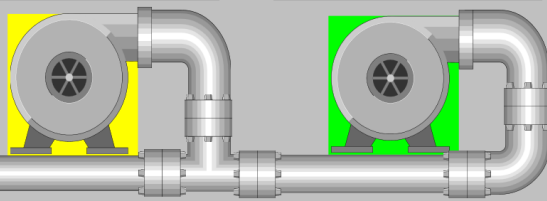
Amperage 0.00 A
% Max Speed 0.00 %
Vibration 0.01 In/S

RUNNING
STANDBY

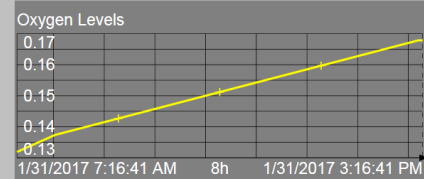
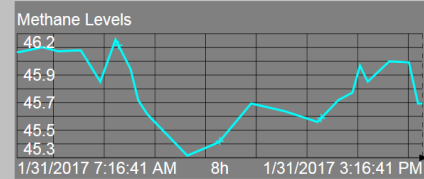
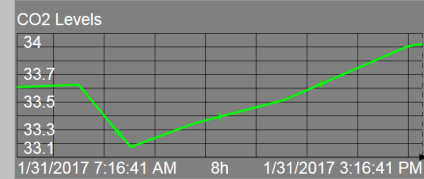
Blower 302

Amperage 8.41 A
% Max Speed 41.12 %
Vibration 0.14 In/S

RUNNING
STANDBY

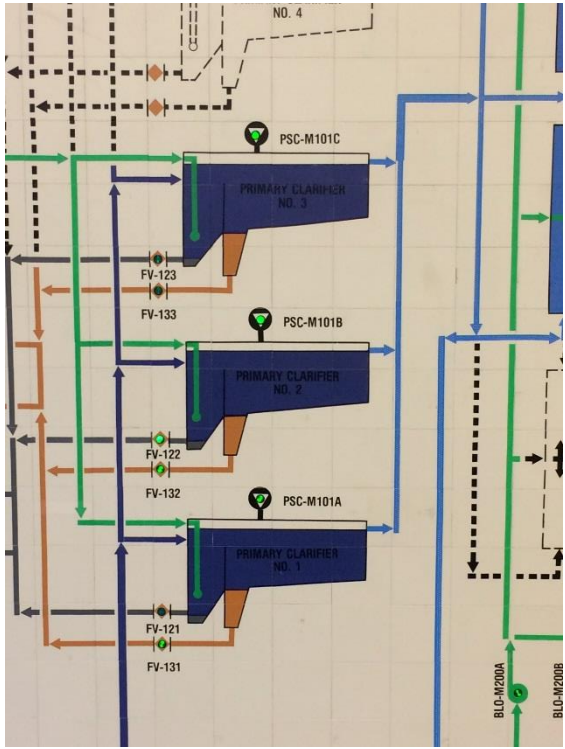
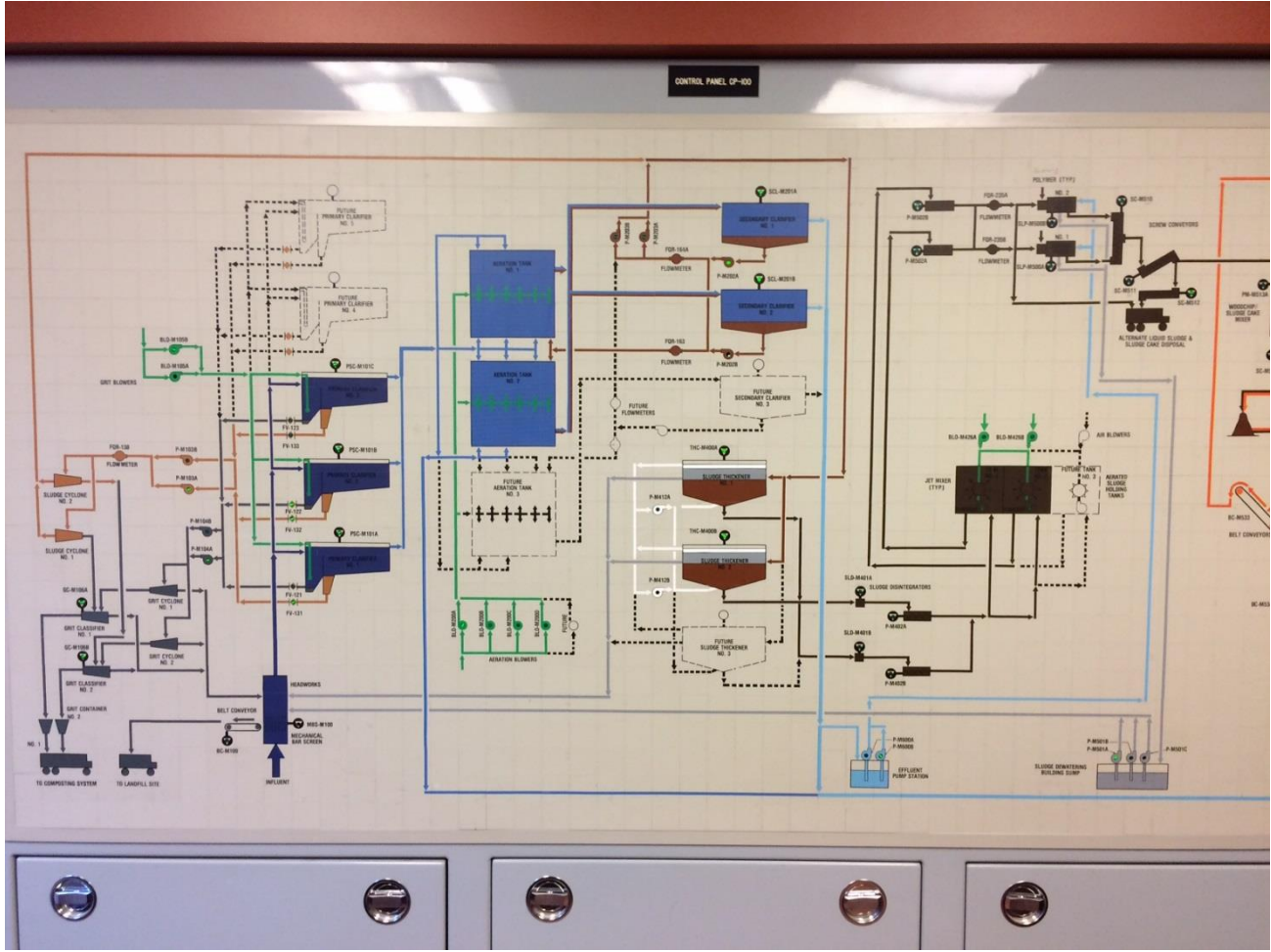


Gas Composition	
CO2	33.92 %
Methane	45.69 %
Oxygen	0.17 %



Water System Overview

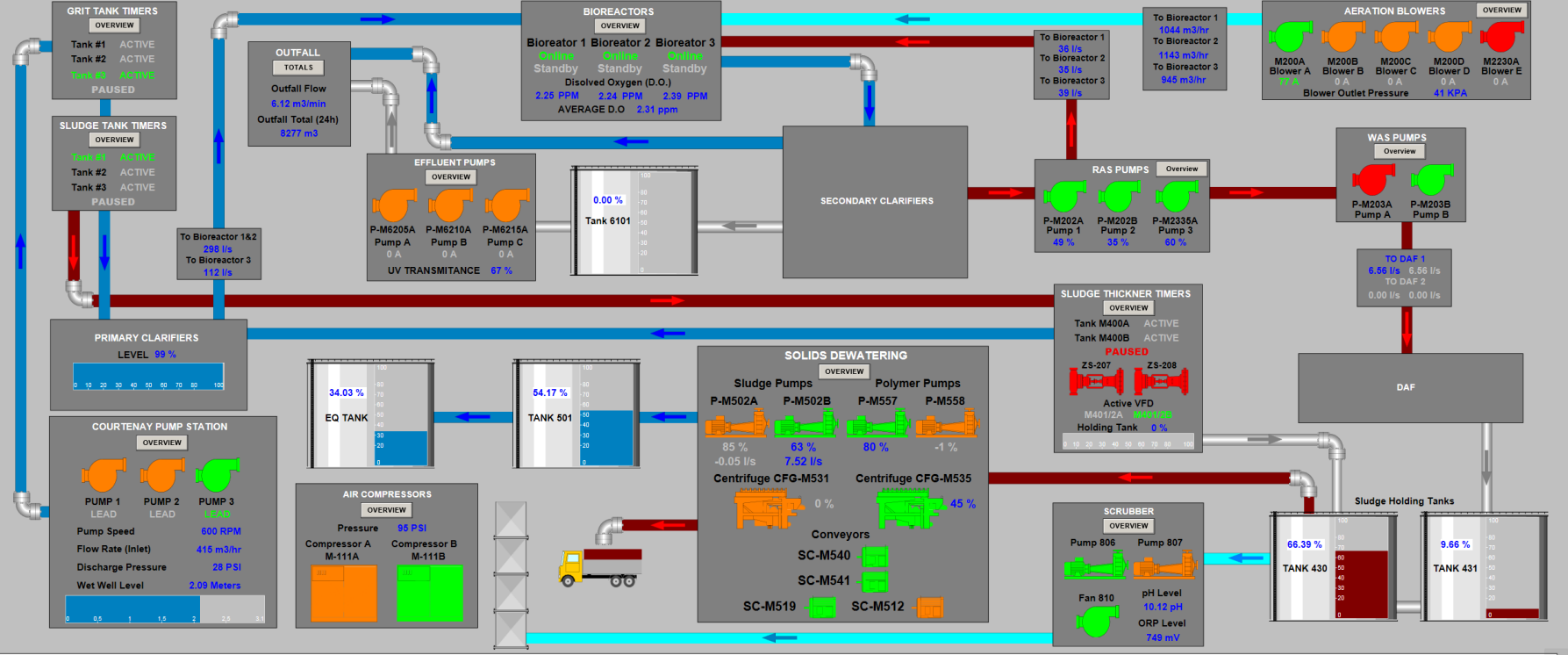
Treatment Plant Overview





Comox Valley Regional District Treatment Plant Overview

PLANT ALARMS | LEGEND



AERATION | BIOREACTORS | COMPRESSORS | COURT PUMP | DEWATERING | EFFLUENT | GRIT TANK | RAS PUMP | REPORTING | SCRUBBER | SLUDGE TANK | SLUDGE THICK | TRENDS | WAS PUMP | WATER SYSTEM: OVERVIEW | FLARE

1/31/2017 7:17:50 AM

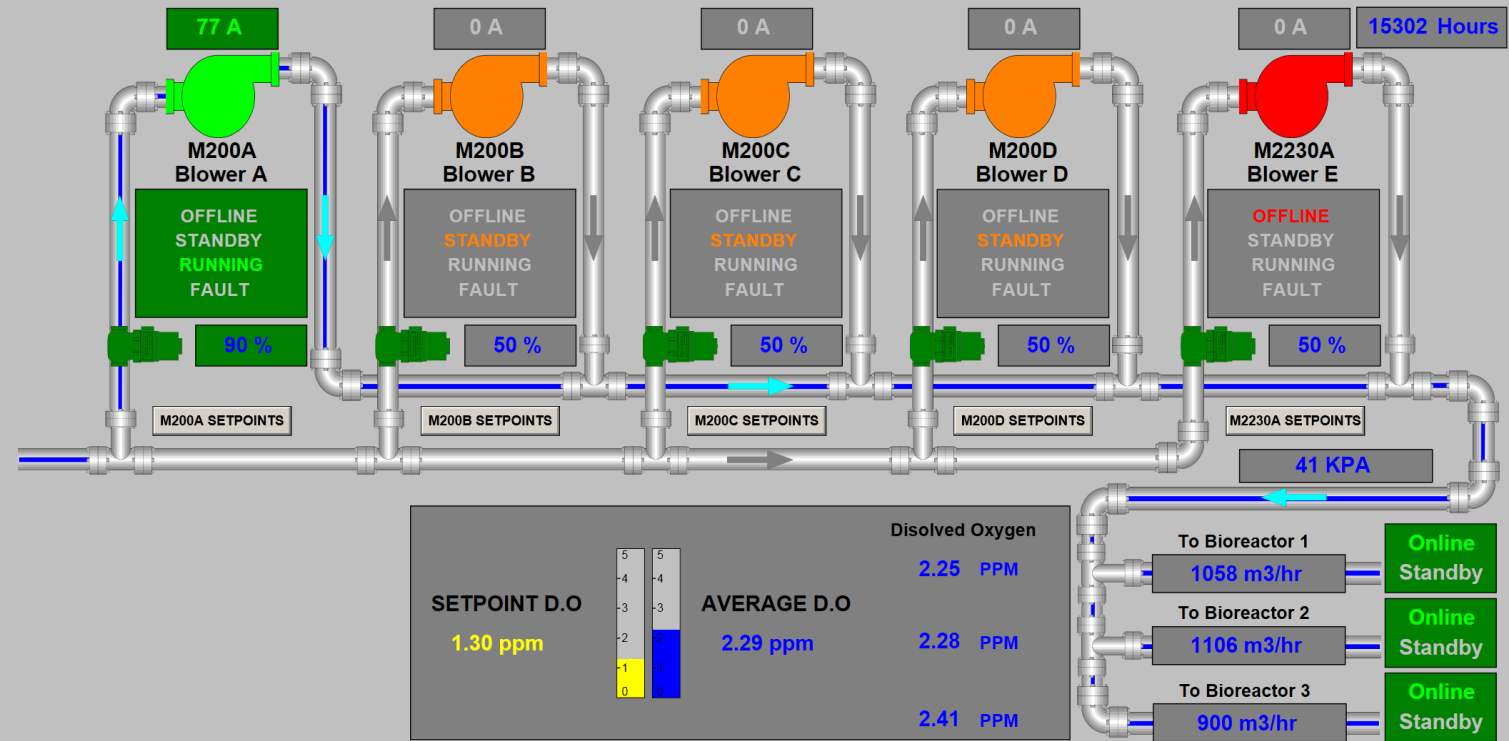
8h

Now | 1/31/2017 3:17:50 PM



Aeration Blower Overview

PLANT ALARMS



- TP Overview
- Aeration
- Bioreactor
- Compressors
- Court Pump
- Dewatering
- Effluent
- Grit Tank
- RAS Pump
- Reporting
- Scrubber
- Sludge Tank
- Sludge Thick
- Trends
- WAS Pump

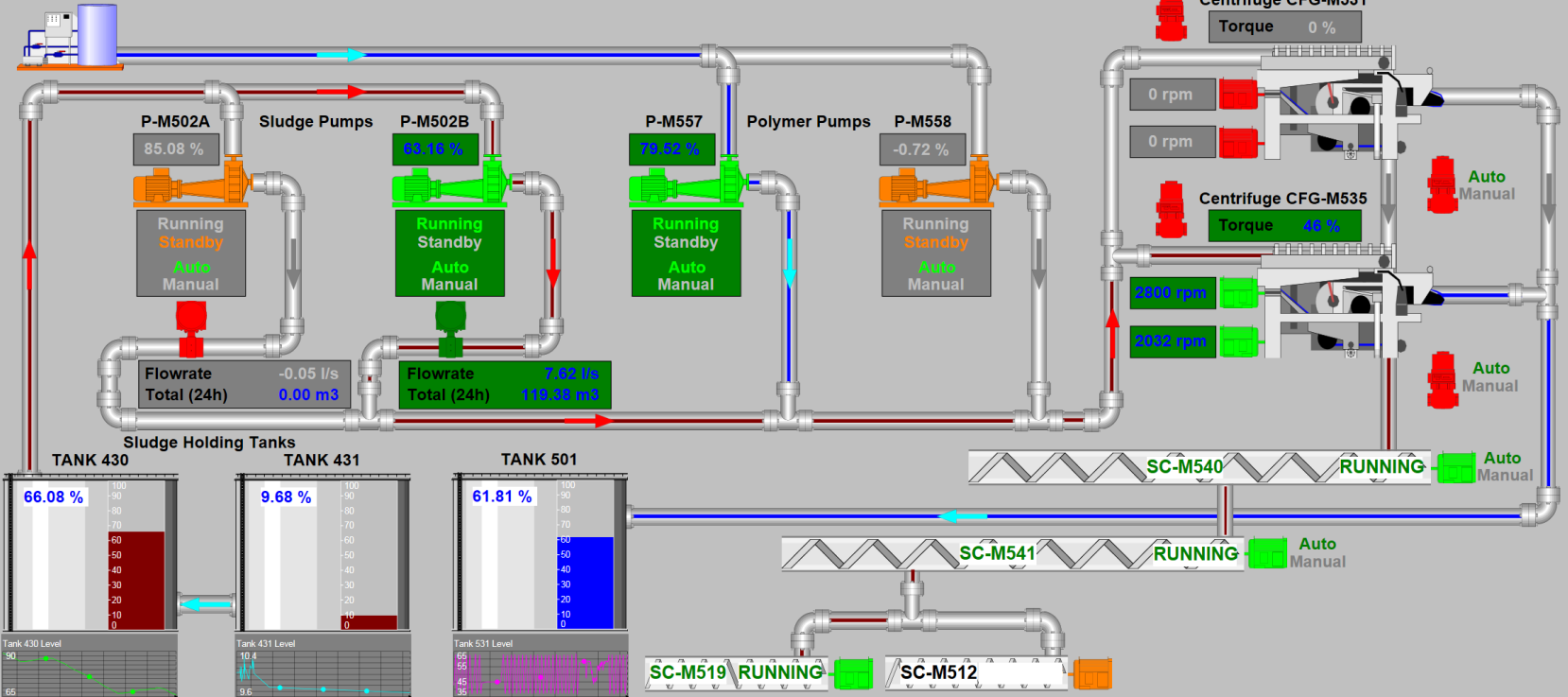


Solids Dewatering Overview

Totals

PLANT ALARMS

Polymer Injection



- TP Overview
- Aeration
- Bioreactor
- Compressors
- Court Pump
- Dewatering
- Effluent
- Grit Tank
- RAS Pump
- Reporting
- Scrubber
- Sludge Tank
- Sludge Thick
- Trends
- WAS Pump

1/31/2017 7:20:05 AM

8h

Now 1/31/2017 3:20:05 PM



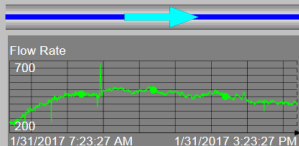
Courtenay Pump Station Overview

Trends

Totals

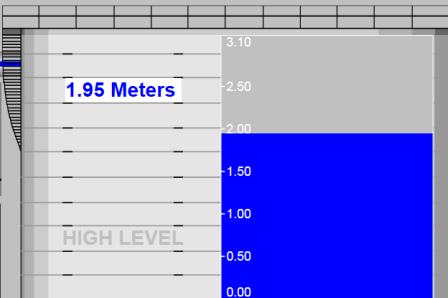
PLANT ALARMS

WET WELL



FLOW RATE
411 m3/hr

FLOW TOTAL (24h)
4986.16 m3

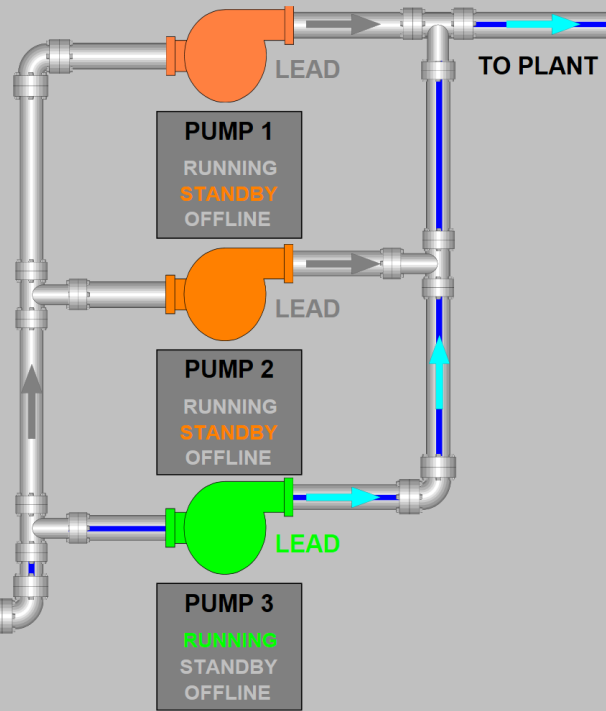
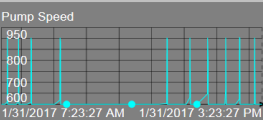
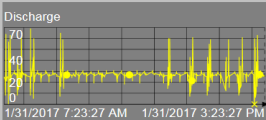


Setpoints

High Level 3.10 Meters
Lag Start 2.90 Meters
Lead Start 2.60 Meters
Stop Level 1.60 Meters
Low Level 1.50 Meters

Discharge Pressure
26 PSI

Pump Speed
600 RPM



PUMP 1
RUNNING
STANDBY
OFFLINE

PUMP 2
RUNNING
STANDBY
OFFLINE

PUMP 3
RUNNING
STANDBY
OFFLINE

- TP Overview
- Aeration
- Bioreactor
- Compressors
- Court Pump
- Dewatering
- Effluent
- Grit Tank
- RAS Pump
- Reporting
- Scrubber
- Sludge Tank
- Sludge Thick
- Trends
- WAS Pump

1/31/2017 7:23:27 AM

8h

Now

1/31/2017 3:23:27 PM

Meeting our Business needs

- **PI System®** allows us to bring all data from remote water, sewer and Solid waste stations to central office, and to all points on the WAN
- **PI System®** allows for collection through many methods as well as providing failover for the many different network connections between remote sites
- **PI System®** centrally stores and archives data from remote sites and allows for data analysis and monitoring in real time, anywhere
- **PI Coresight™** allows staff members in several different departments, at many remote sites to view, monitor and analyze collected data quickly and easily.

PI Server™ - Metrics

- **Data Archive** and **PI Interface™** have created a redundant, easily accessible data system
- **PI Server™** has centralized data collection for **27 remote sites**
- Removed the need for sneaker net – staff going to remote sites to fetch data
- Extensive savings in record management, staff time, and time required to maintain historic data. (some sites were still using chart recorders)
 - **4 hours a week saved** to collect scan and store chart records –
Approx savings \$8K/year

PI ProcessBook® - Metrics

- **PI ProcessBook®** has given the ability to create graphic rich HMIs for all PLC controlled sites.
- Has quickly become the standard viewing HMI for all sites, local site control is still RSVIEW and Factory Talk
- **PI ProcessBook®** has allowed single point control of set points for reservoir filling, water control and pumping
 - **Savings of 3 man hours per set point change** – this can happen several times a week, or day. **Savings : \$8K /year**

PI Coresight™ - Metrics

Water

- **PI Coresight™** has allowed the water department to monitor in real time the effects of changes to our water system that enable the CVRD to develop a more dynamic water delivery system
 - Reducing water pumping
 - Electricity use
 - Wear and tear on all aspects of water system
 - Real time monitoring allows for prioritization of site visits
 - Increased safety for operators – less late night traveling to sites
 - Savings in late night call outs per year: **Approx \$10K/year**

PI Coresight™ - Metrics

Sewer

- **PI Coresight™** has allowed the sewer department to monitor in real time remote sites that are 25+ kilometers away
 - Reducing staff travel time and efficiencies during the day
 - Allows for prioritization of site visits for the day/week
 - Electricity use through real time monitoring and adjustments
 - Reductions in wear and tear on all aspects of the treatment plant systems and pumping systems

PI Coresight™ - Metrics

Engineering and management staff

- **PI Coresight™** allows staff to easily access data and generate needed analytics on data.
 - **Saving many hours a week** of SCADA tech time using PI Datalink®: **Savings of approx. \$5k – 8k/yr**
 - Managers and Staff generate their own graphs, analytics or data downloads that they need through the course of a day.
 - All data is accessible, exportable and usable in many applications

Next Steps with data and PI system

Incorporating really remote Field Data

- Two rivers affecting water turbidity in Comox Lake, regional source of drinking water
- Need to collect turbidity data from remote data recorders
- No access to power, microwave connections or cellular data
- Satellite data connection through NOAA satellite
- Data to be incorporated into the PI System® using PI UFL Connector
- Compare turbidity from source to entry to water system



- **Brian Pearson**
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- Senior Manager of Information Systems & GIS
- Comox Valley Regional District



Questions

Please wait for the **microphone** before asking your questions



State your **name & company**

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