CMMS & SCADA
Condition-based maintenance

SCADA Intro

CMMS Intro

CMMS & SCADA

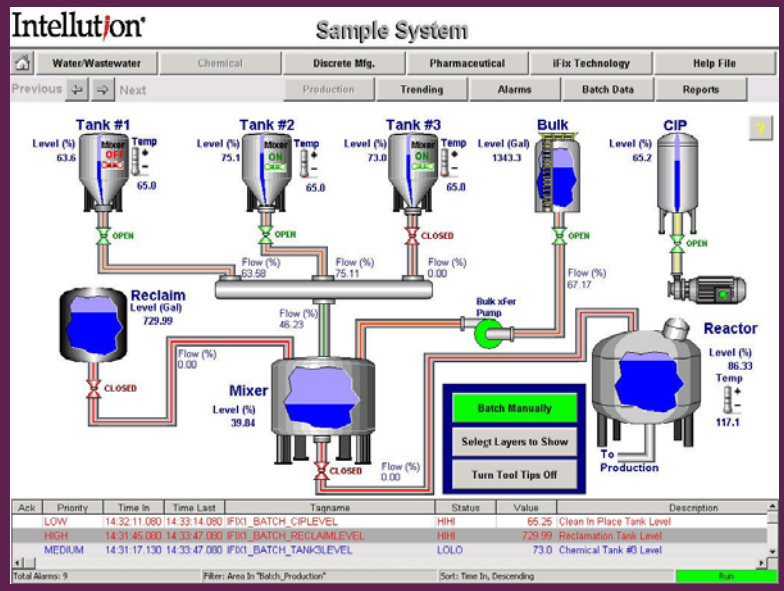
SCADA/CMMS Interfaces

Real-World Applications

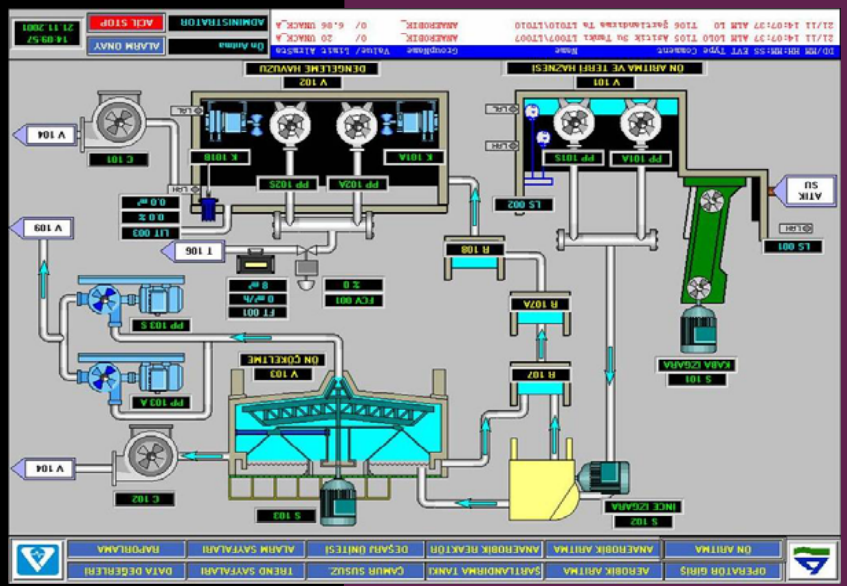
SCADA Intro

SCADA- *Supervisory Control And Data Acquisition*

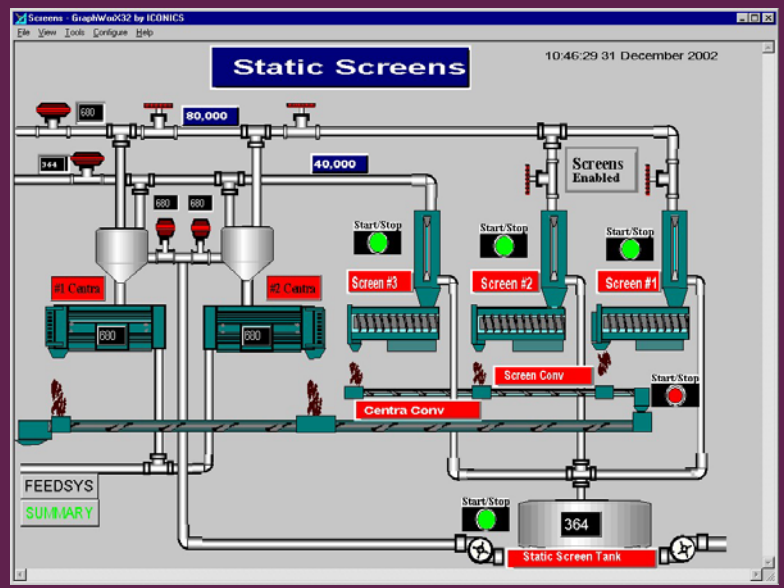
A system that collects data from various sensors at plant and sends this data to a central computer to interpret.



GE Intellution/ ifix



Wonderware InTouch

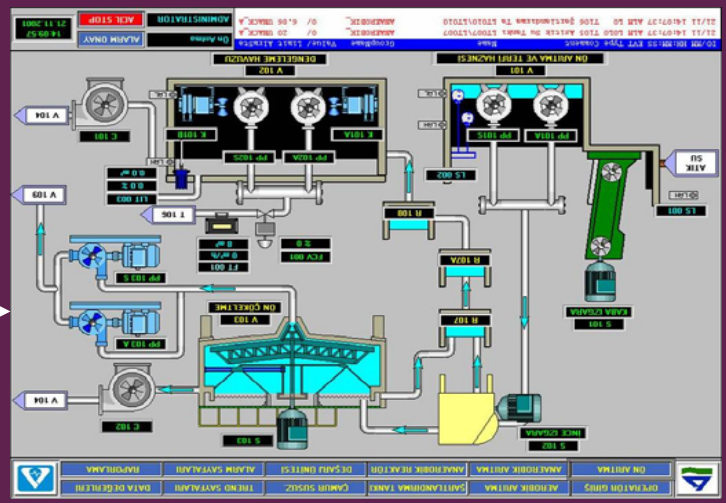


Allen-Bradley RS View

SCADA Intro

Flow Meter

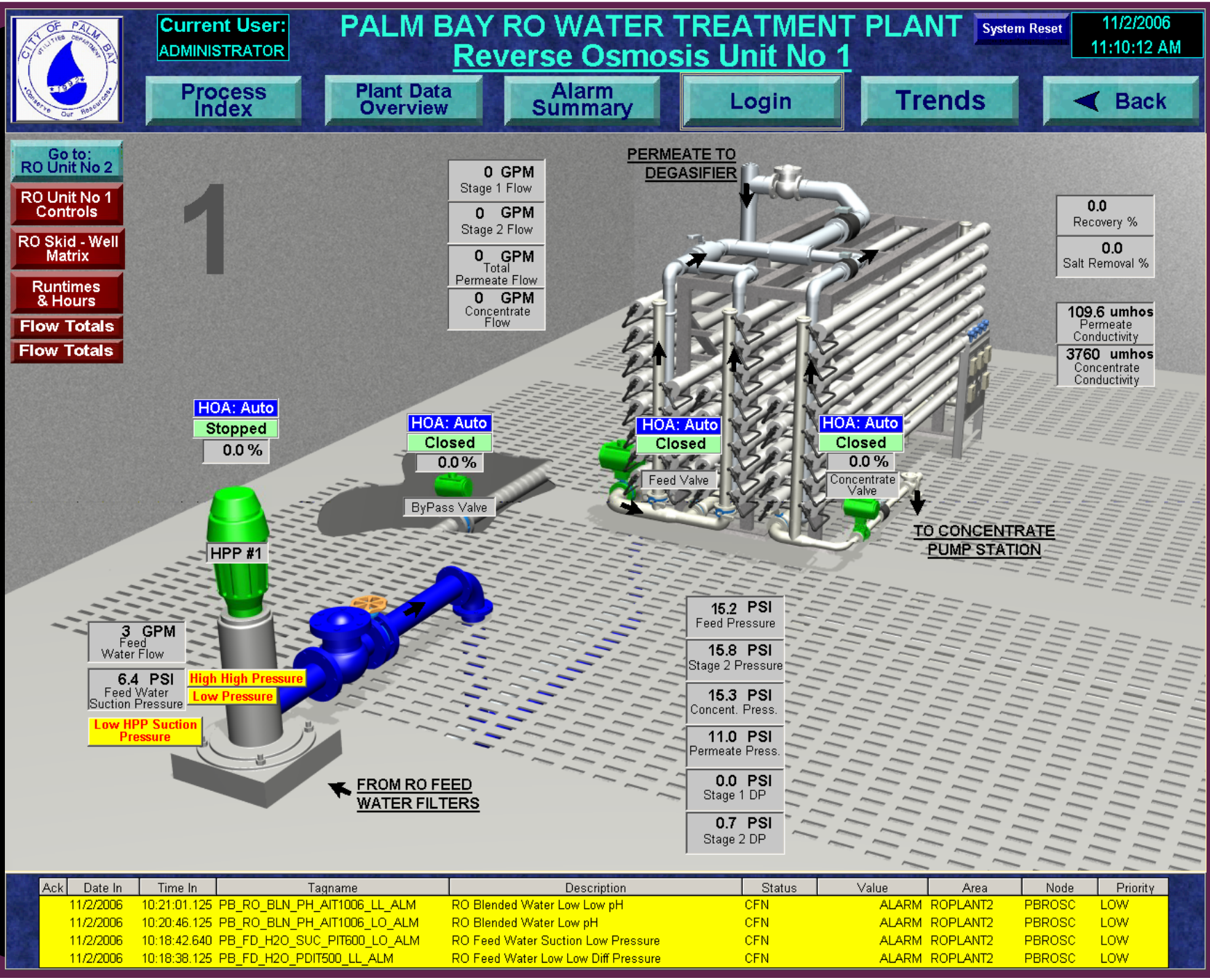
PLC



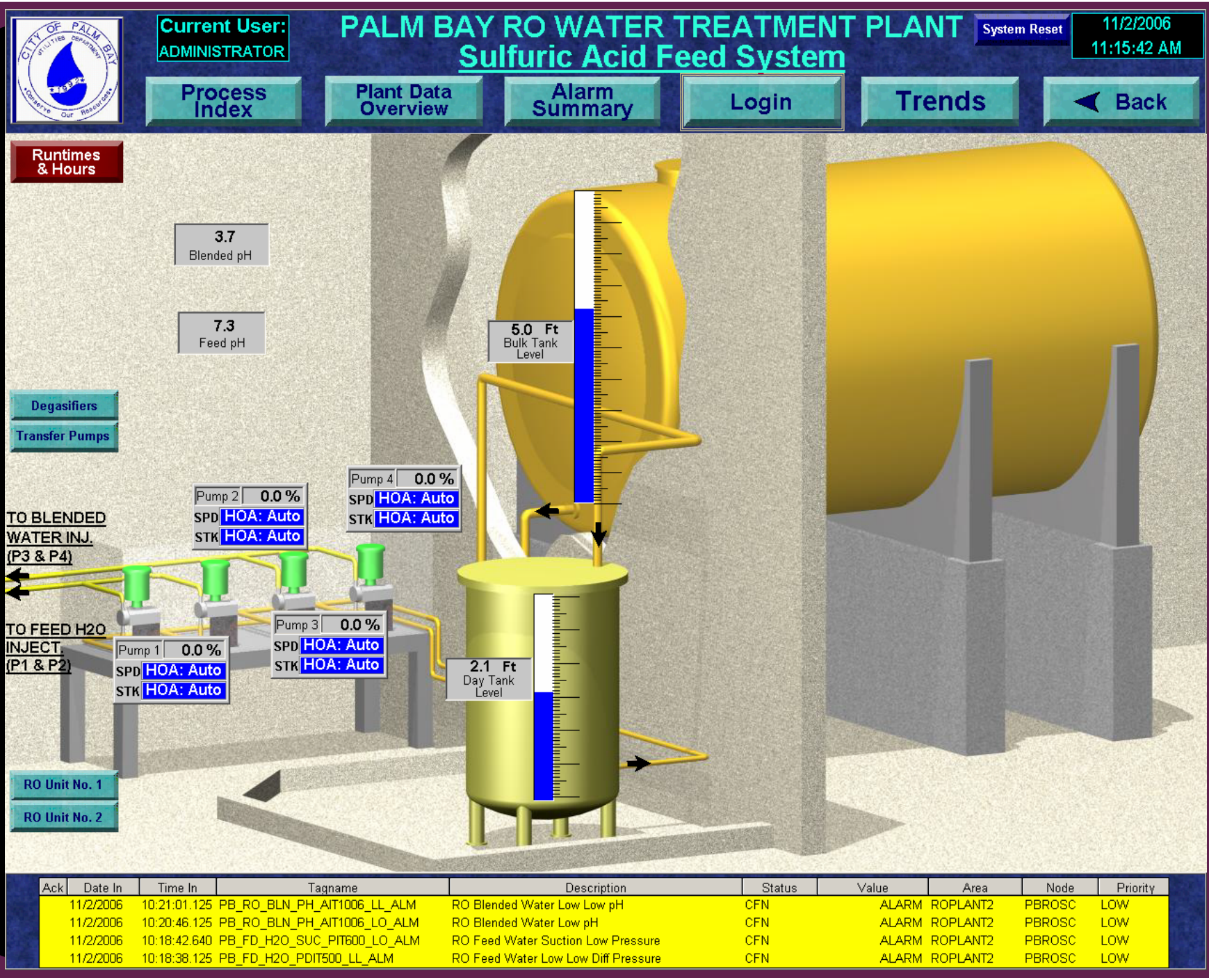
SCADA

Pump

- A programmable logic controller (PLC) is communicating with a pump's flow meter.
- A SCADA system acts as an HMI (Human machine interface), allowing operators to view and change flow meter settings via the PLC



Ack	Date In	Time In	Tagname	Description	Status	Value	Area	Node	Priority
	11/2/2006	10:21:01.125	PB_RO_BLN_PH_AIT1006_LL_ALM	RO Blended Water Low Low pH	CFN	ALARM	ROPLANT2	PBROSC	LOW
	11/2/2006	10:20:46.125	PB_RO_BLN_PH_AIT1006_LO_ALM	RO Blended Water Low pH	CFN	ALARM	ROPLANT2	PBROSC	LOW
	11/2/2006	10:18:42.640	PB_FD_H2O_SUC_PIT600_LO_ALM	RO Feed Water Suction Low Pressure	CFN	ALARM	ROPLANT2	PBROSC	LOW
	11/2/2006	10:18:38.125	PB_FD_H2O_PDIT500_LL_ALM	RO Feed Water Low Low Diff Pressure	CFN	ALARM	ROPLANT2	PBROSC	LOW



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	11/2/2006	10:18:42.640	PB_FD_H2O_SUC_PIT600_LO_ALM	RO Feed Water Suction Low Pressure	CFN	ALARM	ROPLANT2	PBROSC	LOW
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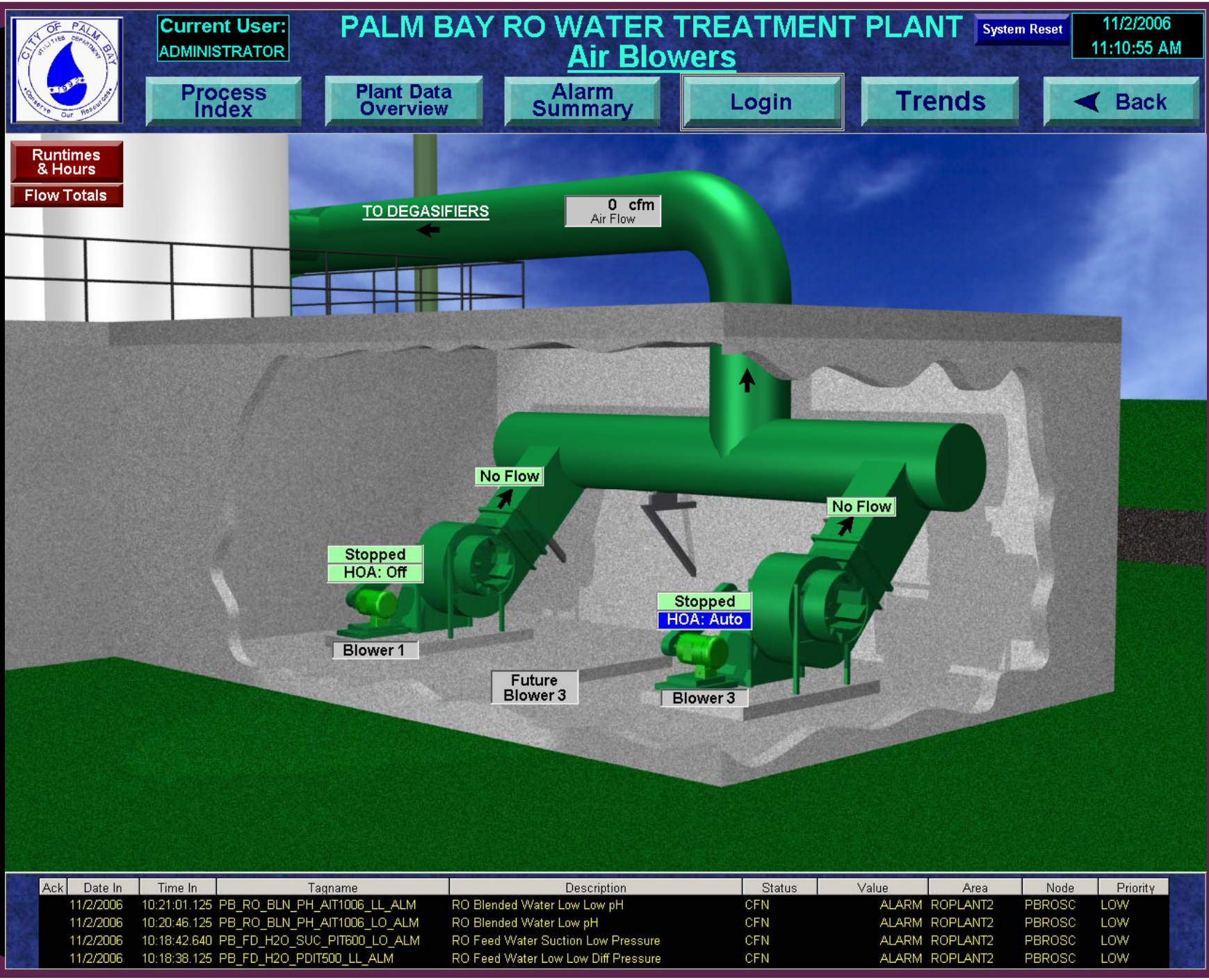
Current User:
ADMINISTRATOR
PALM BAY RO WATER TREATMENT PLANT
Air Blowers
System Reset
11/2/2006
11:10:55 AM
Process Index
Plant Data Overview
Alarm Summary
Login
Trends
Back
Runtimes & Hours
Flow Totals
TO DEGASIFIERS
0 cfm
Air Flow
No Flow
No Flow
Stopped
HOA: Off
Stopped
HOA: Auto
Blower 1
Future Blower 3
Blower 3
Ack
Date In
Time In
Tagname
Description
Status
Value
Area
Node
Priority
11/2/2006 10:21:01.125 PB_RO_BLN_PH_AIT1006_LL_ALM RO Blended Water Low Low pH CFN ALARM ROPLANT2 PBROSC LOW
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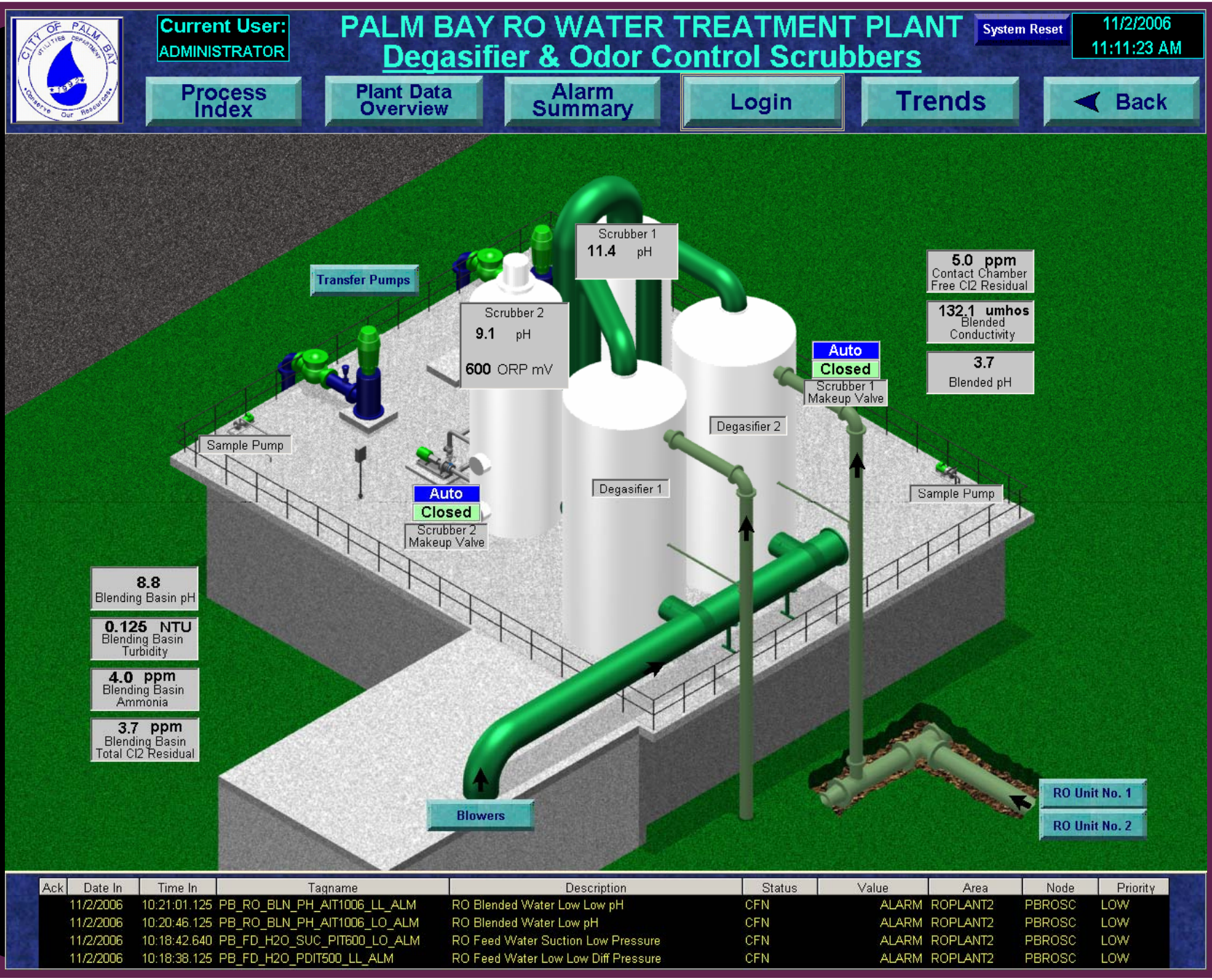

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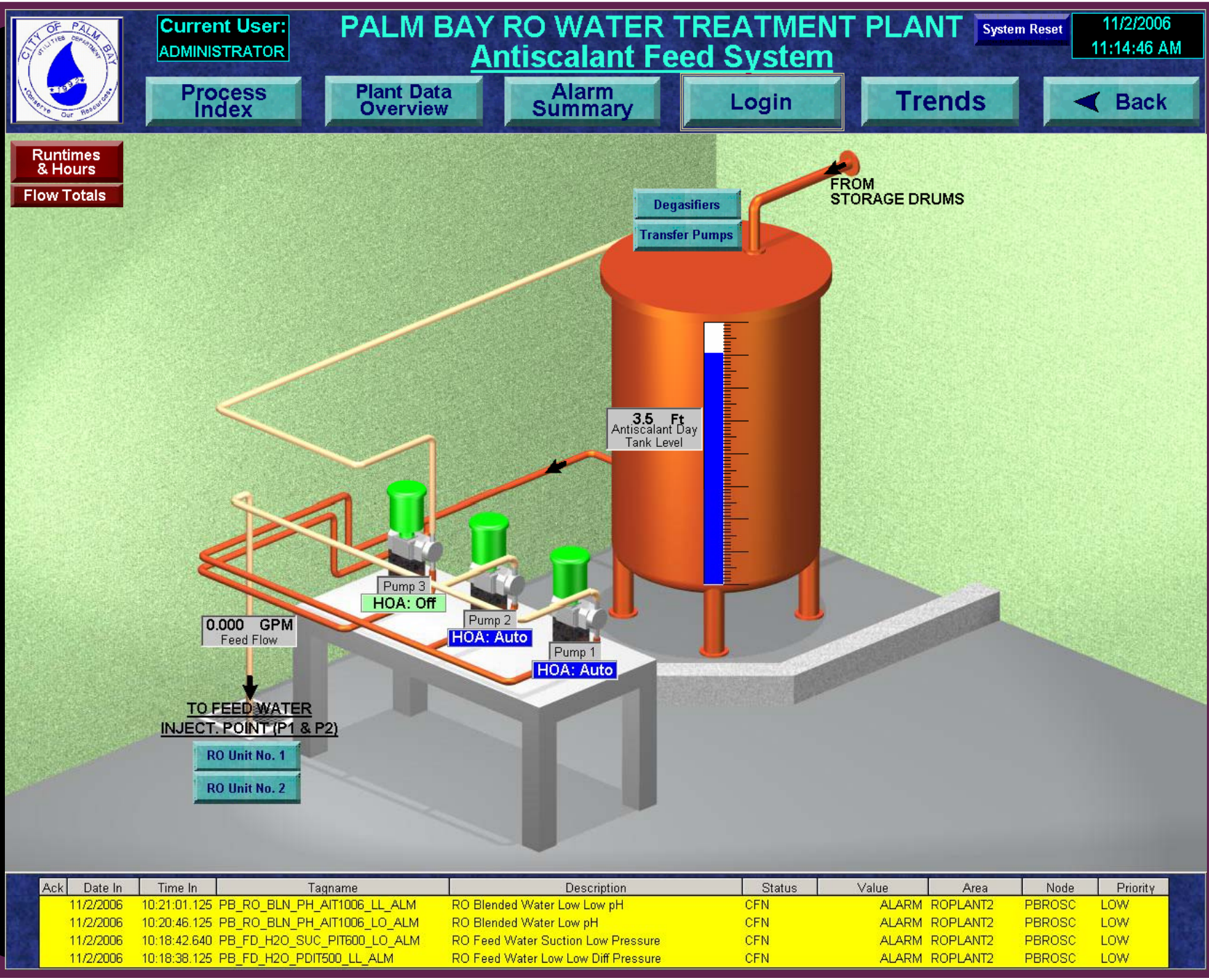

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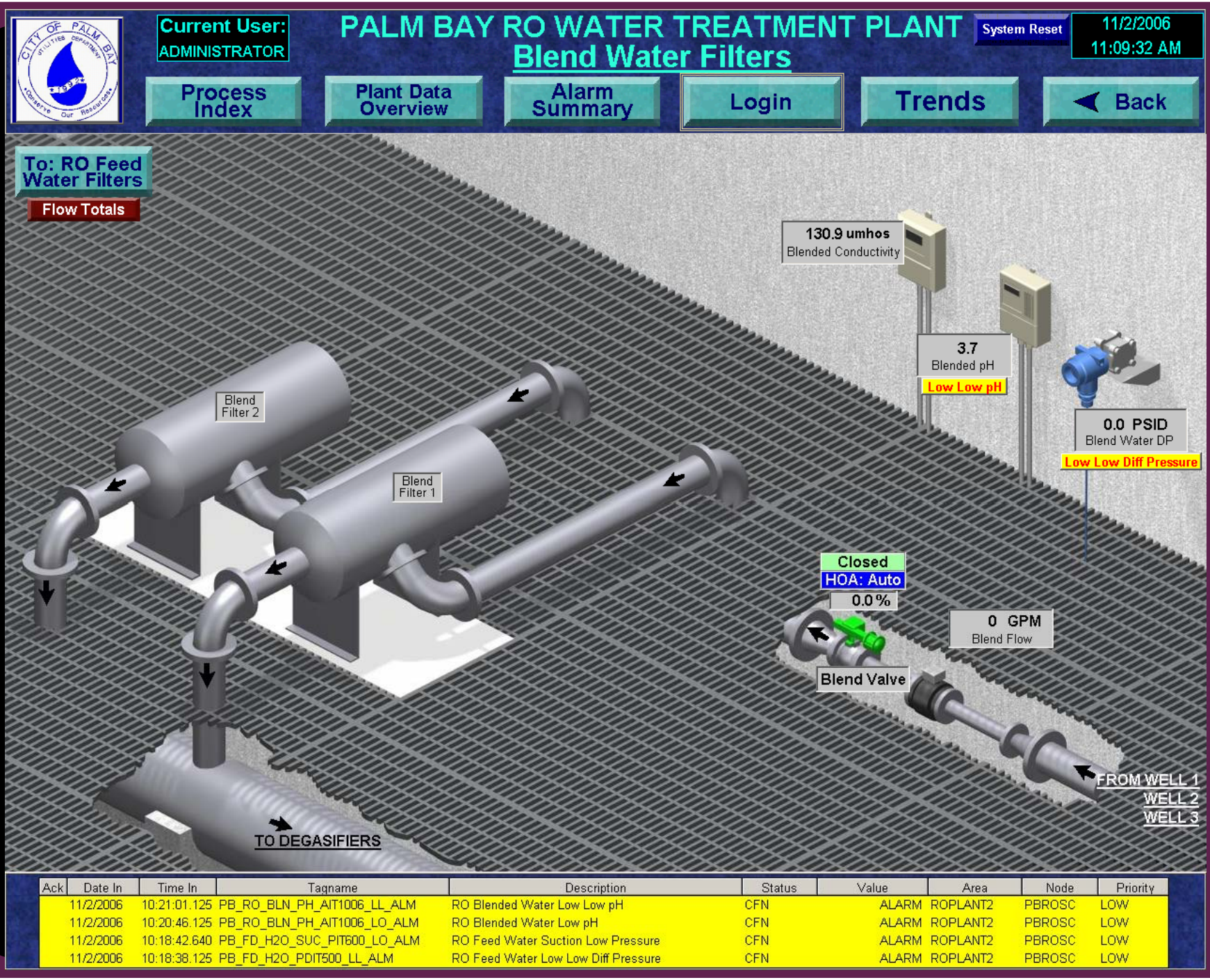

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CMMS & SCADA
Condition-based maintenance

SCADA Intro

CMMS Intro

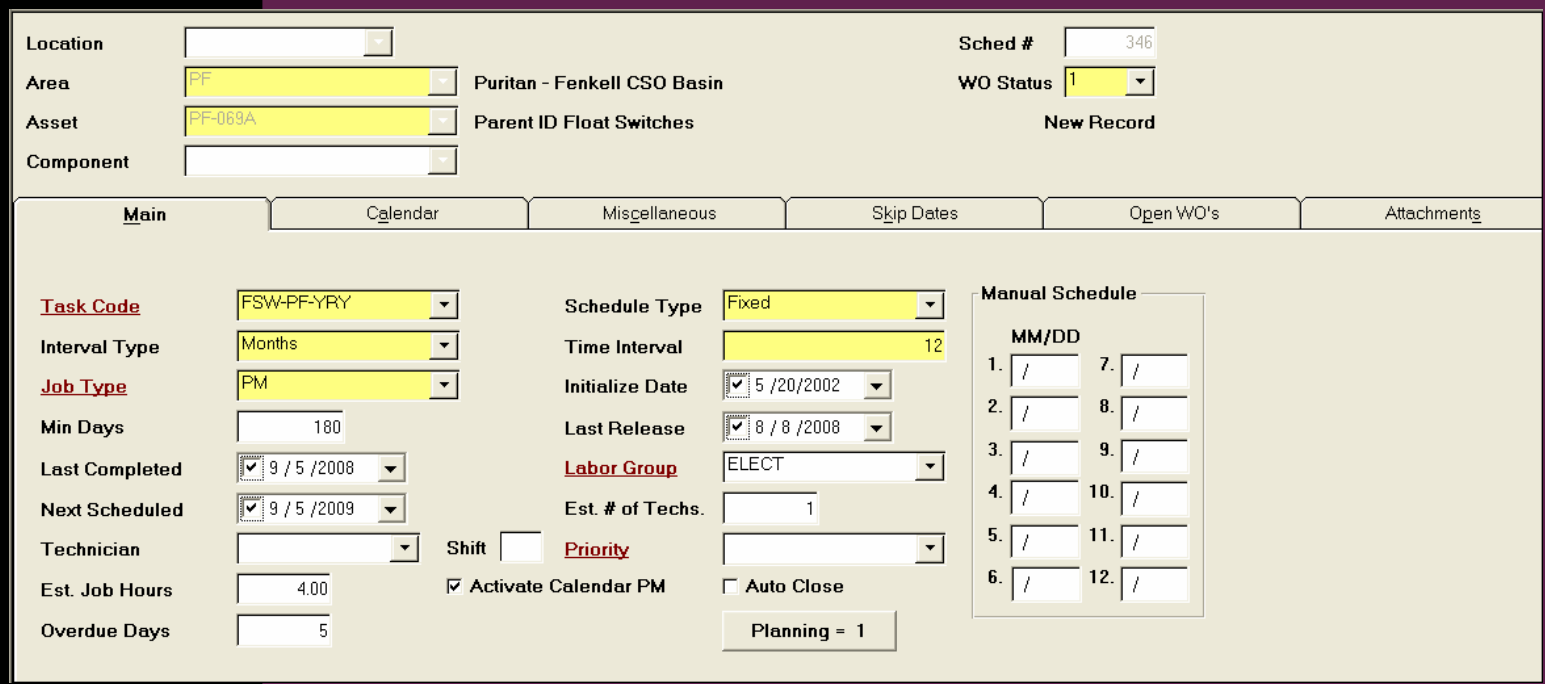
CMMS & SCADA

SCADA/CMMS Interfaces

Real-World Applications

CMMS Intro

- CMMS typically use calendar-based preventive maintenance



CMMS Intro

MAINTENANCE ITEMS	SERVICE TIME						
	See Engine Schdl.	Daily or after 8 Hours	Weekly or after 50 Hours	Month-ly or after 100 Hours	6 Months or af-ter 250 Hours	Yearly or after 500 Hours	4000 – 4500 Hours
General Genset Inspection	X[1]	X[2]					
Check Coolant Heater		X					
Check Oil Level		X					
Check Coolant Level		X					
Check Fuel Level		X					
Check Charge Air Piping		X					
Check Air Cleaner (Clean if required)			X[3]				
Check Battery Charging System			X				
Drain Water and Sediment from Fuel Tank			X[5]				
Drain Exhaust Condensate Trap				X			
Check Starting Batteries				X			
Change Air Cleaner Element					X[3]		
Check Radiator Hoses for Wear & Cracks					X		
Test Generator Insulation Resistance						X[7]	
Grease generator bearing (P7)							X
Drain Fuel Filter(s)	X[1]						
Check Anti-freeze and DCA Concentration	X[1]						
Change Crankcase Oil and Filter	X[1, 6]						
Check Drive Belt Tension	X[1]						
Change Coolant Filter	X[1]						
Clean Crankcase Breather	X[1]						
Change Fuel Filters	X[1]						
Clean Cooling System	X[1]						

Calendar-based

Runtime-based

CMMS & SCADA
Condition-based maintenance

SCADA Intro

CMMS Intro

CMMS & SCADA

SCADA/CMMS Interfaces

Real-World Applications

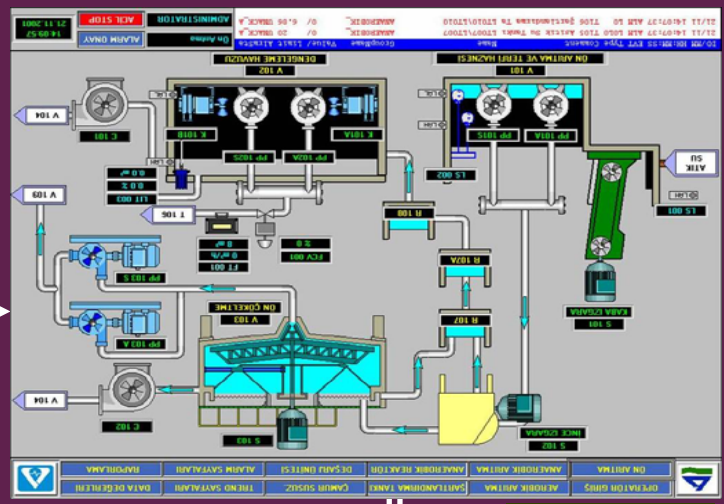
CMMS & SCADA

- SCADA software can deliver signals indicating the status of equipment or systems and corrective work orders can be raised based on the data received.

CMMS & SCADA

Flow Meter

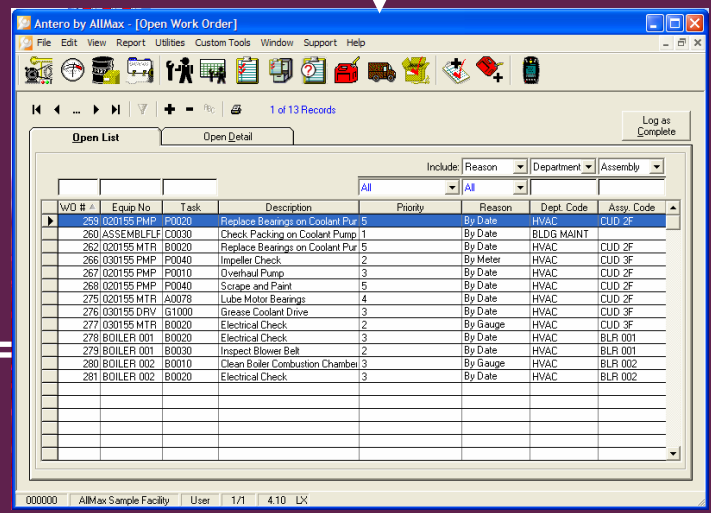
PLC



SCADA

Pump

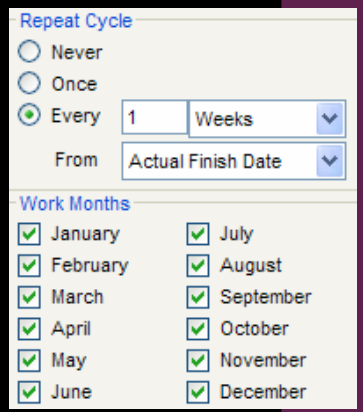
Workers Informed



CMMS

CMMS & SCADA

Why not rely solely on calendar-based preventive maintenance?



- Inadequate maintenance: A “Weekly or 50 hours” PM is generated every week- but runs 100 or more hours per week
- Wasting money: A “Weekly or 50 hours” PM is generated every week but only runs about 50 hours a year

With many integrations- alarms for high chlorine level, pump failure, high level, low flow etc. can automatically generate a CM work order.

Leading to:

- Reduction in human error
- A more standardized process
- An increase in equipment uptime
- Reduced cost in the long-run

CMMS & SCADA
Condition-based maintenance

SCADA Intro

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CMMS & SCADA

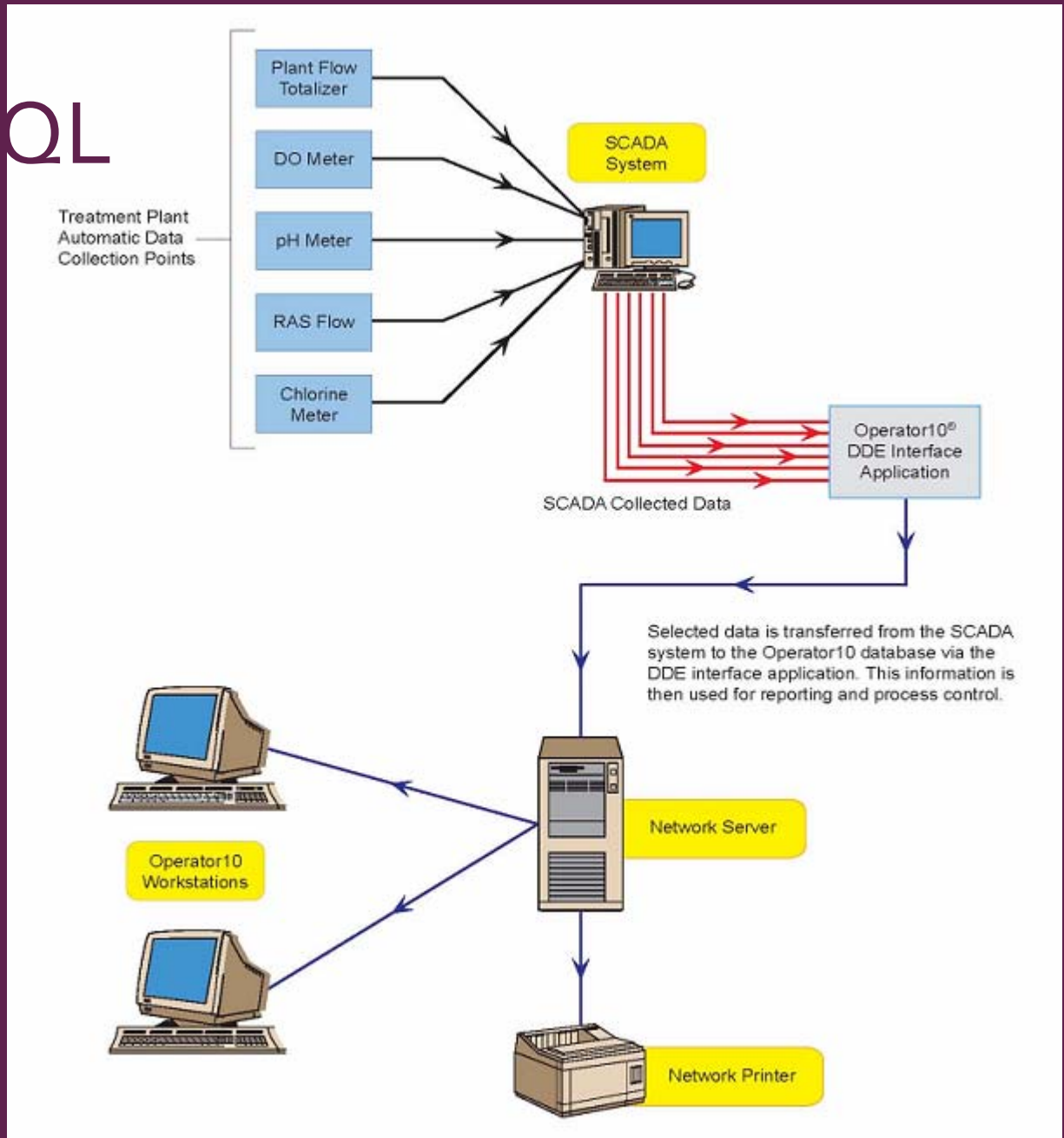
SCADA/CMMS Interfaces

Real-World Applications

SCADA/CMMS Interfaces

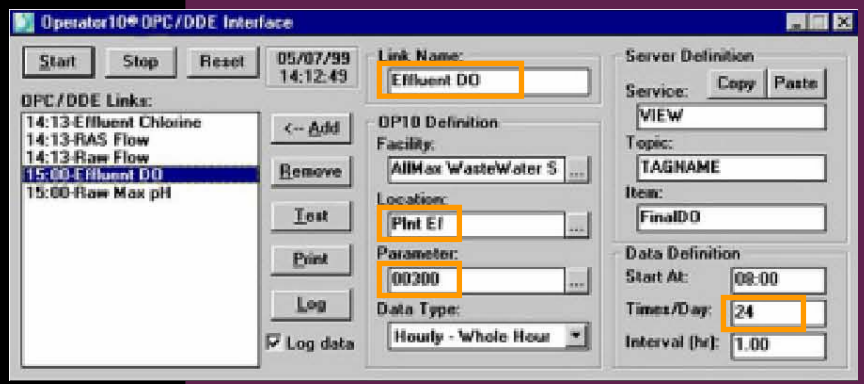
- Direct SQL link
- Manual input
- Historical data CSV interpretation

Direct SQL Link



Direct SQL link (Wonderware Intouch)

- In this example, a reading of the "Effluent DO" meter is taken 24 times per day (every hour)



Data can be exchanged with any running application that supports OPC/DDE linking using the ASCII text format.

Examples are:
Microsoft® Excel®
Microsoft Access®
Microsoft Word®
FactoryLink®
Wonderware®
InTouch®
LookOut®
Intellution Fix®
Citect®
RSLinx®
FMT

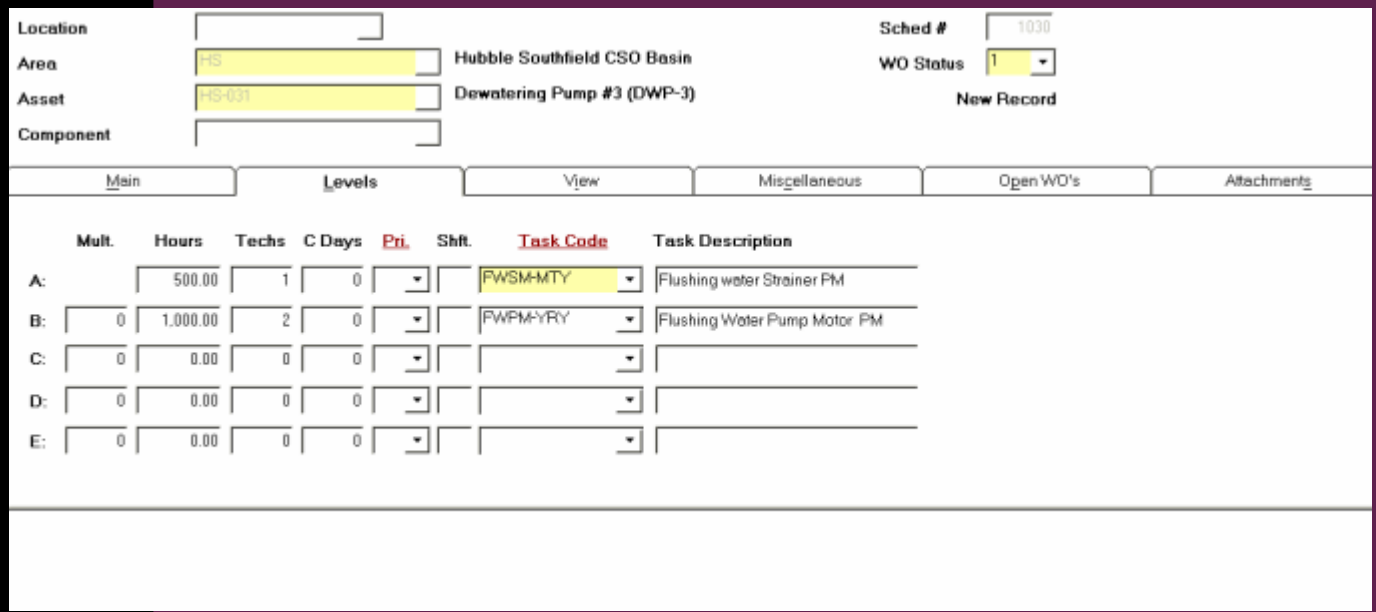
- The readings are placed in the database location "Plnt Ef" (Plant Effluent) for parameter 00300 (Disolved Oxygen). When a reading surpasses a user-defined high or low, a work order is generated.

SCADA/CMMS Interfaces

- Direct SQL link
- Manual input
- Historical data CSV interpretation

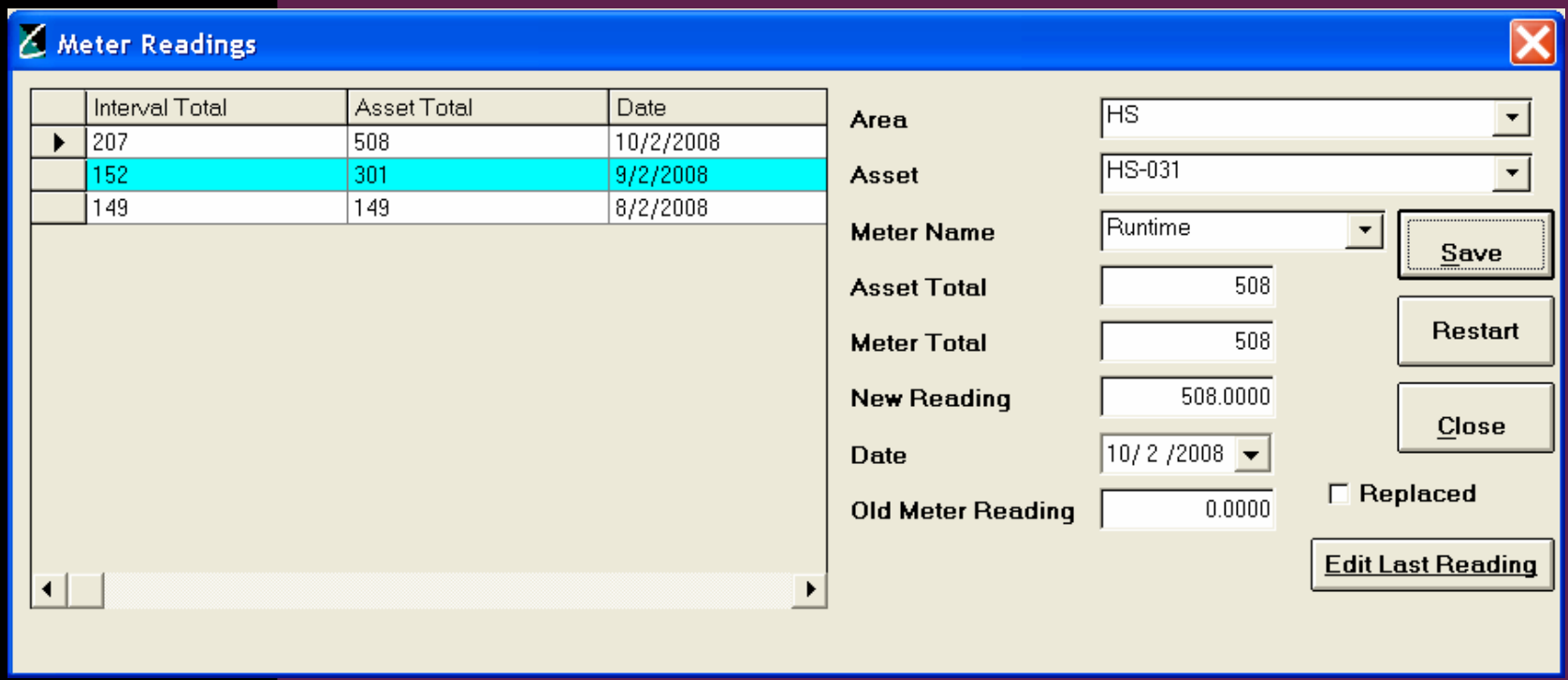
Manual Input

1. Declare maintenance intervals



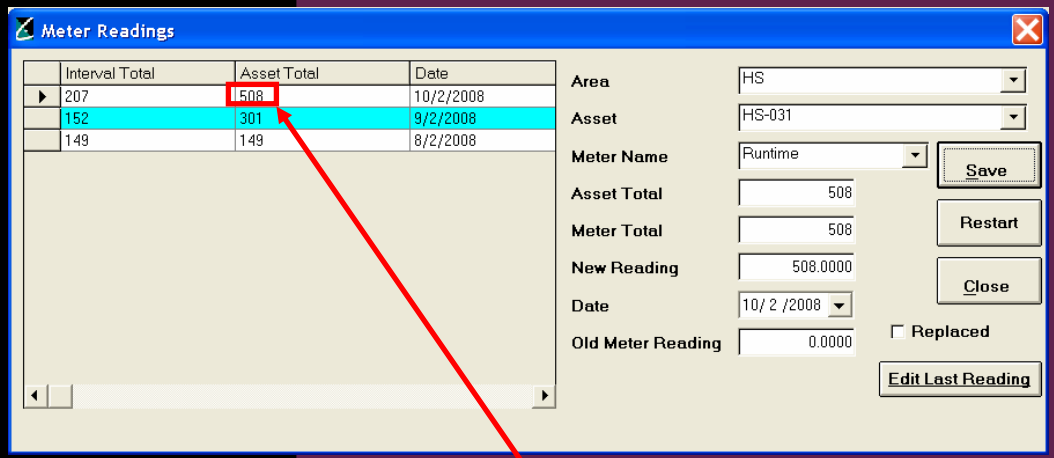
Manual Input

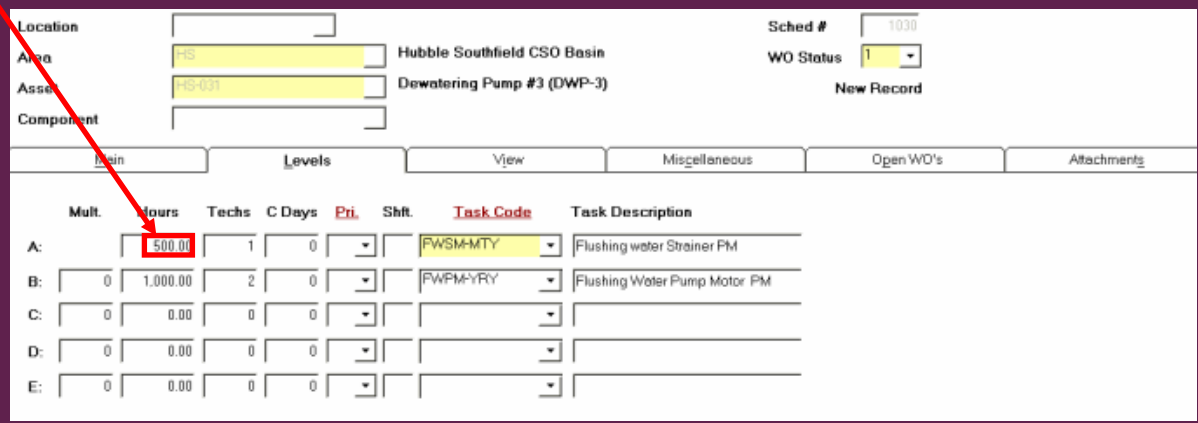
2. Perform routine inspections



Manual Input

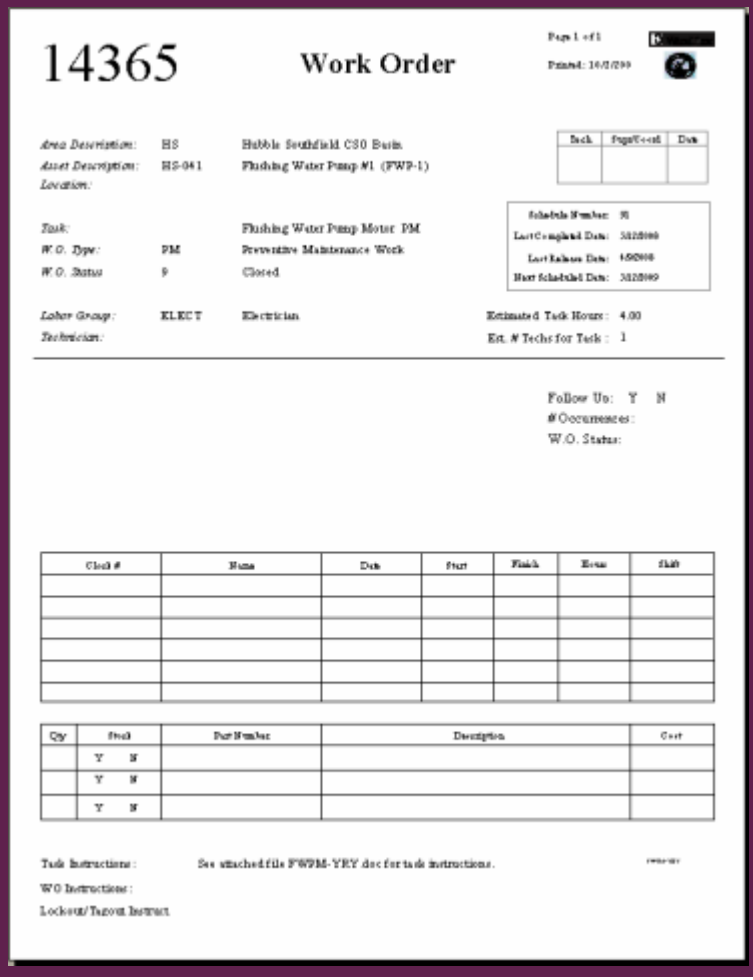
3. Work order enters que once "Asset Total" surpasses "Levels- Hours"





Manual Input

4. Work order is generated and distributed



14365

Work Order

Page 1 of 1

Printed: 10/1/09

Area Description:	HS	Hubble Southfield CSO Basin
Asset Description:	HS-041	Flushing Water Pump #1 (FWP-1)
Location:		
Task:		Flushing Water Pump Motor PM
W.O. Type:	PM	Preventive Maintenance Work
W.O. Status	9	Closed
Labor Group:	ELECT	Electrician
Technician:		

Task	Page/Count	Date

Schedule Number: H
Last Completed Date: 3/12/2009
Last Release Date: 6/9/2008
Next Scheduled Date: 3/12/2009

Estimated Task Hours: 4.00
Est. # Techs for Task: 1

Follow Up: Y N
Occurrences:
W.O. Status:

Clock #	Name	Date	Start	Finish	Hours	Shift

Qty	Stock	Part Number	Description	Cost
	Y N			
	Y N			
	Y N			

Task Instructions: See attached file FWPM-VRY doc for task instructions.

WO Instructions:

Lockout/Tagout Instruct

SCADA with CMMS Interfaces

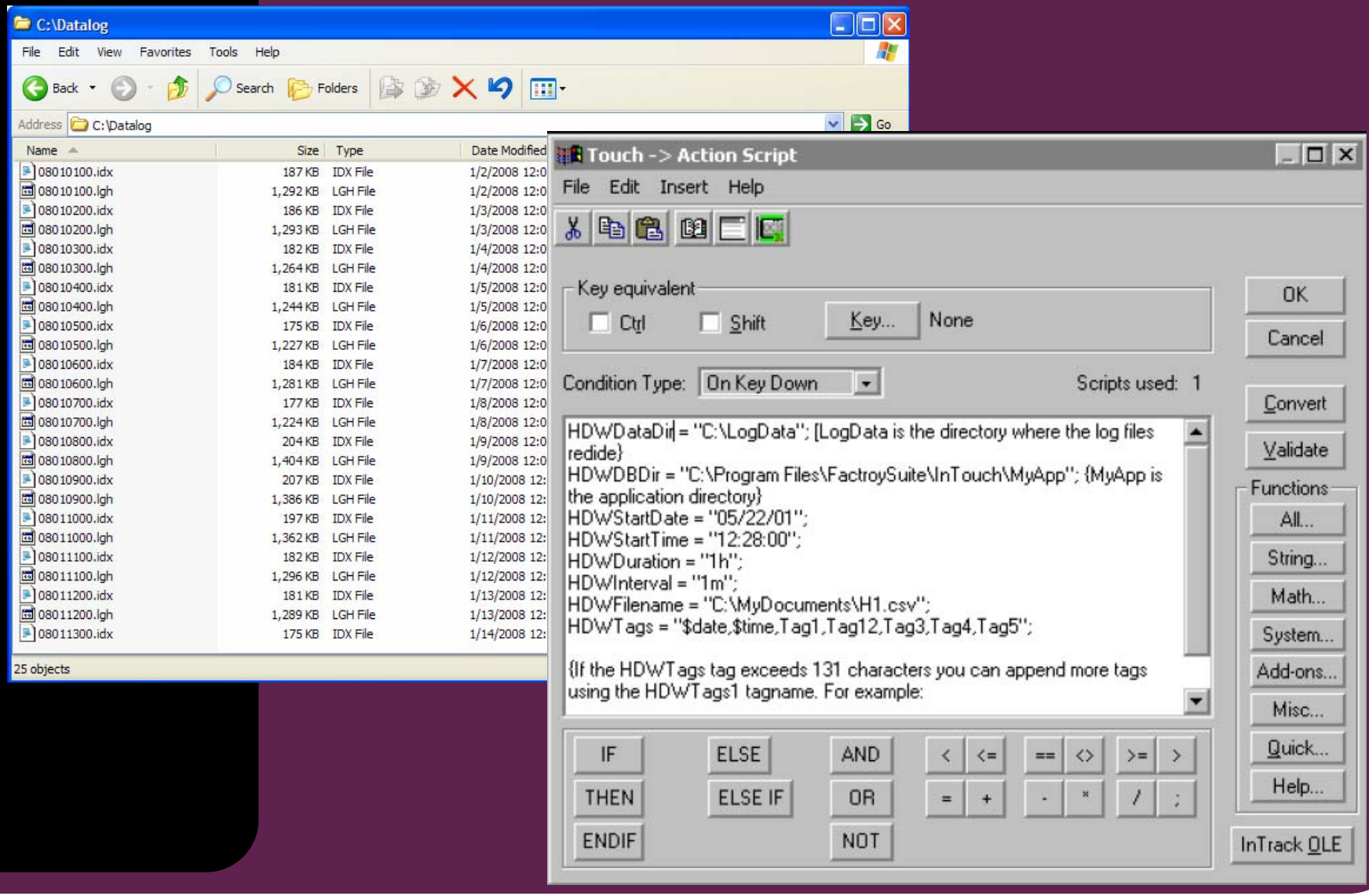
- Direct SQL link
- Manual input
- Historical data CSV interpretation

Historical data CSV interpretation

JOB Plus with Wonderware SCADA –

1. Intouch (by Wonderware) writes daily values to a "HistData" comma separated values (csv) file.
2. JOB Plus reads and interprets the csv file
3. JOB Plus summarizes that data based upon user-defined statistics and places summarized values into the "meter" field
4. When the "meter" field value goes beyond an upper or lower bound- a work order will be generated

Historical data CSV interpretation



CMMS & SCADA
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SCADA Intro

CMMS Intro

CMMS & SCADA

SCADA/CMMS Interfaces

Real-World Applications

Real-world applications

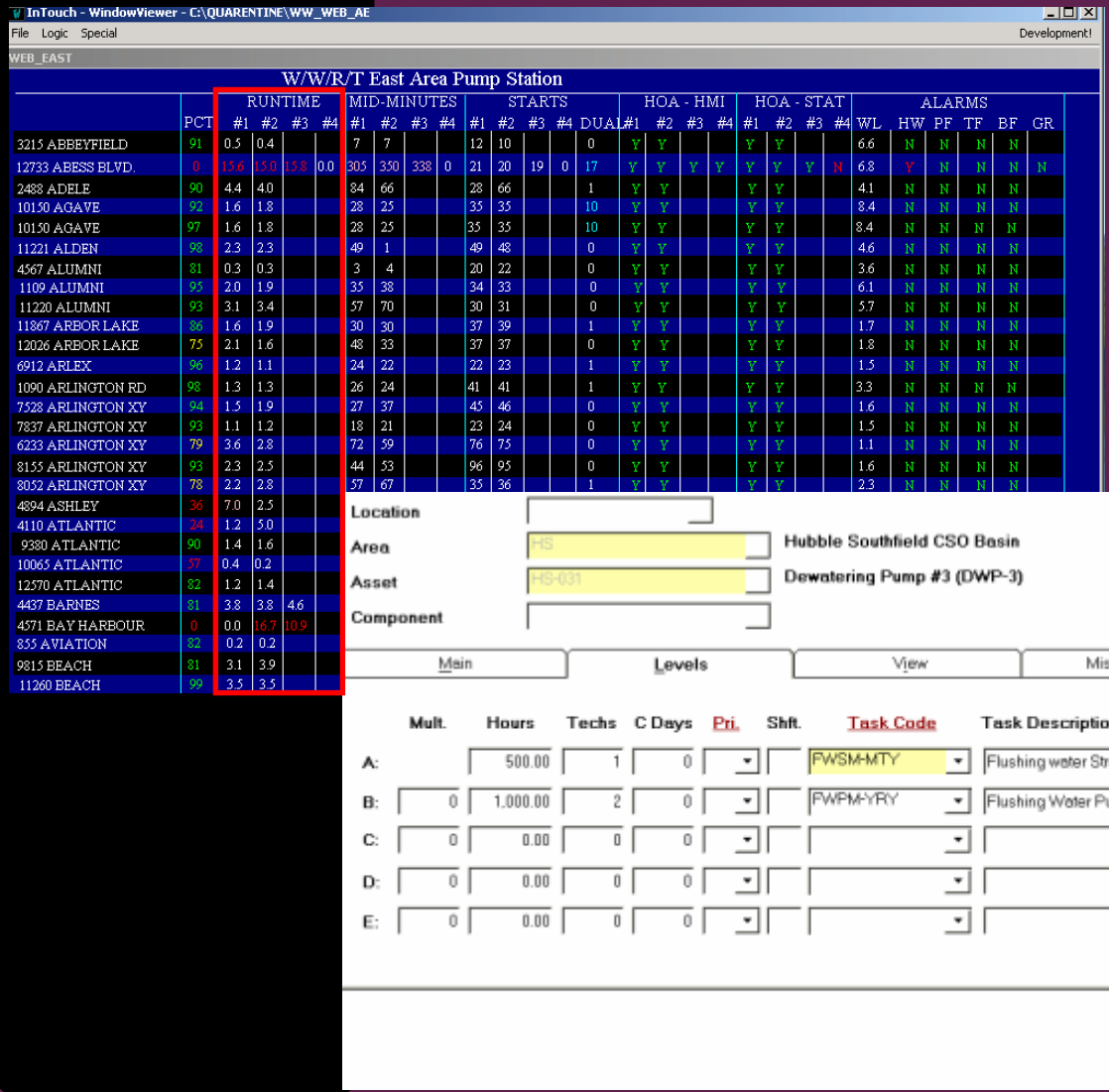
Preventive Maintenance:

- Runtime hours
- Low flow

Corrective Maintenance:

- High level
- High gas readings

Runtime Hours



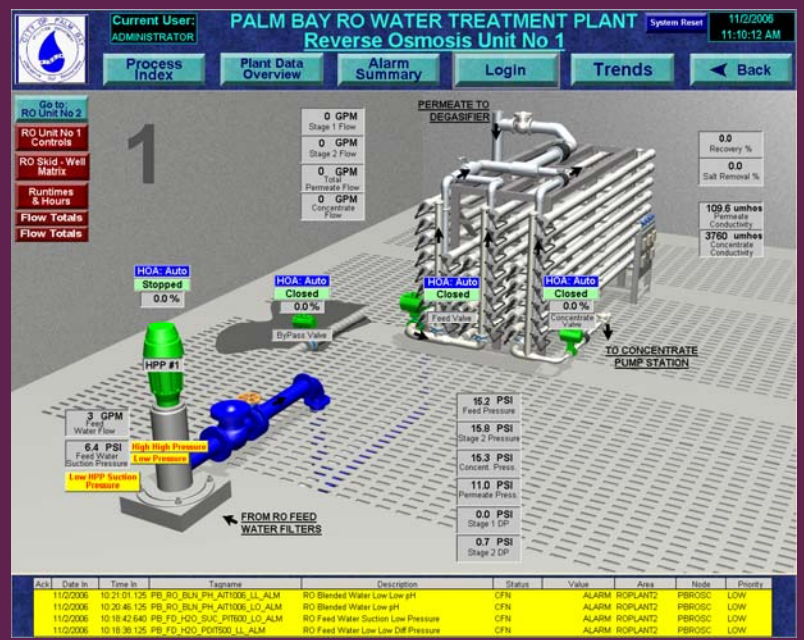
	PCT	RUNTIME #1	#2	#3	#4	MID-MINUTES #1	#2	#3	#4	STARTS #1	#2	#3	#4	DUAL	HOA - HMI #1	#2	#3	#4	HOA - STAT #1	#2	#3	#4	ALARMS WL	HW	PF	TF	BF	GR
3215 ABBEYFIELD	91	0.5	0.4			7	7			12	10			0	Y	Y			Y	Y			6.6	N	N	N	N	
12733 ABESS BLVD.	0	15.6	15.0	15.8	0.0	305	350	338	0	21	20	19	0	17	Y	Y	Y	Y	Y	Y	Y	N	6.8	Y	N	N	N	N
2488 ADELE	90	4.4	4.0			84	66			28	66			1	Y	Y			Y	Y			4.1	N	N	N	N	
10150 AGAVE	92	1.6	1.8			28	25			35	35			10	Y	Y			Y	Y			8.4	N	N	N	N	
10150 AGAVE	97	1.6	1.8			28	25			35	35			10	Y	Y			Y	Y			8.4	N	N	N	N	
11221 ALDEN	98	2.3	2.3			49	1			49	48			0	Y	Y			Y	Y			4.6	N	N	N	N	
4567 ALUMNI	81	0.3	0.3			3	4			20	22			0	Y	Y			Y	Y			3.6	N	N	N	N	
1109 ALUMNI	95	2.0	1.9			35	38			34	33			0	Y	Y			Y	Y			6.1	N	N	N	N	
11220 ALUMNI	93	3.1	3.4			57	70			30	31			0	Y	Y			Y	Y			5.7	N	N	N	N	
11867 ARBOR LAKE	86	1.6	1.9			30	30			37	39			1	Y	Y			Y	Y			1.7	N	N	N	N	
12026 ARBOR LAKE	75	2.1	1.6			48	33			37	37			0	Y	Y			Y	Y			1.8	N	N	N	N	
6912 ARLEX	96	1.2	1.1			24	22			22	23			1	Y	Y			Y	Y			1.5	N	N	N	N	
1090 ARLINGTON RD	98	1.3	1.3			26	24			41	41			1	Y	Y			Y	Y			3.3	N	N	N	N	
7528 ARLINGTON XY	94	1.5	1.9			27	37			45	46			0	Y	Y			Y	Y			1.6	N	N	N	N	
7837 ARLINGTON XY	93	1.1	1.2			18	21			23	24			0	Y	Y			Y	Y			1.5	N	N	N	N	
6233 ARLINGTON XY	79	3.6	2.8			72	59			76	75			0	Y	Y			Y	Y			1.1	N	N	N	N	
8155 ARLINGTON XY	93	2.3	2.5			44	53			96	95			0	Y	Y			Y	Y			1.6	N	N	N	N	
8052 ARLINGTON XY	78	2.2	2.8			57	67			35	36			1	Y	Y			Y	Y			2.3	N	N	N	N	
4894 ASHLEY	36	7.0	2.5																									
4110 ATLANTIC	24	1.2	5.0																									
9380 ATLANTIC	90	1.4	1.6																									
10065 ATLANTIC	57	0.4	0.2																									
12570 ATLANTIC	82	1.2	1.4																									
4437 BARNES	81	3.8	3.8	4.6																								
4571 BAY HARBOUR	0	0.0	16.7	10.9																								
855 AVIATION	82	0.2	0.2																									
9815 BEACH	81	3.1	3.9																									
11260 BEACH	99	3.5	3.5																									

When the runtime hours surpass “500” hours, a PM will be generated to lubricate bearings and check amperage and voltage draw.

When the runtime hours surpass “1000” hours, a PM will be generated to lubricate and inspect drive line.

Low flow

Once permeate flow drops by 10%, a PM is automatically generated to flush the RO membranes.

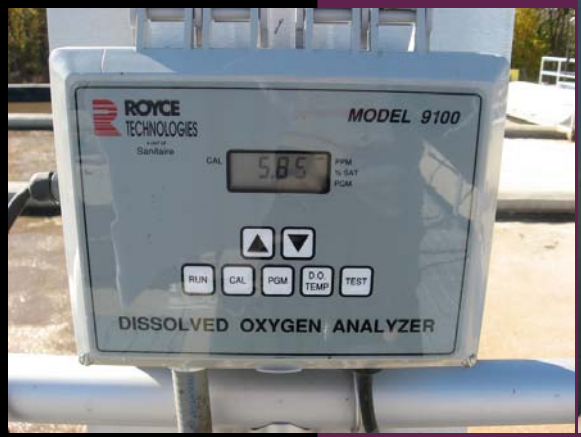


The RO membranes should be cleaned whenever permeate flow drops 10% below its initial flow rate

High gas alarm

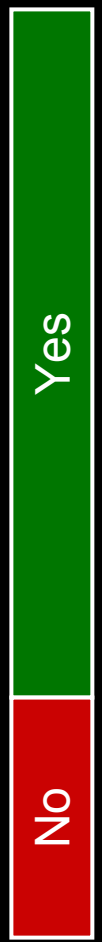
Once chlorine gas levels approach dangerous levels, a CM is generated to inspect supply and exhaust fans, tubing, chlorine storage tanks, etc.

Low DO readings



When DO readings drop below an acceptable level, a CM will be generated to check rotors, solids level, and potential IPP issues.

CMMS software with built-in SCADA integration



- Maintenance Connection Onsite/Online 2.5
- TabWare EFX EFX00
- Infor EAM Asset Sustainability Edition 8.3
- Avantis.PRO 4.1
- Oracle Utilities Work and Asset Management 1.7.15.2
- FaciliWorks 8i
- IBM Maximo Asset Manager 7.1
- Lawson Enterprise Asset Management (EAM)
- IFS Applications 7
- Ivara SuprEAM 5.0
- Jobcal
- Bigfoot CMMS Internet/Enterprise Edition 8.0.1 – No
- MaintiMizer 4.0 - No
- Cityworks 4.5- No
- ePAC- No

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