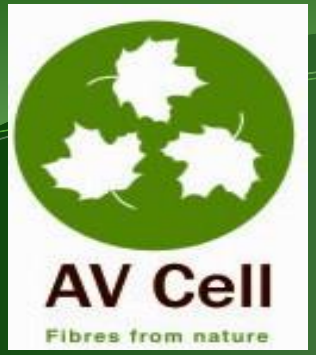


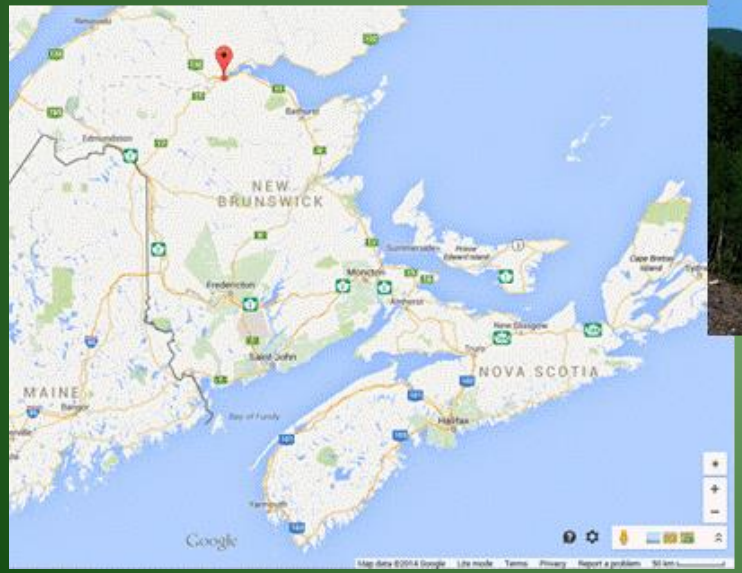
AV CELL & the PI SYSTEM

Presented by: Suzanne Smith
Process Engineer, Technical Dept.

Agenda – AVCell & the PI System

- AV Cell Mill History
- Dissolving Pulp Process Overview
- Evolution from Manual to Digital Data Storage
- PI ProcessBook Pages mimic DCS Screens
- PI ProcessBook & PI DataLink
  - Process Monitoring & Troubleshooting
  - Statistical Analysis & Quality Initiative
- Benefits of Digital System
- Future Plans

AV Cell Pulp Mill History



AV Cell History

- Opened in 1930 by Fraser Co. to make high grade bleached sulphite pulp for the paper industry.
- Major upgrades in 1982, 1989, 1995, & 1998 (when converted to dissolving pulp process).
- 375 MT/day of SW + HW Dissolving Pulp
- ~270 employees
- 24/365 operation (1-2 major shut downs / year)

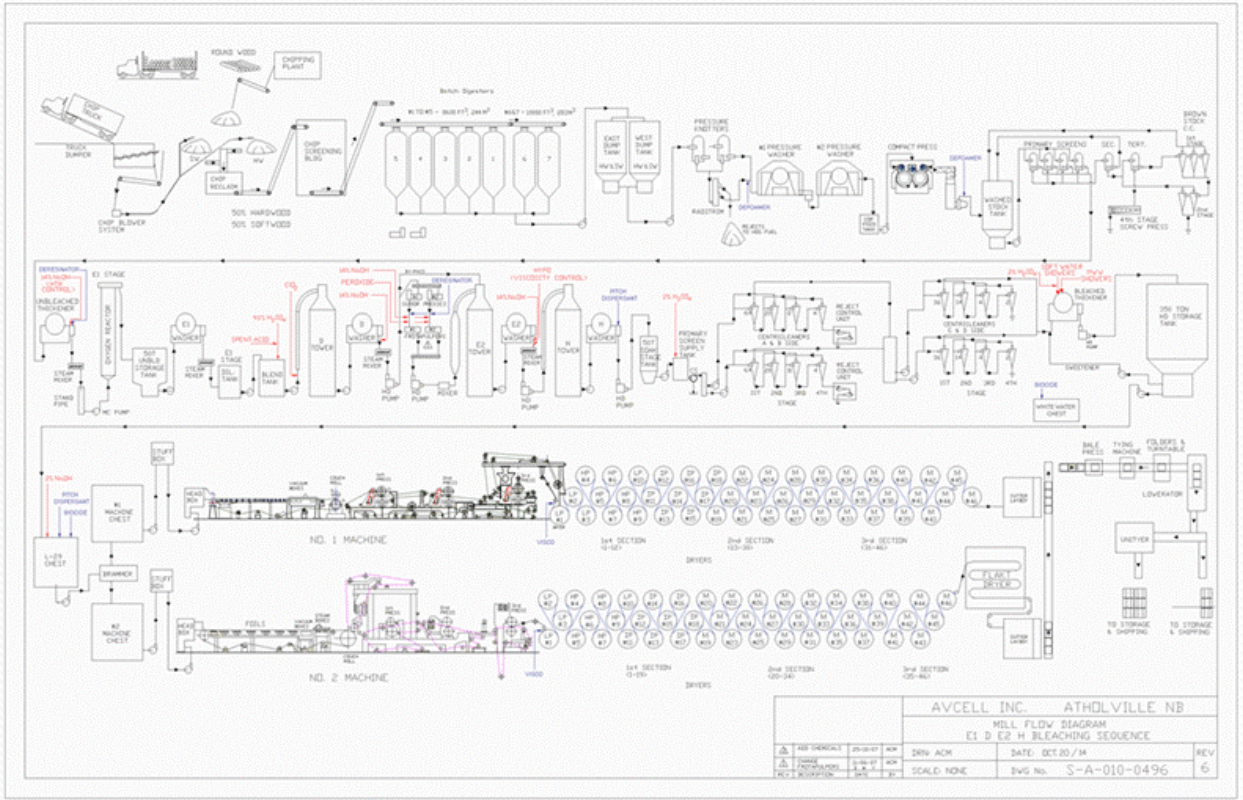
AV Cell Dissolving Pulp

Softwood + Hardwood Chips >> Pure Cellulose in bales

shipped by container
to Asian customers

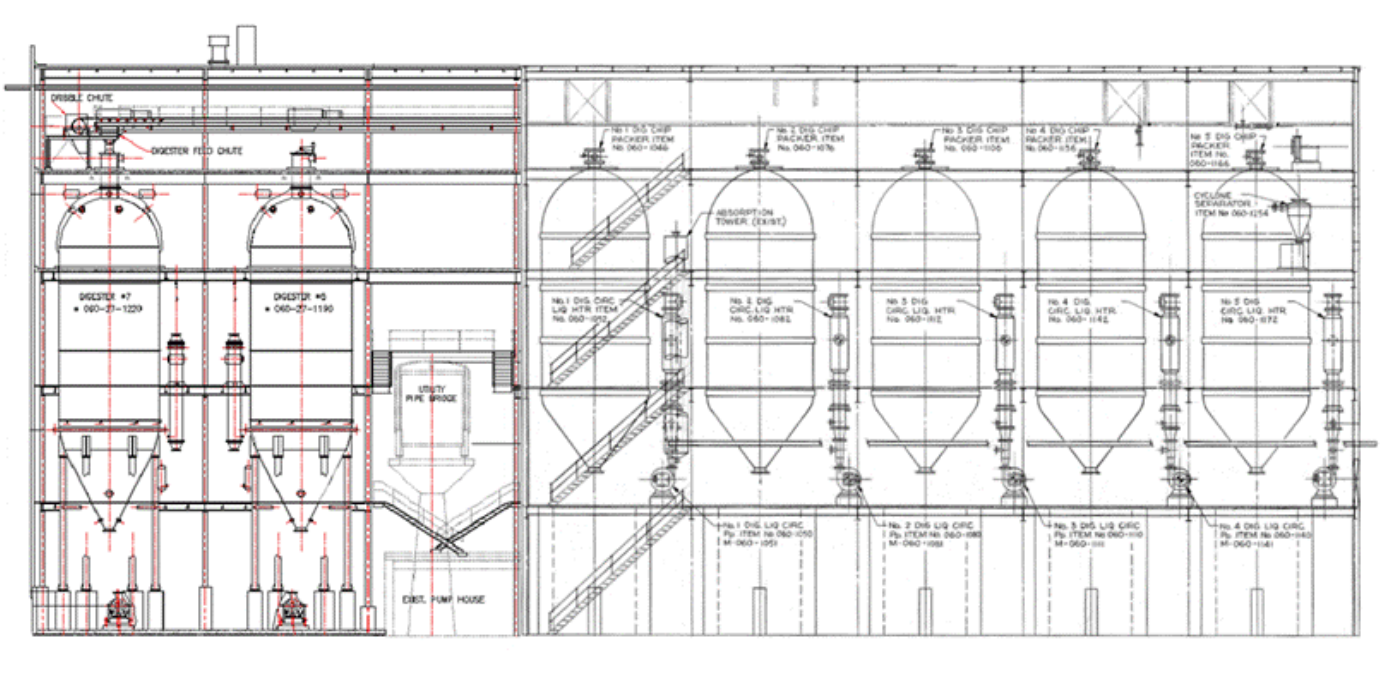
Cellulose bales >> Viscose Staple Fibre
>> Yarn >> Cloth
>> Clothing (Rayon, Viscose)

AV Cell Dissolving Pulp Process



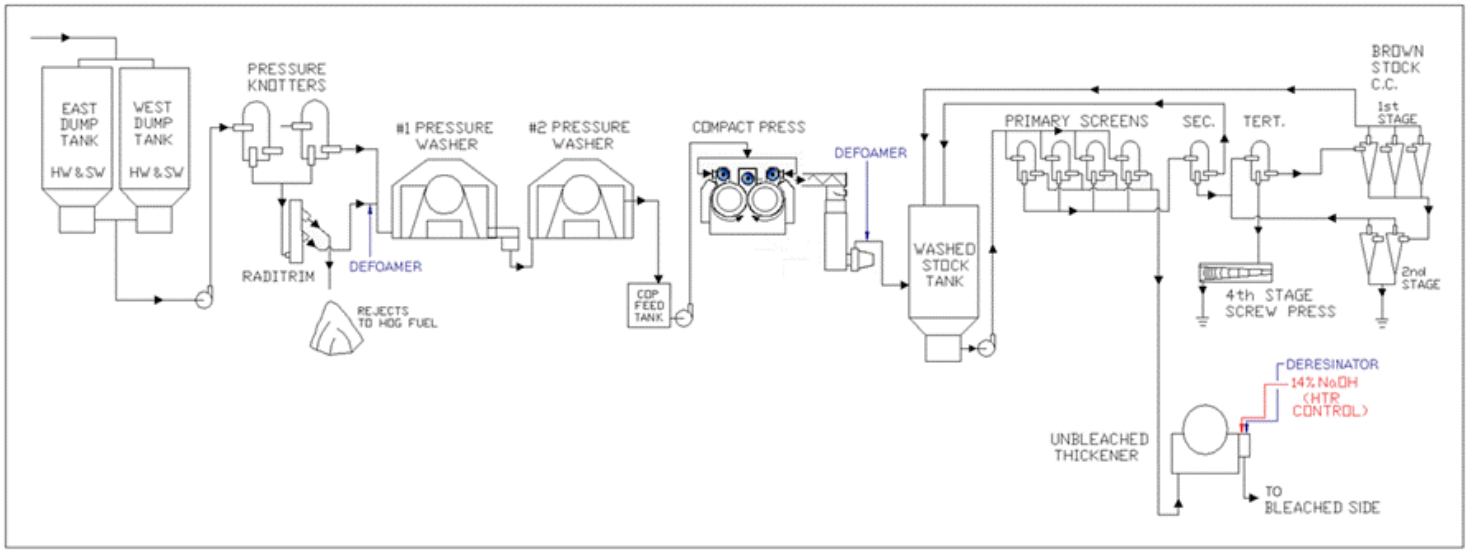
Cooking

SW & HW chips cooked under high pressure with magnesium bisulphite acid in 7 batch Digesters – dissolves lignin, freeing wood fibres.

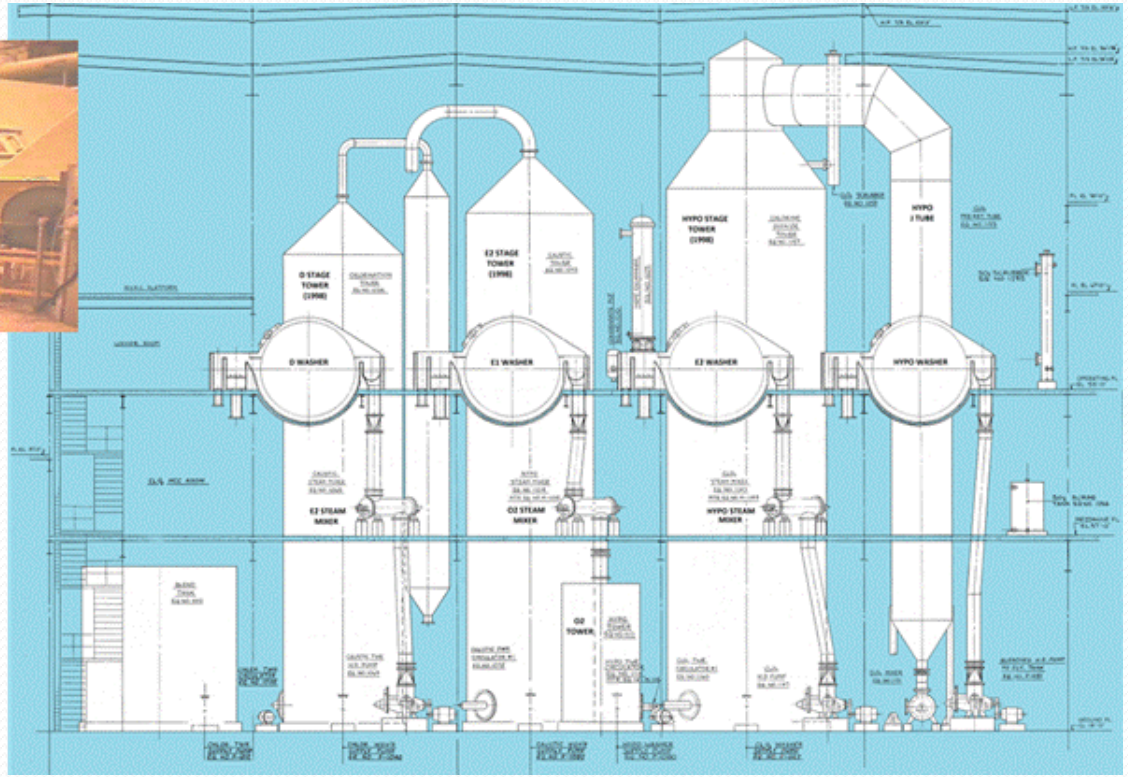


Washing & Screening

"Brownstock" pulp is washed & screened to remove solid impurities and weak liquor. Weak liquor is concentrated to use as fuel and to recycle acid components (in Recovery Dept.).



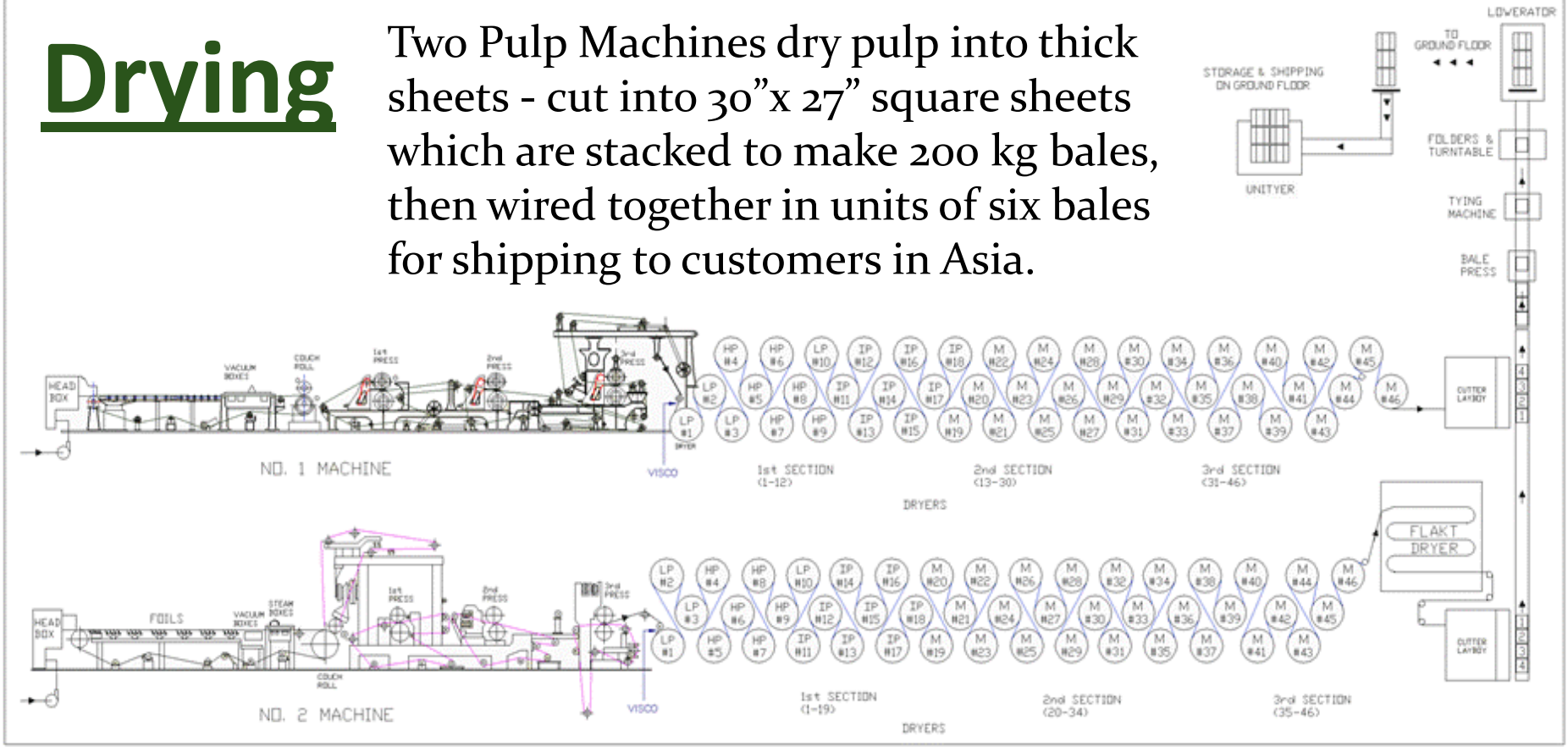
Purifying & Bleaching



Four Bleaching Stages (EDEH) remove Hemi-cellulose, resin, and inorganic material, and modify purified Cellulose to desired specifications.

Drying

Two Pulp Machines dry pulp into thick sheets - cut into 30”x 27” square sheets which are stacked to make 200 kg bales, then wired together in units of six bales for shipping to customers in Asia.



Evolution from Manual to Digital Data Records

Manual to Digital Data Records

- 1998 – Limited operational & quality information recorded and stored:
  - Data from Foxboro & Bailey DCS displays and field tests were recorded by hand on paper logsheets, at 1, 2 or 4 hour intervals. Any process study required manual entries into a spreadsheet or statistical program.
  - Forte System automatically transferred bale data to an SQL database on the network, Operators entered test results in database logsheet, SQL calculated lot totals and weighted averages for reports & shipping documents.

Manual to Digital Data Records

- 1999 – 2004 – Progression to digital records: set up Excel logsheets for each department, designed with same layout as the paper ones for easy use by Operators.
  - Each file had one tab per day, daily tabs for one month, and saved on network public drive.
  - Consolidating data from multiple Excel files was cumbersome for studying the process, but a big improvement on using the paper logsheets.

Manual to Digital Data Records

- 2004 – Phase I of DCS replacement: DeltaV Control System installed in Digester Dept.
  - DeltaV System set up to be isolated from network.
  - Automatic process data stored on DeltaV Pro Plus Control Station, had to copy data to memory stick and download on own PC to study the process.

Manual to Digital Data Records

- 2007 – Phase II of DCS replacement: DV for Bleachery, ETP, & Evaporator sections, plus 2 new servers for the PI Server and Ekho Systems, for network database & manual entry uploads.
  - Ekho department logsheets replaced Excel ones but still did manual entries at 1, 2 or 4 hour intervals.
  - Automatic data from DeltaV and Forte to the PI Server database.
  - Lot information calculated by Ekho, transferred to the PI Server database and Ross Accounting System.

Manual to Digital Data Records

- 2010 – Phase III of DCS replacement: DV for Recovery & Hog Boilers.
  - Many automatic data tags linked to existing Ekho logsheets, replaced some manual entries for Operators.
- 2012 – Phase IV of DCS replacement: DV for Machine Room, and some new instrumentation & auto valves installed for the Pulp Machines.

Progression of Control Stations

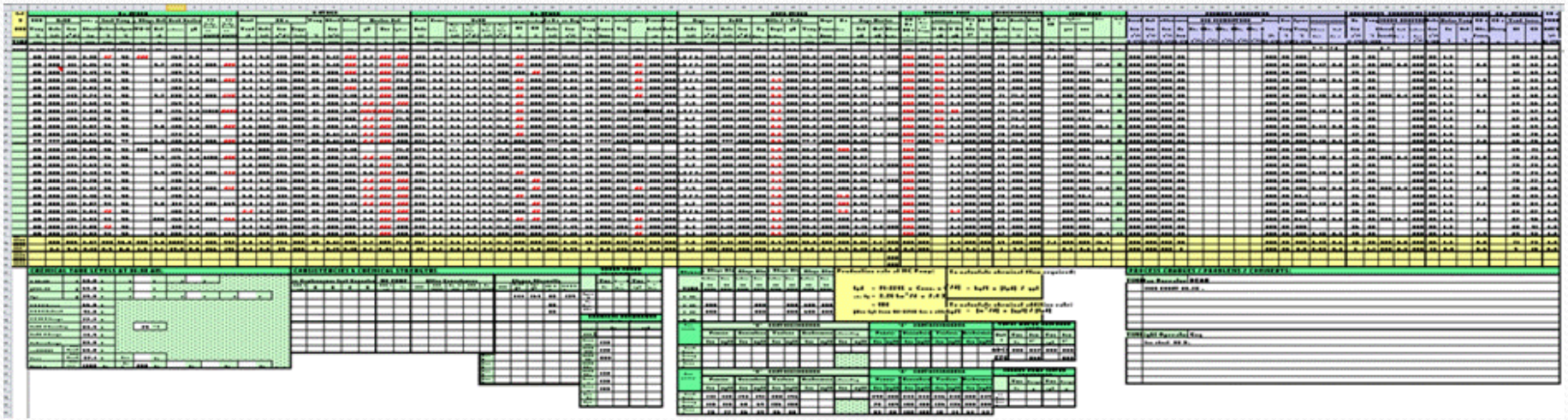
1) Foxboro Control Screens

2) Foxboro Screens + PC's for Excel Logsheets

3) DeltaV Control Screens + PC's for Ekho Logsheets in Bleachery

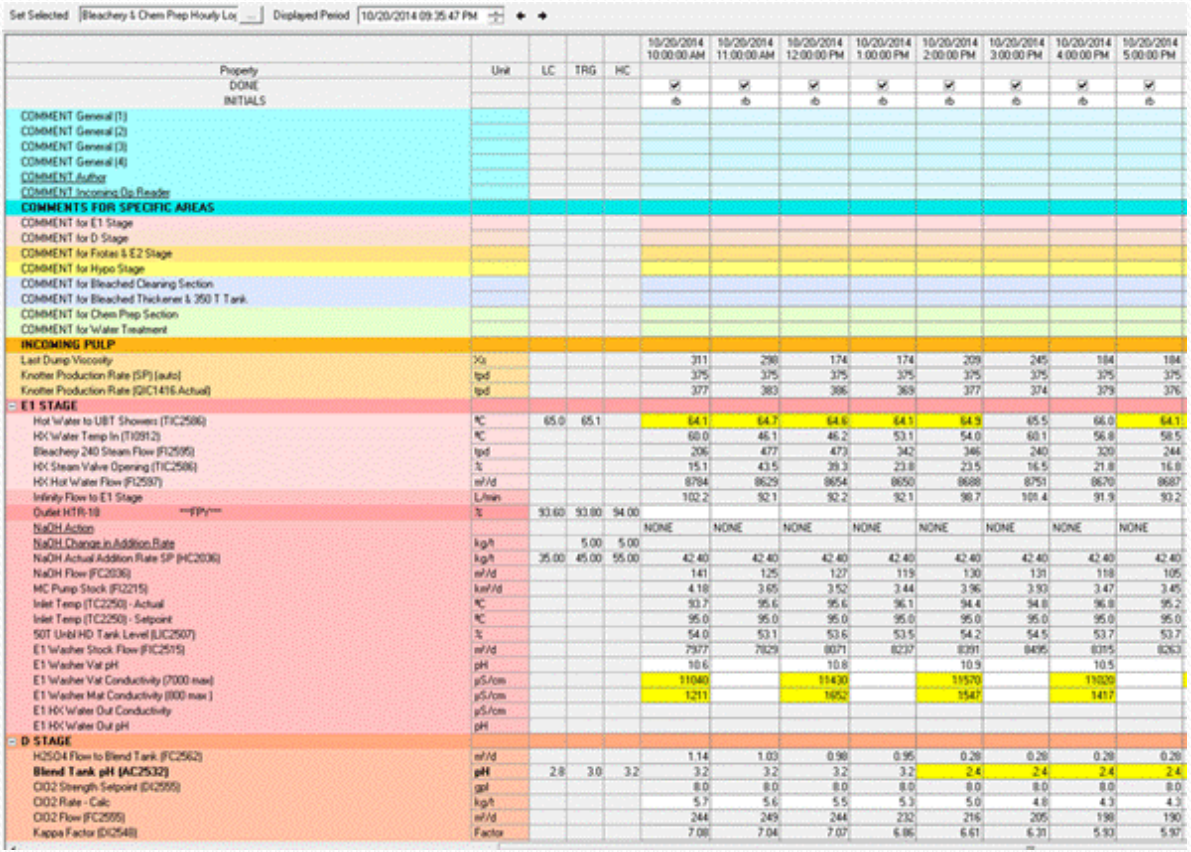
4) Recovery Foxboro Screens + PC's for Ekho Logsheets + DeltaV Control Screens for Evaps

Bleachery Logsheet – originally 3 large paper logs, then one wide Excel table per day…



Current Bleachery Ekho Logsheet

(auto & manual tags)

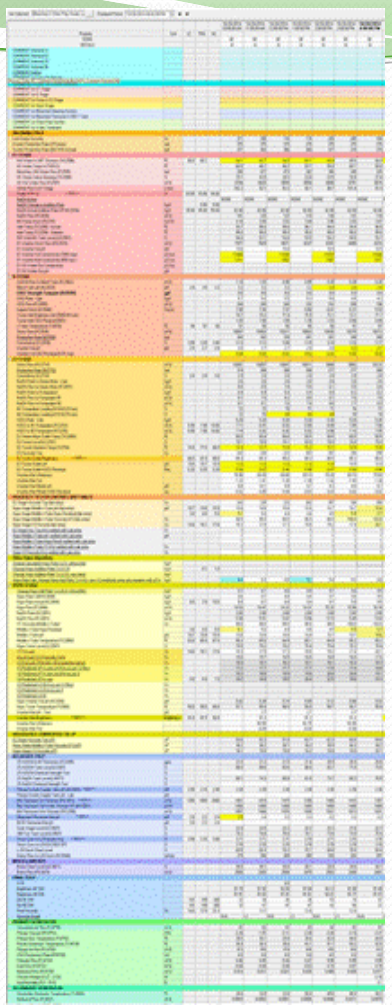


Set Selected: Bleachery & Chem Prep Hourly Lo | Displayed Period: 10/20/2014 09:35:47 PM

Property	Unit	LC	TRG	HC	10/20/2014 10:00:00 AM	10/20/2014 11:00:00 AM	10/20/2014 12:00:00 PM	10/20/2014 1:00:00 PM	10/20/2014 2:00:00 PM	10/20/2014 3:00:00 PM	10/20/2014 4:00:00 PM	10/20/2014 5:00:00 PM
DONE					☑	☑	☑	☑	☑	☑	☑	☑
INITIALS					ab	ab	ab	ab	ab	ab	ab	ab
COMMENT General (1)												
COMMENT General (2)												
COMMENT General (3)												
COMMENT General (4)												
COMMENT Author												
COMMENT Incoming Op Reader												
COMMENTS FOR SPECIFIC AREAS												
COMMENT for E1 Stage												
COMMENT for D Stage												
COMMENT for Fiotec & E2 Stage												
COMMENT for Hypo Stage												
COMMENT for Bleached Cleaning Section												
COMMENT for Bleached Thickener & 350 T Tank												
COMMENT for Chem Prep Section												
COMMENT for Water Treatment												
INCOMING PULP												
Last Dump Viscosity	Xs				311	298	174	174	209	245	184	184
Knotter Production Rate (SP) [auto]	tpd				375	375	375	375	375	375	375	375
Knotter Production Rate (QIC1416 Actual)	tpd				377	383	386	369	377	374	379	376
E1 STAGE												
Hot Water to UBT Showers (TIC2586)	℃	65.0	65.1		64.1	64.7	64.6	64.1	64.9	65.5	66.0	64.1
HX Water Temp In (TI0912)	℃				60.0	46.1	46.2	53.1	54.0	60.1	56.8	58.5
Bleachery 240 Steam Flow (FI2595)	tpd				206	477	473	342	346	240	320	244
HX Steam Valve Opening (TIC2586)	%				15.1	43.5	39.3	23.8	23.5	16.5	21.8	16.8
HX Hot Water Flow (FI2587)	m³/d				8784	8629	8654	8650	8688	8751	8670	8687
Infinity Flow to E1 Stage	L/min				102.2	92.1	92.2	92.1	98.7	101.4	91.9	93.2
Outlet H1R-18 ***FPY***	%	93.60	93.80	94.00								
NaOH Action					NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
NaOH Change in Addition Rate	kg/t		5.00	5.00								
NaOH Actual Addition Rate SP (HC2036)	kg/t	35.00	45.00	55.00	42.40	42.40	42.40	42.40	42.40	42.40	42.40	42.40
NaOH Flow (FC2036)	m³/d				141	125	127	119	130	131	118	105
MC Pump Stock (FI2215)	kg/d				4.18	3.65	3.52	3.44	3.96	3.93	3.47	3.45
Inlet Temp (TC2250) - Actual	℃				93.7	95.6	95.6	96.1	94.4	94.8	96.8	95.2
Inlet Temp (TC2250) - Setpoint	℃				95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
50T Unbl HD Tank Level (LIC2507)	%				54.0	53.1	53.6	53.5	54.2	54.5	53.7	53.7
E1 Washer Stock Flow (FIC2515)	m³/d				7977	7829	8071	8237	8391	8495	8315	8263
E1 Washer Vat pH	pH				10.6		10.8		10.9		10.5	
E1 Washer Vat Conductivity (7000 max)	µS/cm				11040		11430		11570		11020	
E1 Washer Mat Conductivity (800 max)	µS/cm				1211		1652		1547		1417	
E1 HX Water Out Conductivity	µS/cm											
E1 HX Water Out pH	pH											
D STAGE												
H2SO4 Flow to Blend Tank (FC2562)	m³/d				1.14	1.03	0.98	0.95	0.28	0.28	0.28	0.28
Blend Tank pH (AC2532)	**pH**	2.8	3.0	3.2	3.2	3.2	3.2	3.2	2.4	2.4	2.4	2.4
ClO2 Strength Setpoint (DI2555)	gpl				8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
ClO2 Rate - Calc	kg/t				5.7	5.6	5.5	5.3	5.0	4.8	4.3	4.3
ClO2 Flow (FC2555)	m³/d				244	249	244	232	216	205	198	190
Kappa Factor (DI2548)	Factor				7.08	7.04	7.07	6.86	6.61	6.31	5.93	5.97

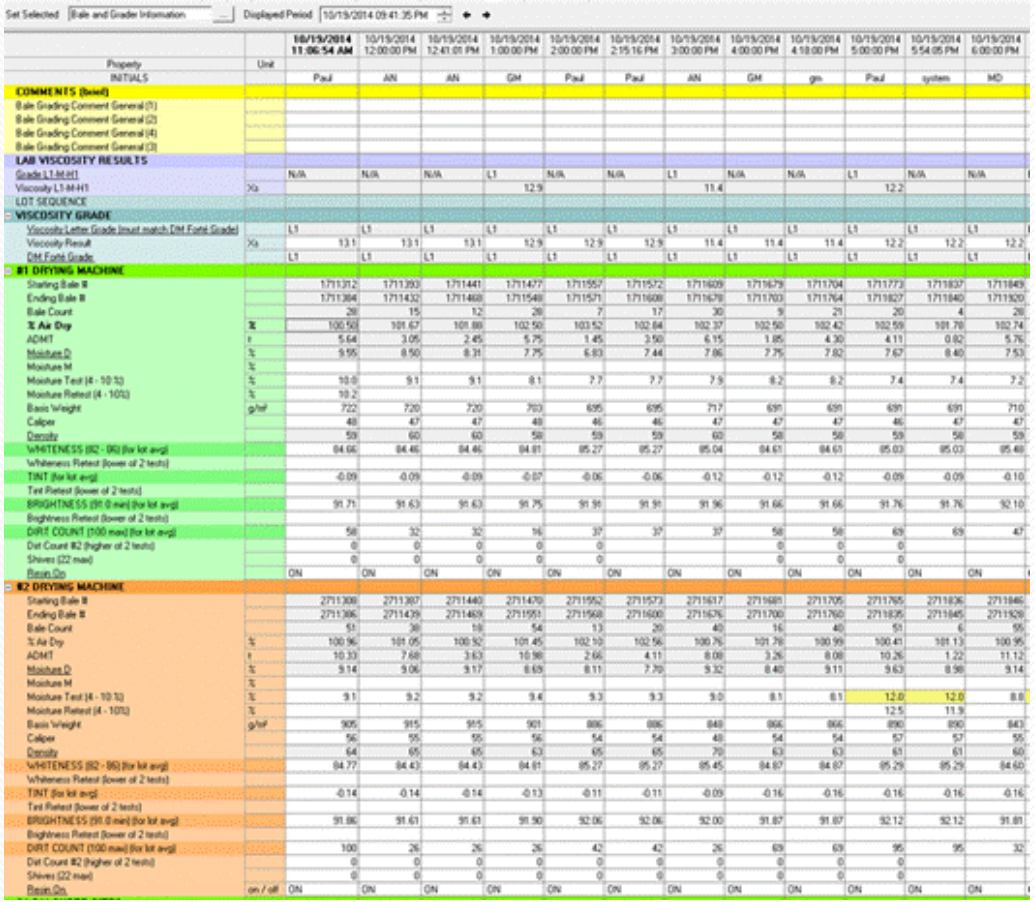
Current Bleachery Ekho Logsheet

(complete page)



Current Ekho Bale & Grader Logsheet

(auto & manual tags)



Set Selected: Bale and Grader Information Displayed Period: 10/19/2014 09:41:35 PM

Property	Unit	10/19/2014 11:06:54 AM	10/19/2014 12:00:00 PM	10/19/2014 12:41:01 PM	10/19/2014 1:00:00 PM	10/19/2014 2:00:00 PM	10/19/2014 2:15:16 PM	10/19/2014 3:00:00 PM	10/19/2014 4:00:00 PM	10/19/2014 4:18:00 PM	10/19/2014 5:00:00 PM	10/19/2014 5:54:05 PM	10/19/2014 6:00:00 PM
INITIALS		Paul	AN	AN	GM	Paul	Paul	AN	GM	gm	Paul	system	MD
COMMENTS (base)													
Bale Grading Comment General (1)													
Bale Grading Comment General (2)													
Bale Grading Comment General (4)													
Bale Grading Comment General (3)													
LAB VISCOSITY RESULTS													
Grade L1-M-H1		N/A	N/A	N/A	L1	N/A	N/A	L1	N/A	N/A	L1	N/A	N/A
Viscosity L1-M-H1	Xa				12.9			11.4			12.2		
LOT SEQUENCE													
VISCOSITY GRADE													
Viscosity Letter Grade (must match DM Font Grade)		L1	L1	L1	L1	L1	L1	L1	L1	L1	L1	L1	L1
Viscosity Result	Xa	13.1	13.1	13.1	12.9	12.9	12.9	11.4	11.4	11.4	12.2	12.2	12.2
DM Font Grade		L1	L1	L1	L1	L1	L1	L1	L1	L1	L1	L1	L1
#1 DRYING MACHINE													
Starting Bale #		1711312	1711393	1711441	1711477	1711557	1711572	1711609	1711679	1711704	1711773	1711837	1711849
Ending Bale #		1711384	1711432	1711468	1711548	1711571	1711600	1711678	1711703	1711764	1711827	1711840	1711926
Bale Count		28	15	12	28	7	17	30	9	21	20	4	28
% Air Dry	%	100.50	101.67	101.88	102.50	103.52	102.84	102.37	102.50	102.42	102.59	101.78	102.74
ADMT	t	5.64	3.05	2.45	5.75	1.45	3.50	6.15	1.85	4.30	4.11	0.82	5.76
Moisture D	%	9.55	8.50	8.31	7.75	6.83	7.44	7.86	7.75	7.82	7.67	8.40	7.53
Moisture M	%												
Moisture Test (4 - 10 %)	%	10.0	9.1	9.1	8.1	7.7	7.7	7.9	8.2	8.2	7.4	7.4	7.2
Moisture Retest (4 - 10%)	%	10.2											
Basis Weight	g/m²	722	720	720	703	695	695	717	691	691	691	691	710
Caliper		48	47	47	48	46	46	47	47	47	46	47	47
Density		59	60	60	58	59	59	60	58	58	59	58	59
WHITENESS (82 - 86) (for lot avg)		84.66	84.46	84.46	84.81	85.27	85.27	85.04	84.61	84.61	85.03	85.03	85.48
Whiteness Retest (lower of 2 tests)													
TINT (for lot avg)		-0.09	-0.09	-0.09	-0.07	-0.06	-0.06	-0.12	-0.12	-0.12	-0.09	-0.09	-0.10
Tint Retest (lower of 2 tests)													
BRIGHTNESS (91.0 min) (for lot avg)		91.71	91.63	91.63	91.75	91.91	91.91	91.96	91.66	91.66	91.76	91.76	92.10
Brightness Retest (lower of 2 tests)													
DIRT COUNT (100 max) (for lot avg)		58	32	32	16	37	37	37	58	58	69	69	47
Dirt Count #2 (higher of 2 tests)		0	0	0	0				0	0	0		
Shives (22 max)		0	0	0	0	0	0		0	0	0		
Resin On		ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
#2 DRYING MACHINE													
Starting Bale #		2711308	2711387	2711440	2711470	2711552	2711573	2711617	2711681	2711705	2711765	2711836	2711846
Ending Bale #		2711386	2711439	2711469	2711551	2711568	2711600	2711676	2711700	2711760	2711835	2711845	2711928
Bale Count		51	38	18	54	13	20	40	16	40	51	6	55
% Air Dry	%	100.96	101.05	100.92	101.45	102.10	102.56	100.76	101.78	100.99	100.41	101.13	100.95
ADMT	t	10.33	7.68	3.63	10.98	2.66	4.11	8.08	3.26	8.08	10.26	1.22	11.12
Moisture D	%	9.14	9.06	9.17	8.65	8.11	7.79	9.32	8.40	9.11	9.63	8.98	9.14
Moisture M	%												
Moisture Test (4 - 10 %)	%	9.1	9.2	9.2	9.4	9.3	9.3	9.0	8.1	8.1	12.0	12.0	8.8
Moisture Retest (4 - 10%)	%										12.5	11.9	
Basis Weight	g/m²	905	915	915	901	886	886	849	866	866	890	890	843
Caliper		56	55	55	56	54	54	48	54	54	57	57	55
Density		64	65	65	63	65	65	70	63	63	61	61	60
WHITENESS (82 - 86) (for lot avg)		84.77	84.43	84.43	84.81	85.27	85.27	85.45	84.87	84.87	85.29	85.29	84.60
Whiteness Retest (lower of 2 tests)													
TINT (for lot avg)		-0.14	-0.14	-0.14	-0.13	-0.11	-0.11	-0.09	-0.16	-0.16	-0.16	-0.16	-0.16
Tint Retest (lower of 2 tests)													
BRIGHTNESS (91.0 min) (for lot avg)		91.86	91.61	91.61	91.90	92.06	92.06	92.00	91.87	91.87	92.12	92.12	91.81
Brightness Retest (lower of 2 tests)													
DIRT COUNT (100 max) (for lot avg)		100	26	26	26	42	42	26	69	69	95	95	32
Dirt Count #2 (higher of 2 tests)		0	0	0	0	0	0	0	0	0	0		
Shives (22 max)		0	0	0	0	0	0	0	0	0	0		
Resin On	on / off	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

Current Recovery #1 Ekho Logsheet

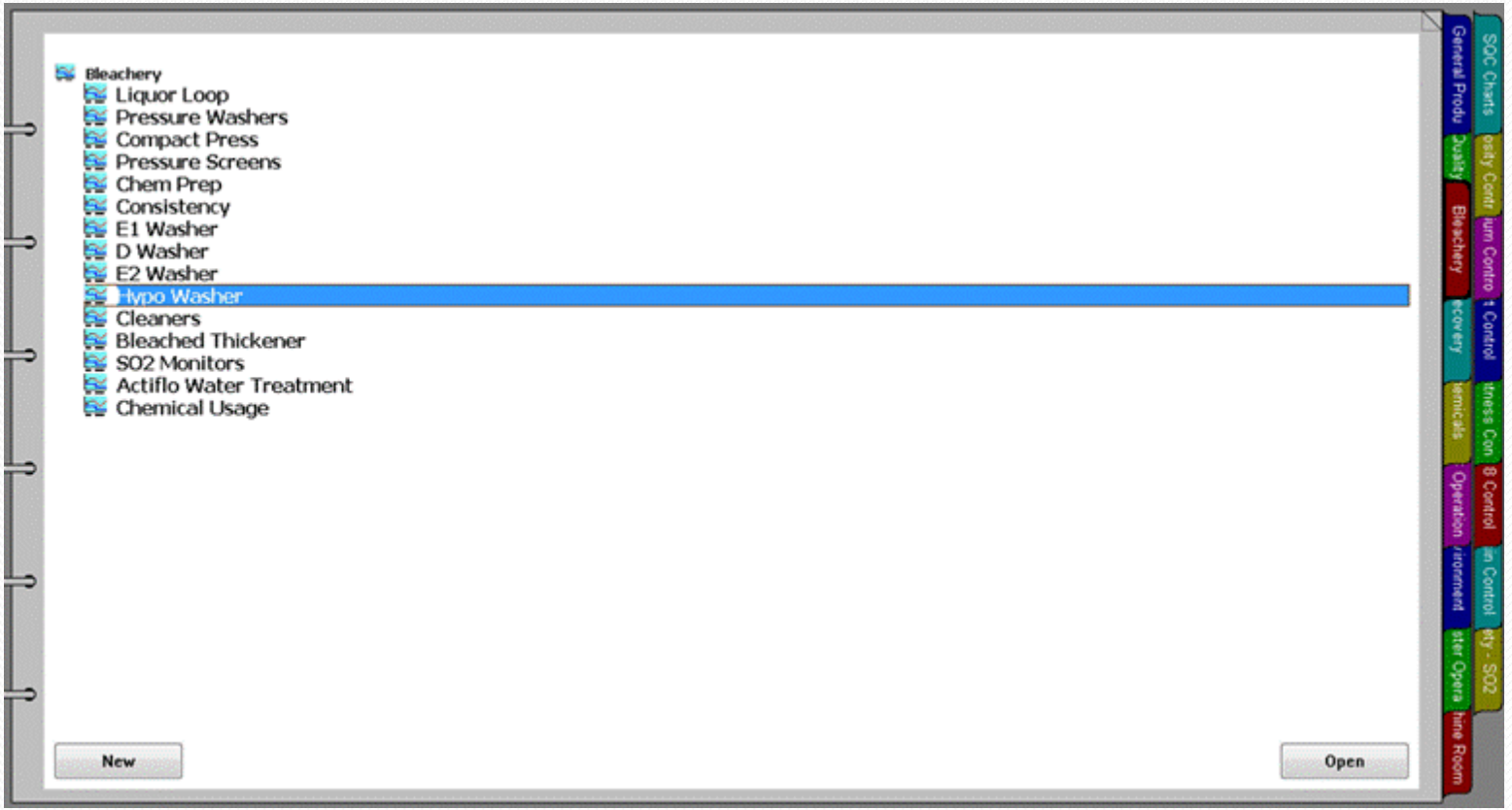
(all auto tags)

Set Selected: Recovery #1 Operator Logsheet | Displayed Period: 10/17/2014 08:38:34 AM

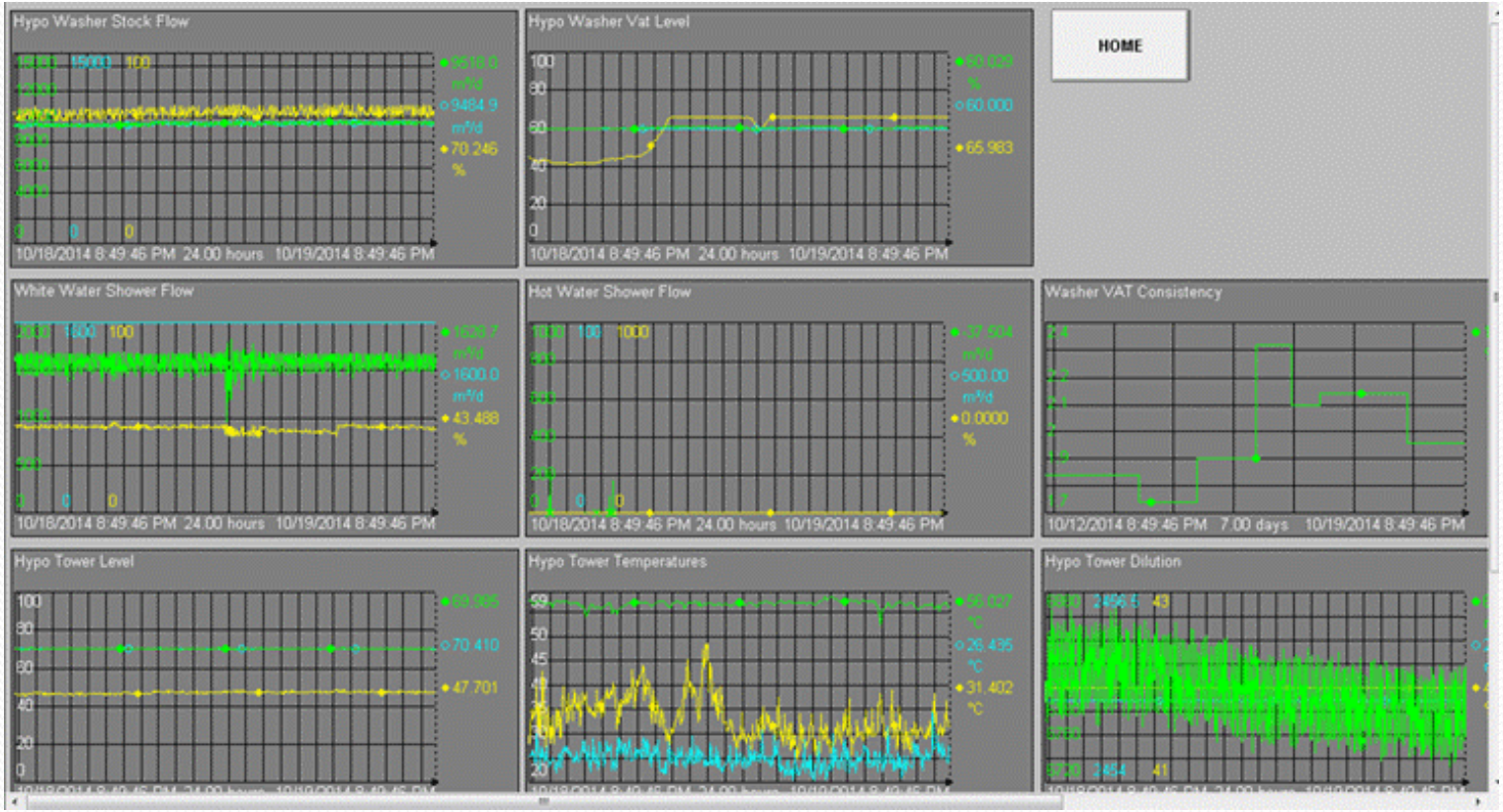
Property	Unit	10/16/2014 12:00:00 PM	10/16/2014 2:00:00 PM	10/16/2014 4:00:00 PM	10/16/2014 6:00:00 PM	10/16/2014 8:00:00 PM	10/16/2014 10:00:00 PM	10/17/2014	10/17/2014 2:00:00 AM
DONE		☑	☑	☑	☑	☑	☑	☑	☑
INITIALS		K.J.	K.J.	K.J.	K.J.	BL	BL	BL	BL
Recovery Boiler									
Secondary Inlet Steam Temp (332 °C min) (TC7322)	ºC	342	300	304	335	303	339	339	331
Main Steam Temp (510 C+/- 5.55 C) (TC7113)	ºC	496	515	501	483	431	497	495	503
Main Steam Pressure (PI7115)	kPa	8496	8032	8648	8629	8543	8345	8640	8629
Total Steam Flow (FI7116)	t/d	2195	2020	1962	2172	2001	2142	2182	2095
Drum Pressure (PI6603)	MPa	9.23	8.56	9.17	9.35	9.16	9.05	9.37	9.32
Furnace Draft Pressure (PC7315)	kPa	-0.17	-0.42	-0.17	-0.17	-0.17	-0.12	-0.18	0.00
I.D. Fan Speed	RPM	855	905	845	874	865	841	888	873
F.D. Fan Speed	RPM	1045	1043	1059	1057	1046	1016	1087	1032
F.D. Fan Discharge Pressure (PI7302)	kPa	3.66	3.48	3.67	3.73	3.57	3.48	3.91	3.58
Total Combustion Air Flow (FI7300)	m³/d	3633	3654	3666	3646	3629	3510	3746	3553
% O2 East (2.00) (AE7328)	%	1.31	1.15	1.43	1.28	1.42	1.08	1.23	1.11
% O2 West (2.00) (AW7328)	%	1.42	1.39	1.73	1.61	1.71	1.32	1.57	1.68
Liquor Flow - Header A (FIC6705)	m³/d	808	800	0	0	0	0	0	0
Liquor Flow - Header B (FIC6704)	m³/d	0	0	802	806	797	799	824	782
Feedwater Flow (FI6301)	m³/d	2107	1658	1408	2156	1541	1945	2096	1967
HL or CCA Flow - Header A (FIC6705)	m³/d	804	798	22	24	20	123	139	12
HL or CCA Flow - Header B (FIC6704)	m³/d	163	162	799	804	797	797	821	784
Liquor Temp (TI6702-2) (Header A)	ºC	115	116	90	74	57	93	93	74
Liquor Temp (TI6702-1) (Header B)	ºC	93	95	115	116	116	116	116	116
Liquor Atomizing Steam Pressure (PC6706)	kPa	904	913	874	893	866	887	896	878
Liquor Atomizing Steam Flow (FI7216)	t/d	165.0	165.0	165.0	165.0	165.0	165.0	165.0	165.0
Primary Furnace Gas Temp East (TI7305)	ºC	1198	1199	1147	1197	1170	1196	1189	1196
Primary Furnace Gas Temp West (TI7306)	ºC	1266	1250	1240	1249	1210	1204	1243	1258
Burner Wind Box East Side Pressure (PI7307)	kPa	1.59	1.37	1.58	1.55	1.45	1.45	1.69	1.51
Burner Wind Box West Side Pressure (PI7308)	kPa	1.73	1.51	1.71	1.74	1.71	1.62	1.89	1.70
TAH Inlet Pressure (PI7326)	kPa	-0.66	-0.94	-0.68	-0.69	-0.65	-0.61	-0.71	-0.53
Prim Superheater Outlet Pressure (PI7318)	kPa	-0.20	-0.54	-0.21	-0.21	-0.19	-0.17	-0.21	-0.03
Sec Superheater Outlet Pressure (PI7324)	kPa	-0.35	-0.69	-0.39	-0.38	-0.32	-0.35	-0.35	-0.24
Boiler Outlet Pressure (PI7325)	kPa	-0.53	-0.85	-0.54	-0.57	-0.53	-0.49	-0.57	-0.41
Economizer Inlet Pressure (PI7331)	kPa	-3.19	-3.30	-2.84	-3.15	-3.32	-3.13	-3.31	-3.35
Economizer Outlet Pressure (PI7333)	kPa	-3.83	-4.31	-3.80	-4.01	-3.82	-3.67	-4.10	-3.79

PI ProcessBook Applications

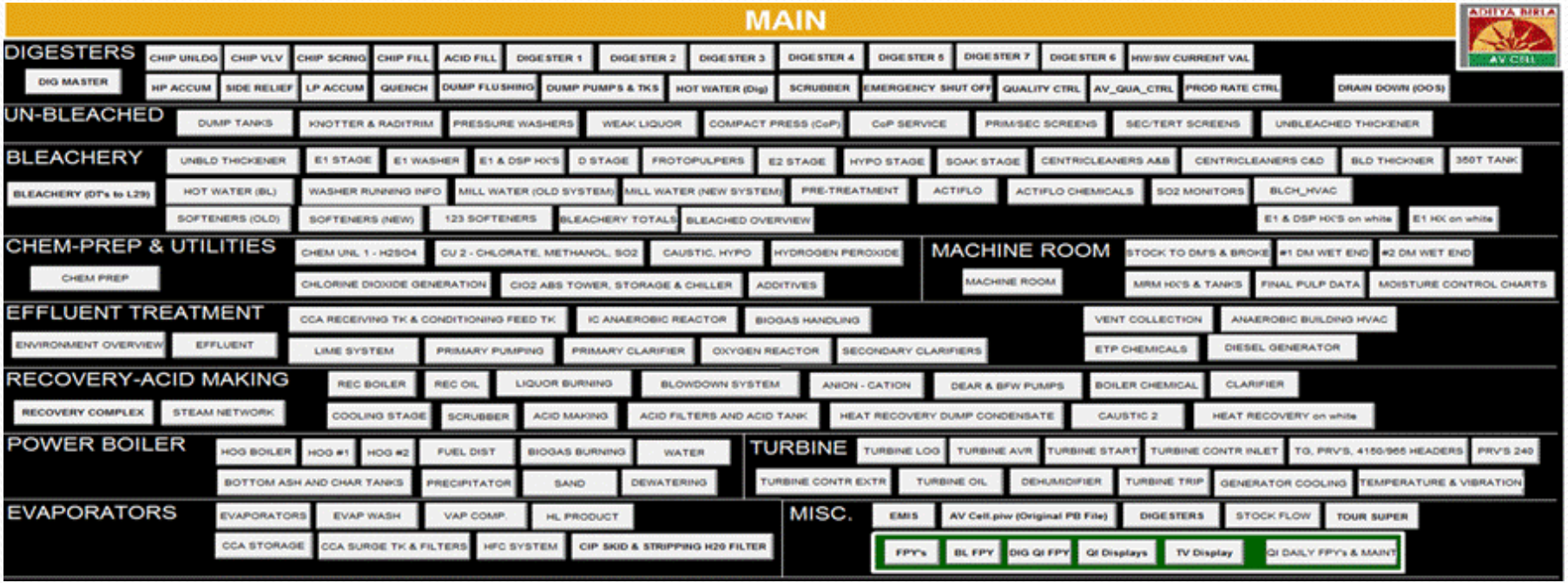
Using PI ProcessBook Charts for Monitoring Processes



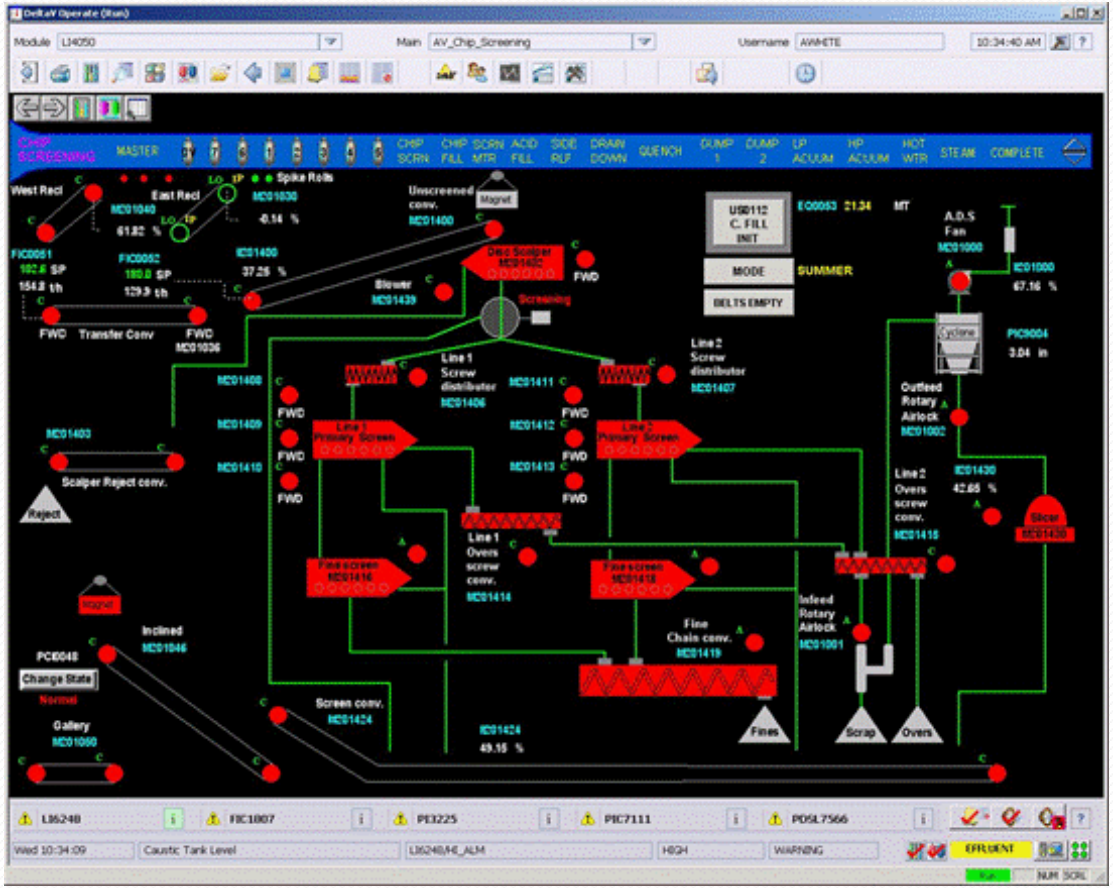
Using PI ProcessBook Charts for Monitoring Processes



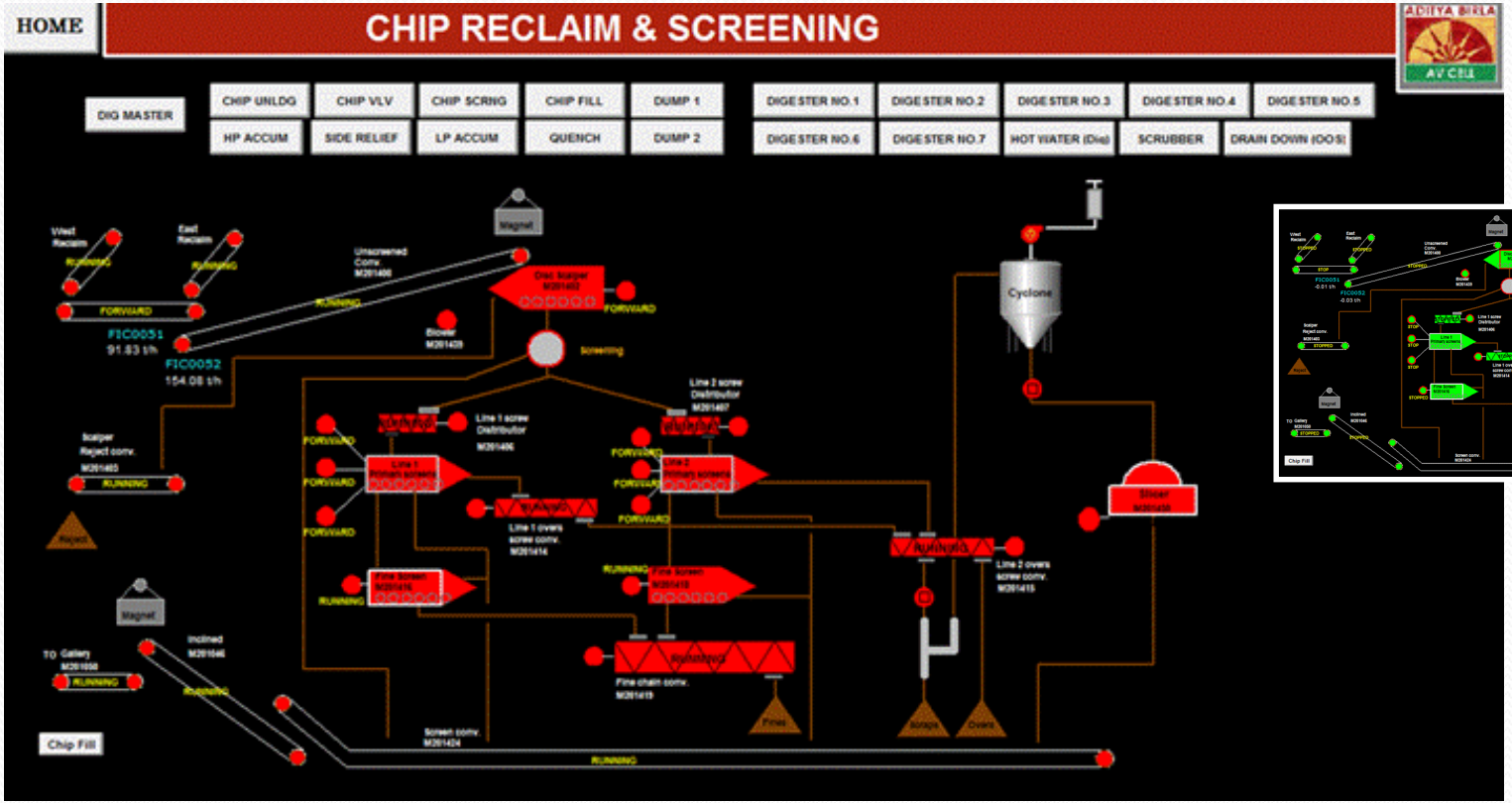
Using PI ProcessBook Pages to Mimic DeltaV Screens



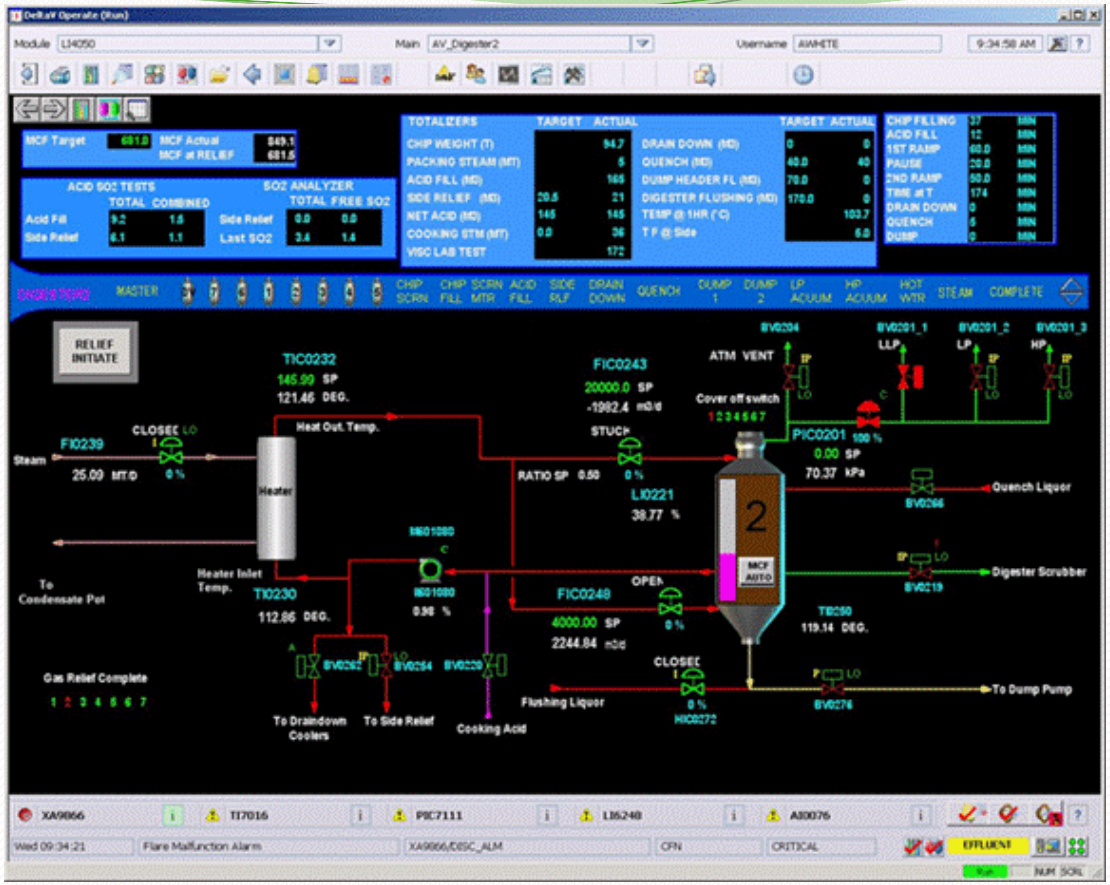
DeltaV Screen for Chip Screening



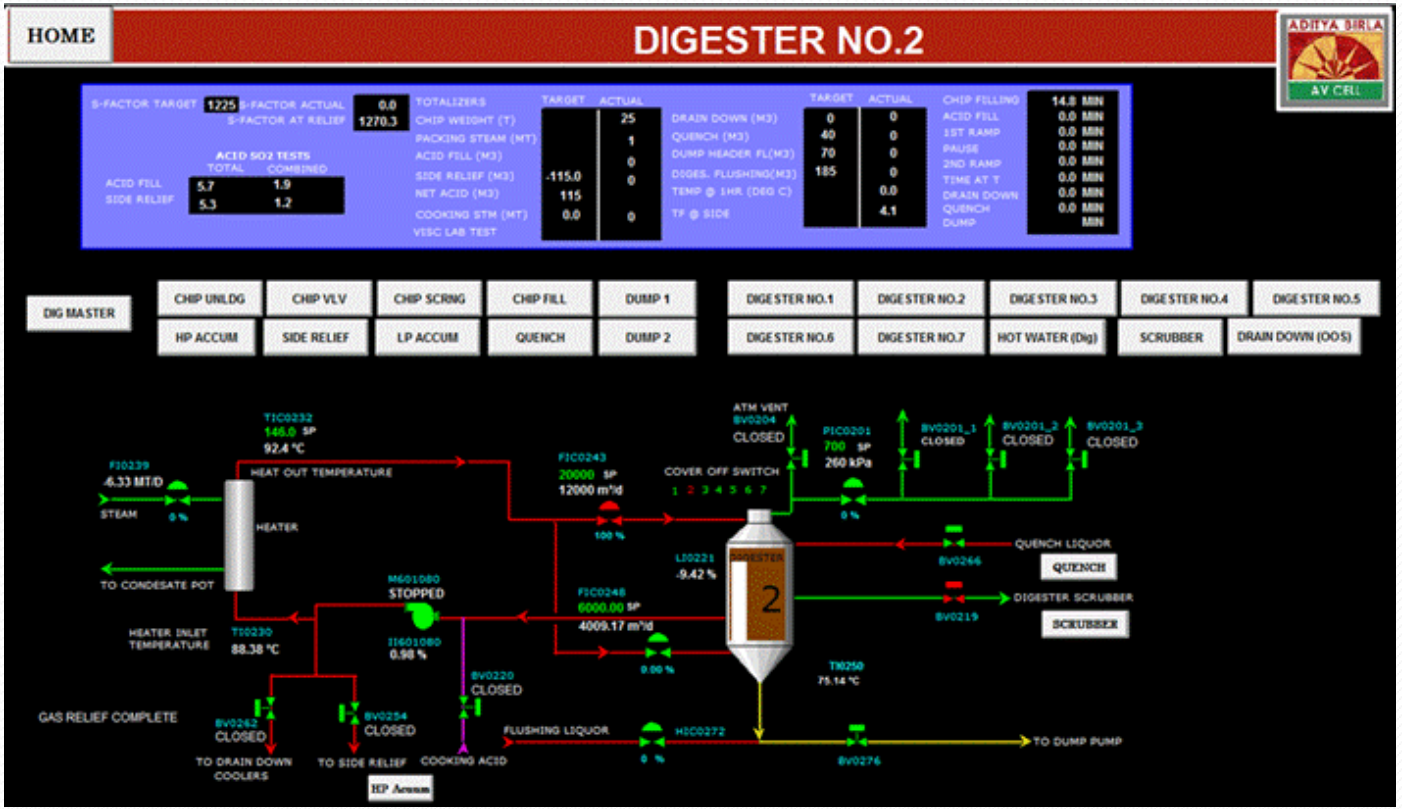
PI ProcessBook Page for Chip Screening



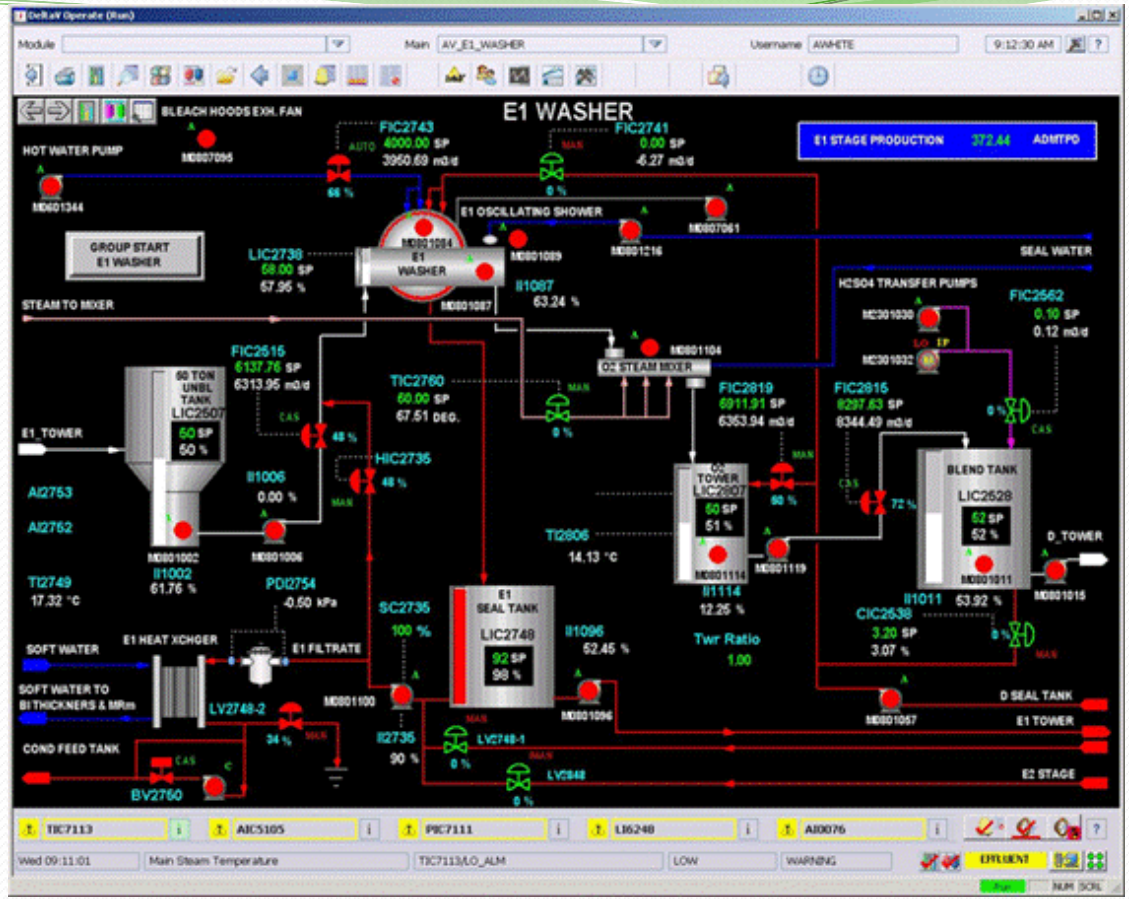
DeltaV Screen for one Digester



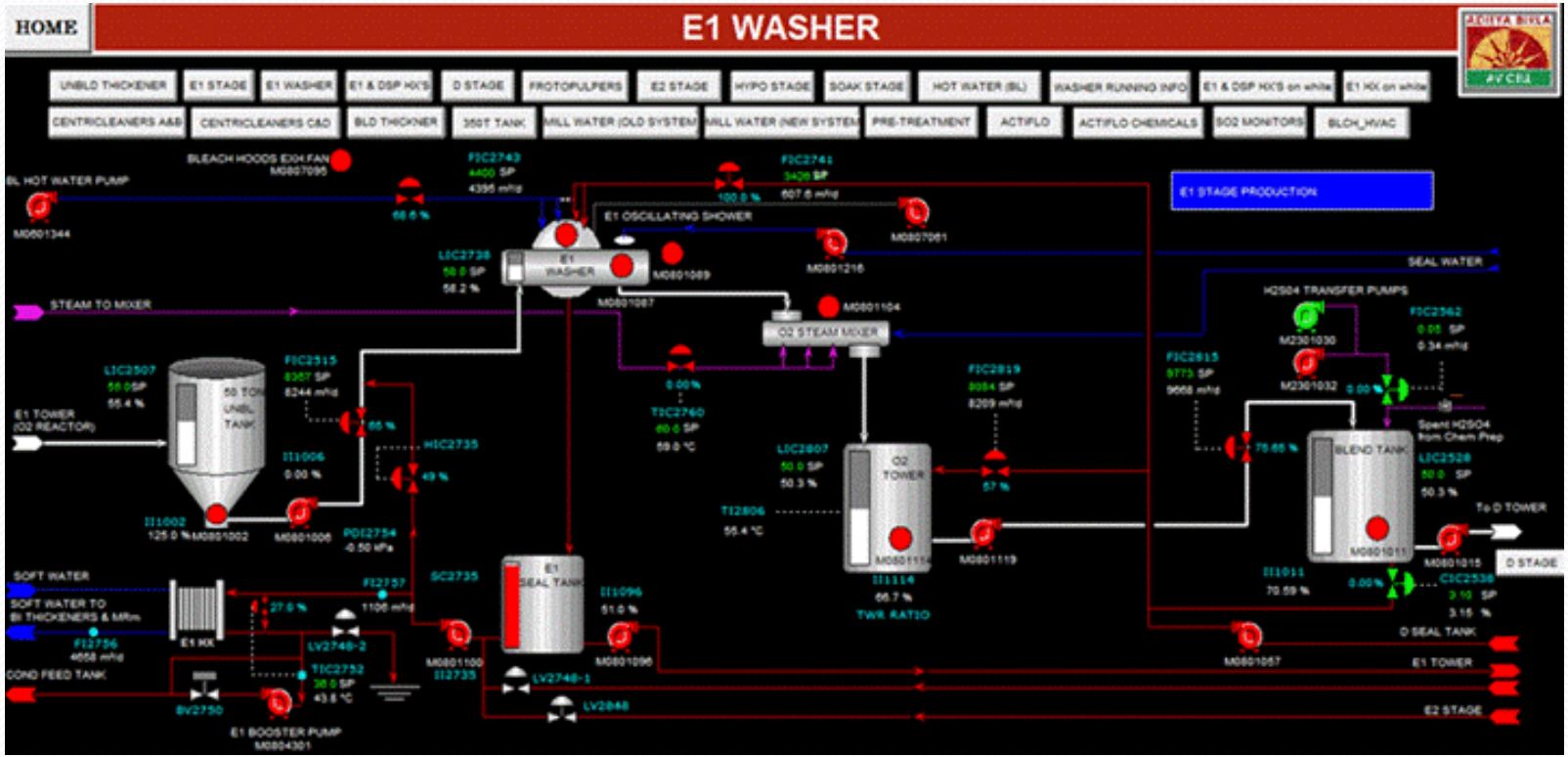
PI ProcessBook Page for one Digester



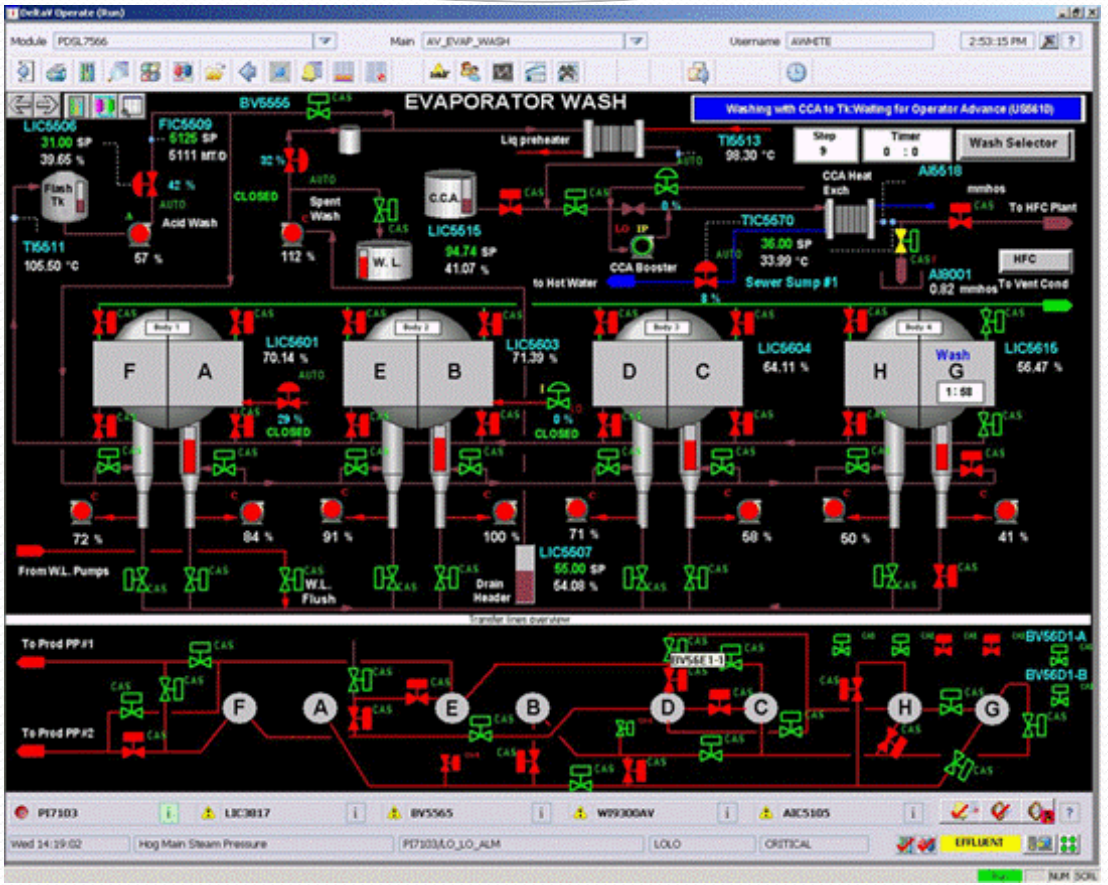
DeltaV Screen for one Bleaching Stage



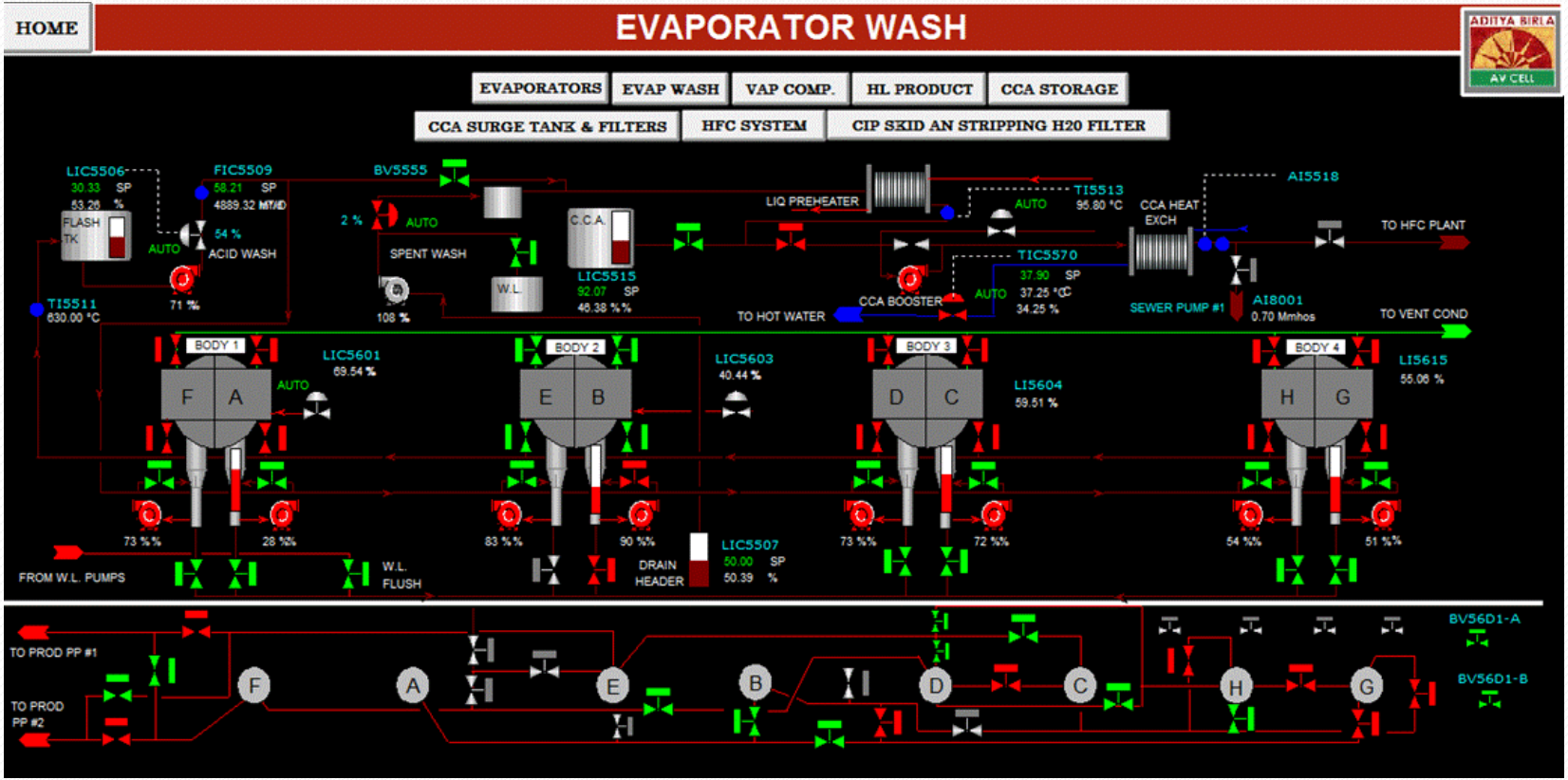
PI ProcessBook Page for one Bleaching Stage



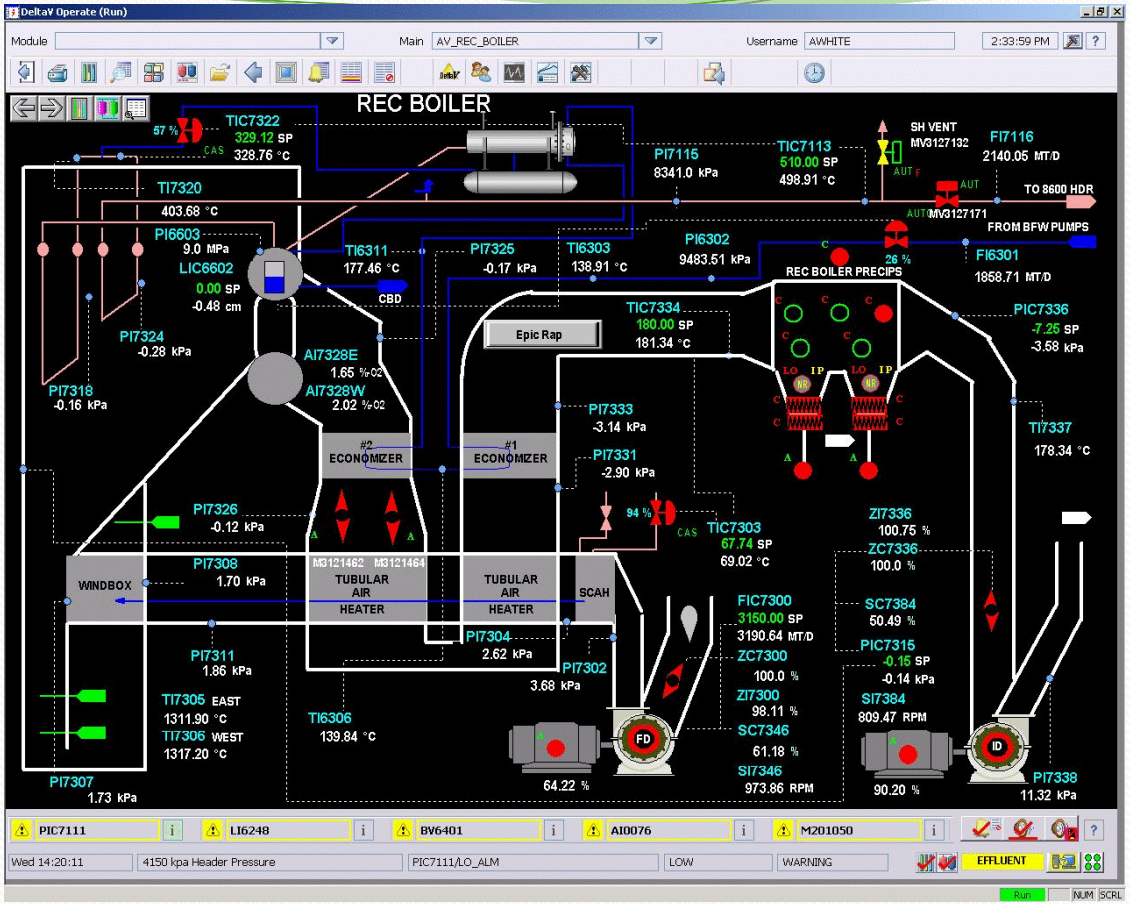
DeltaV Screen for Evaporator Wash Cycle



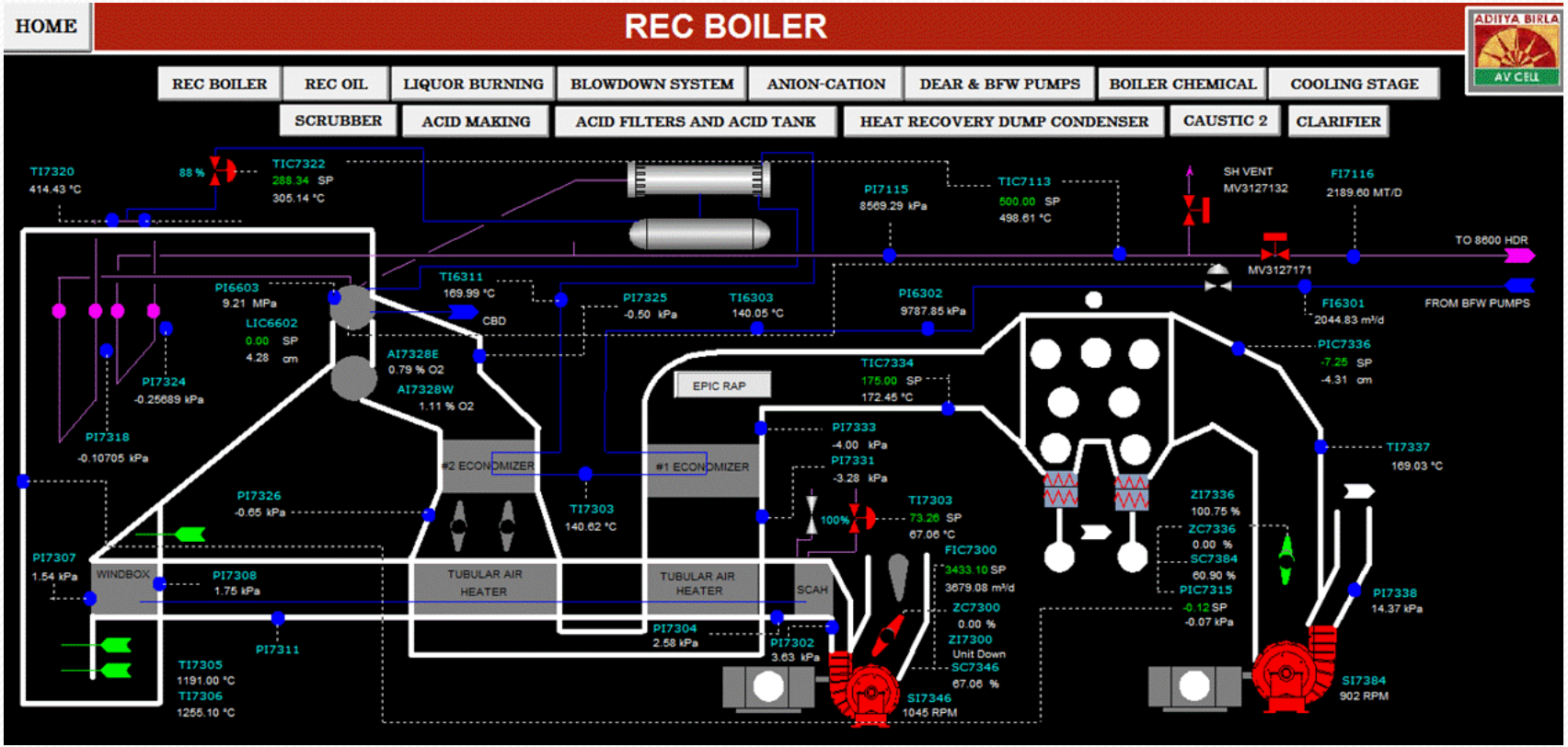
PI ProcessBook Page for Evaporator Wash Cycle



DeltaV Screen for Recovery Boiler

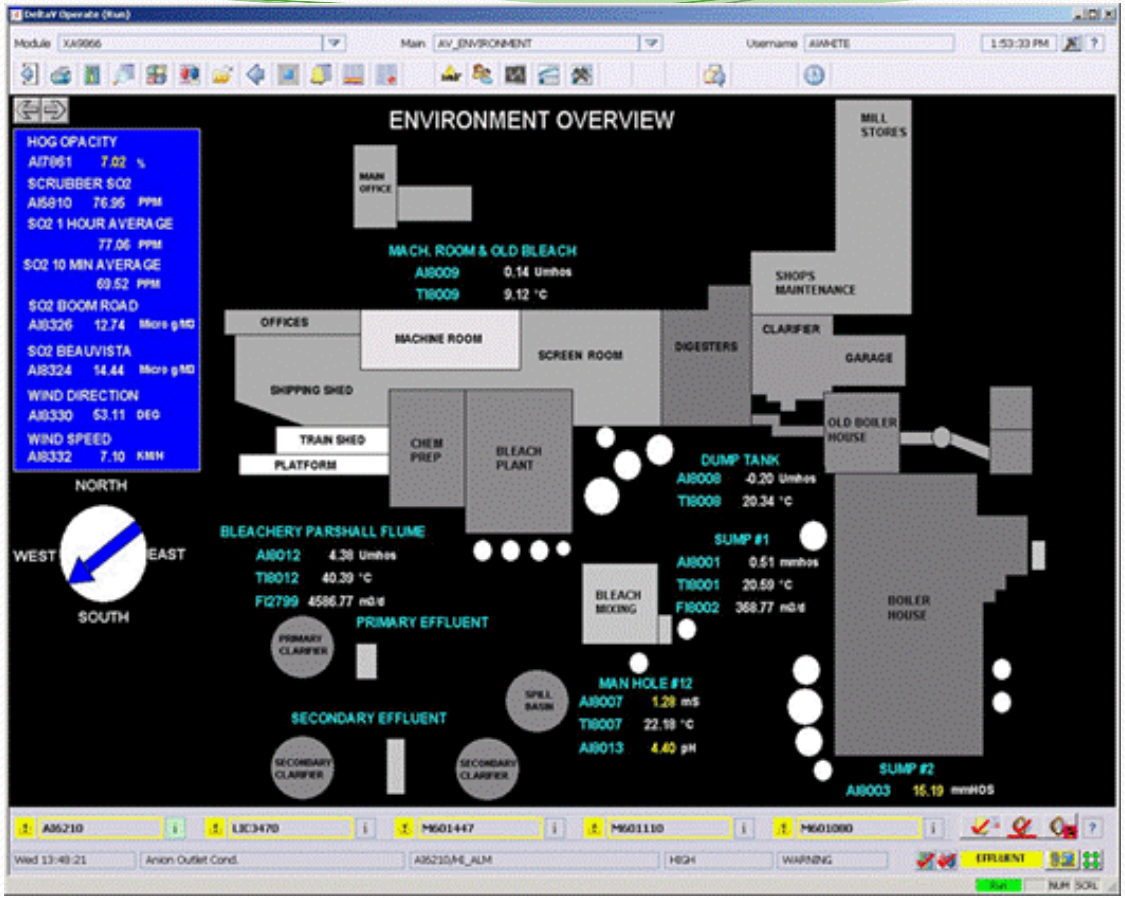


PI ProcessBook Page for Recovery Boiler

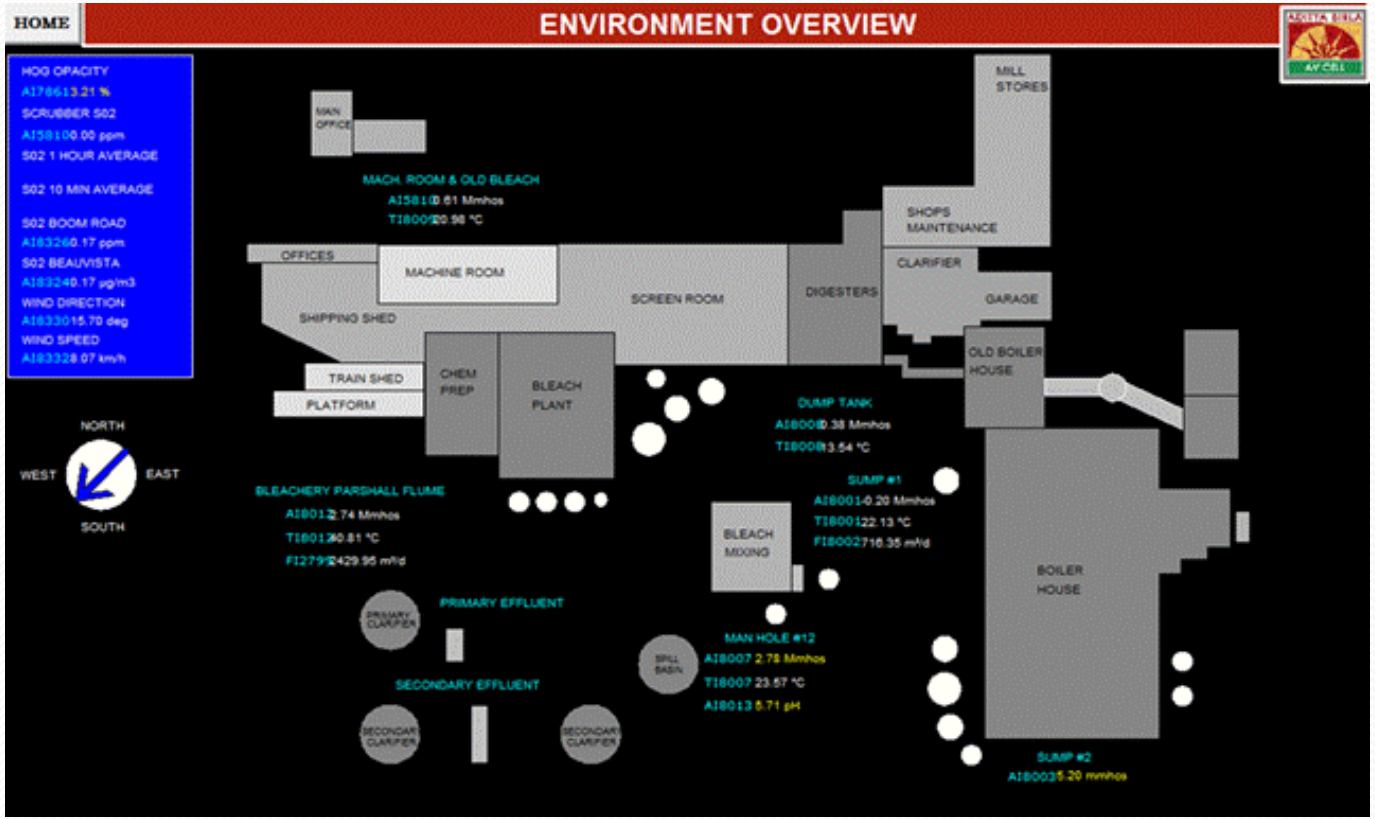


DeltaV Screen for Environment Overview

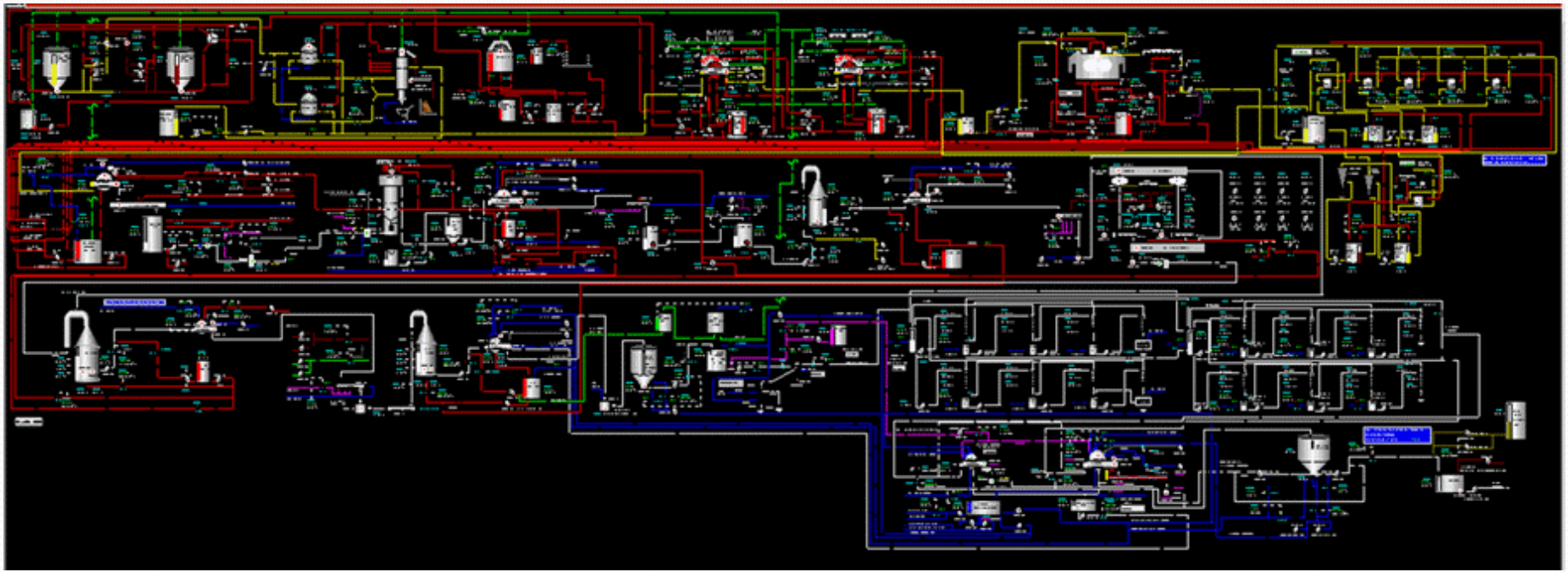
(sewers & air quality)



PI ProcessBook Page for Environment Overview

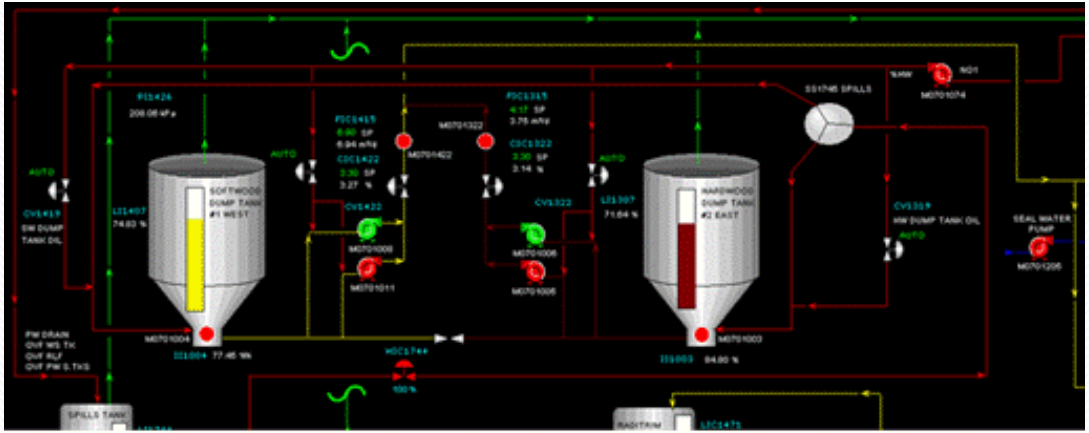


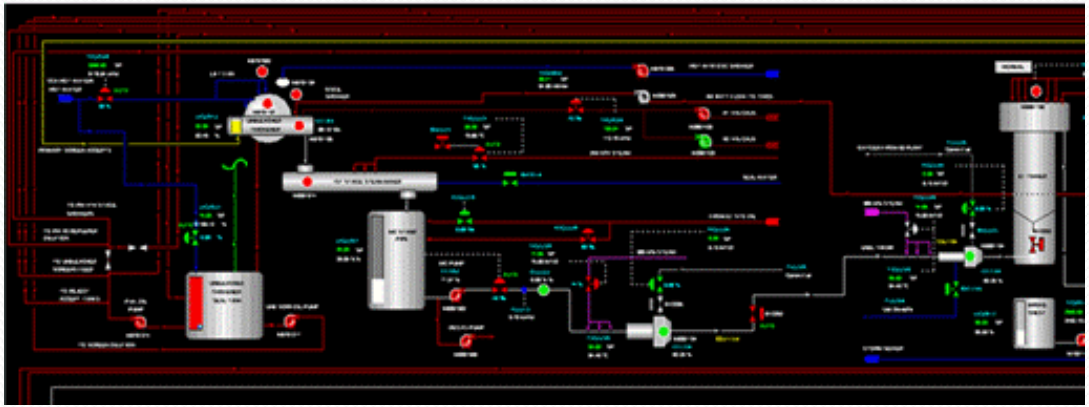
PI ProcessBook Page for all of Bleachery



Magnified View of PI ProcessBook Page for all of Bleachery

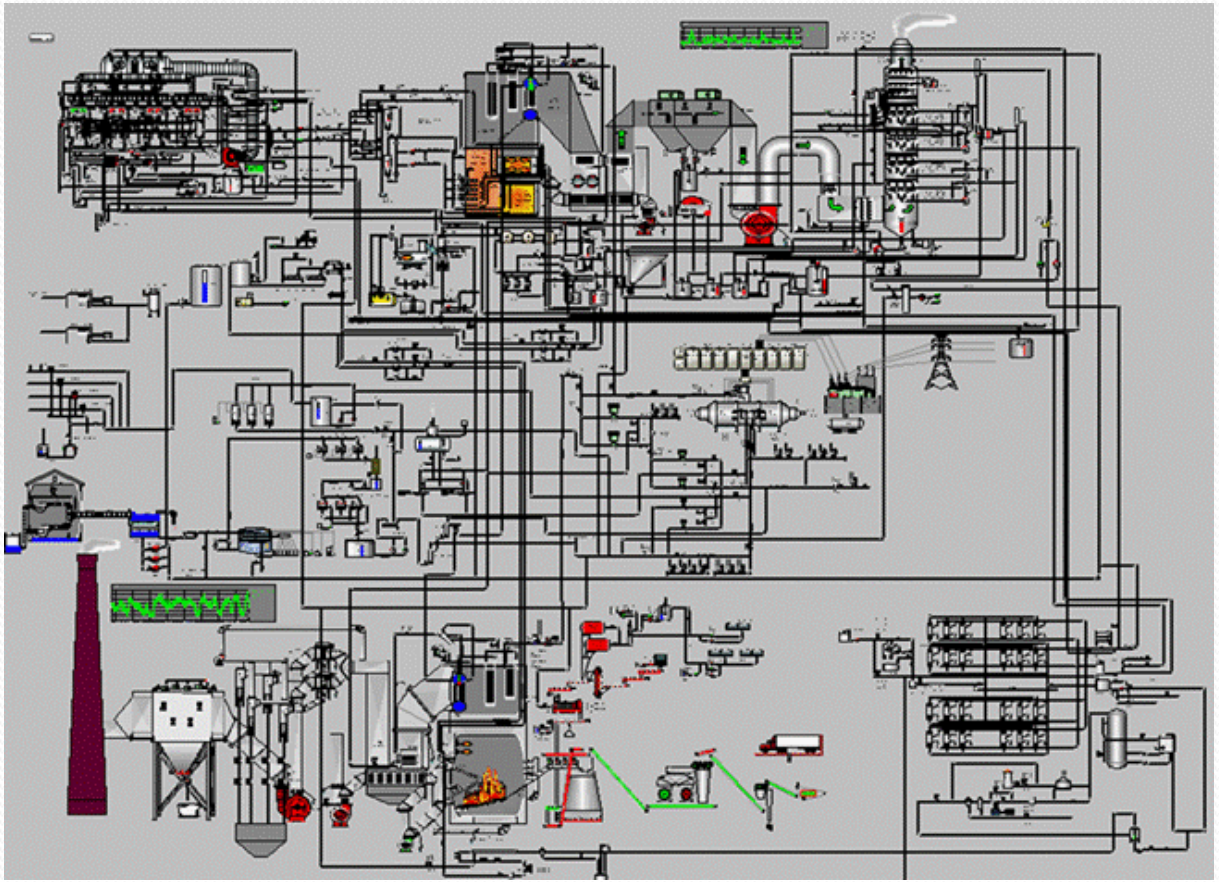
(all PI Tags functional)



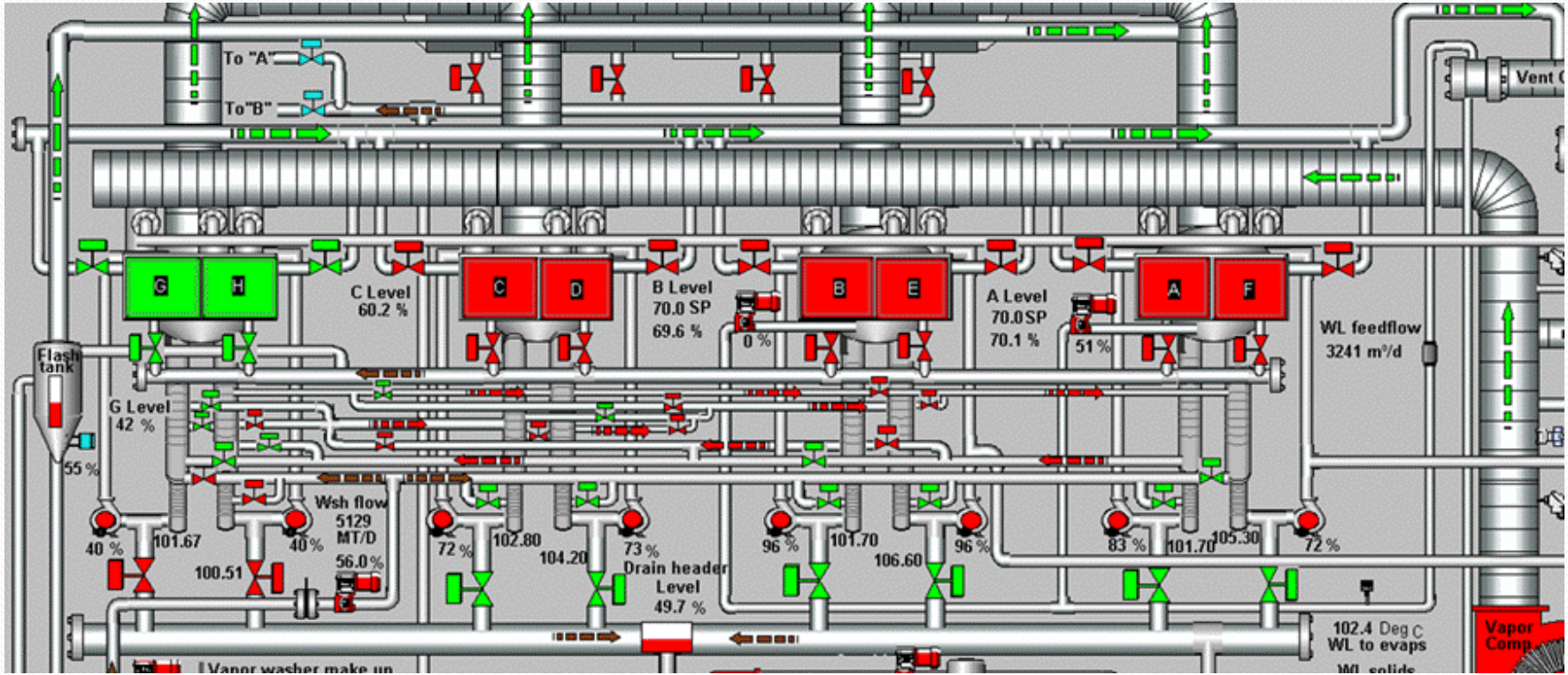


PI ProcessBook Page for all of Steam & Recovery

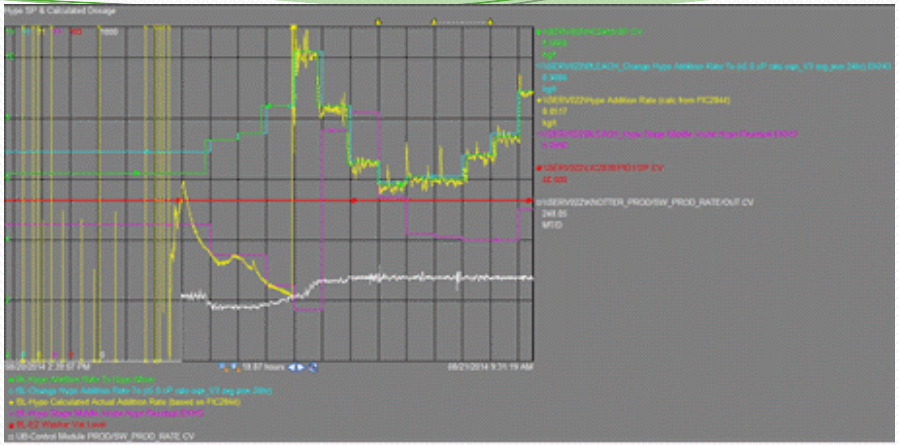
By Recovery Operator

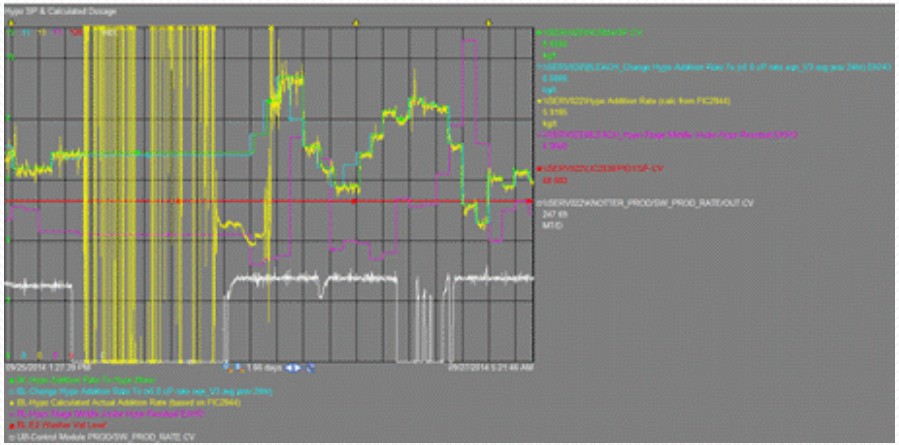


Magnified View of PI ProcessBook Page for all of S & R
(all PI Tags functional)

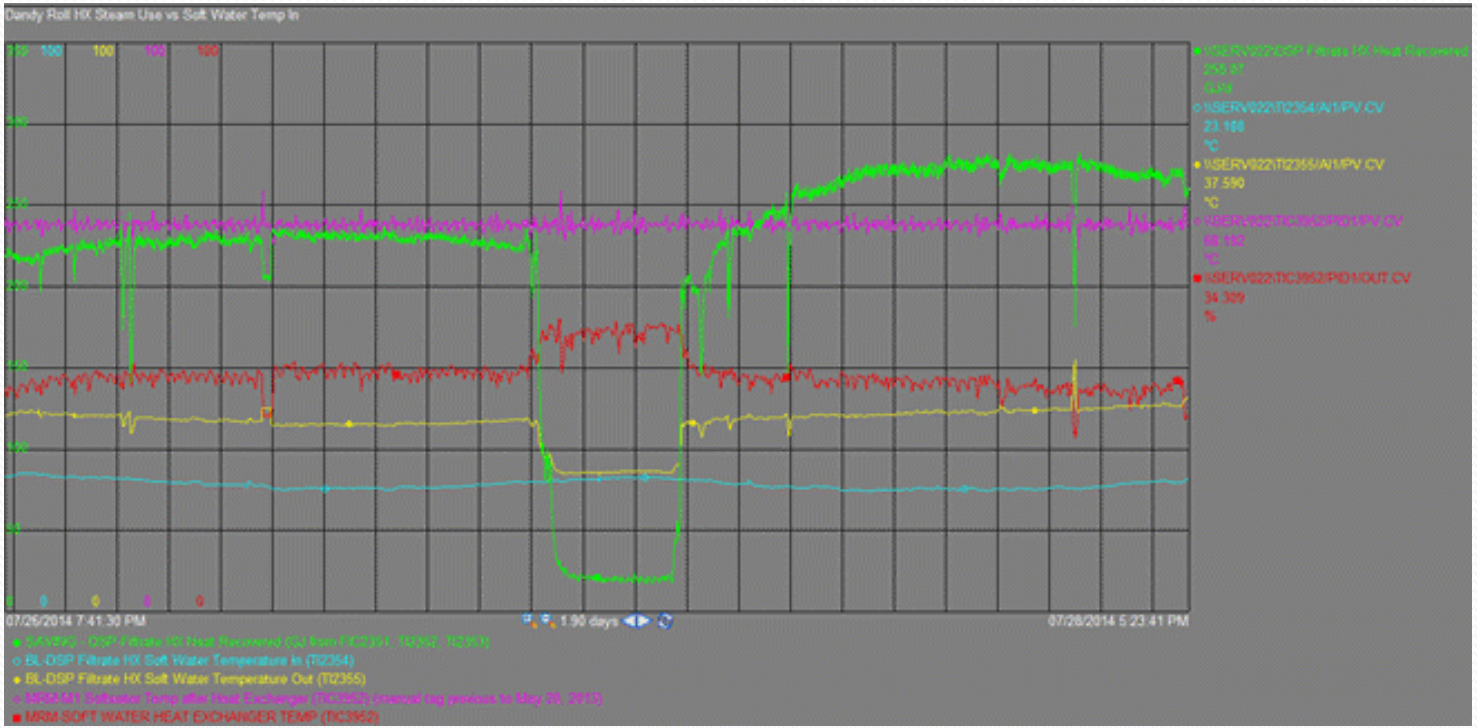


Ex: Using PI ProcessBook for Identifying Valve Problems

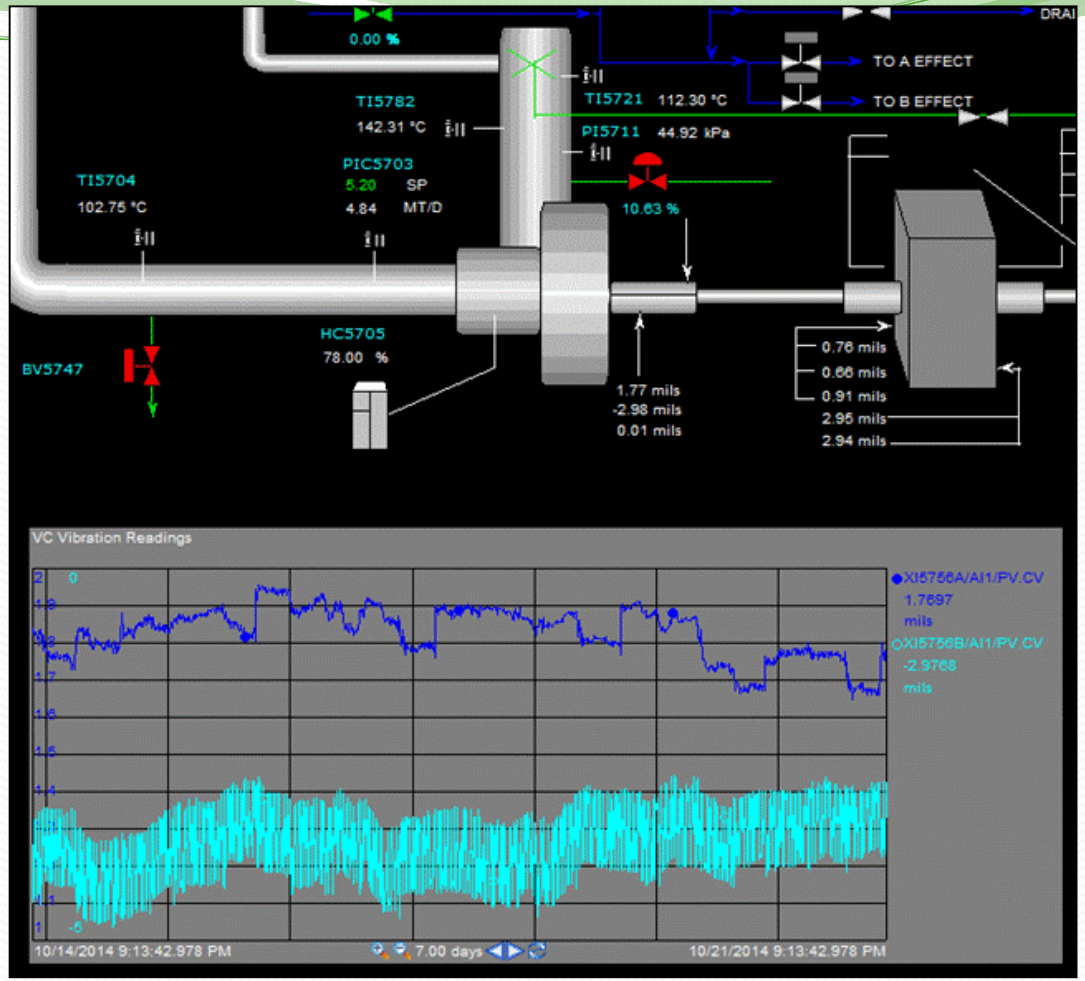




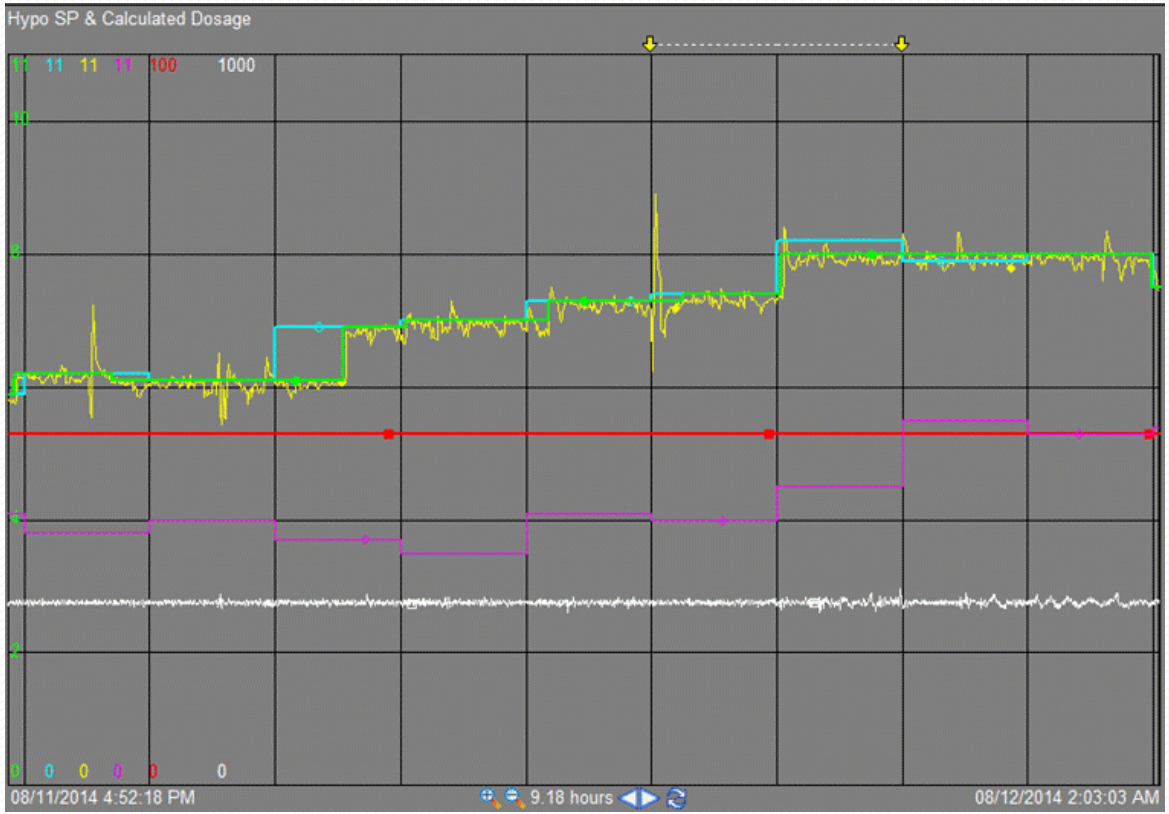
Ex: Identifying when HX bypassed



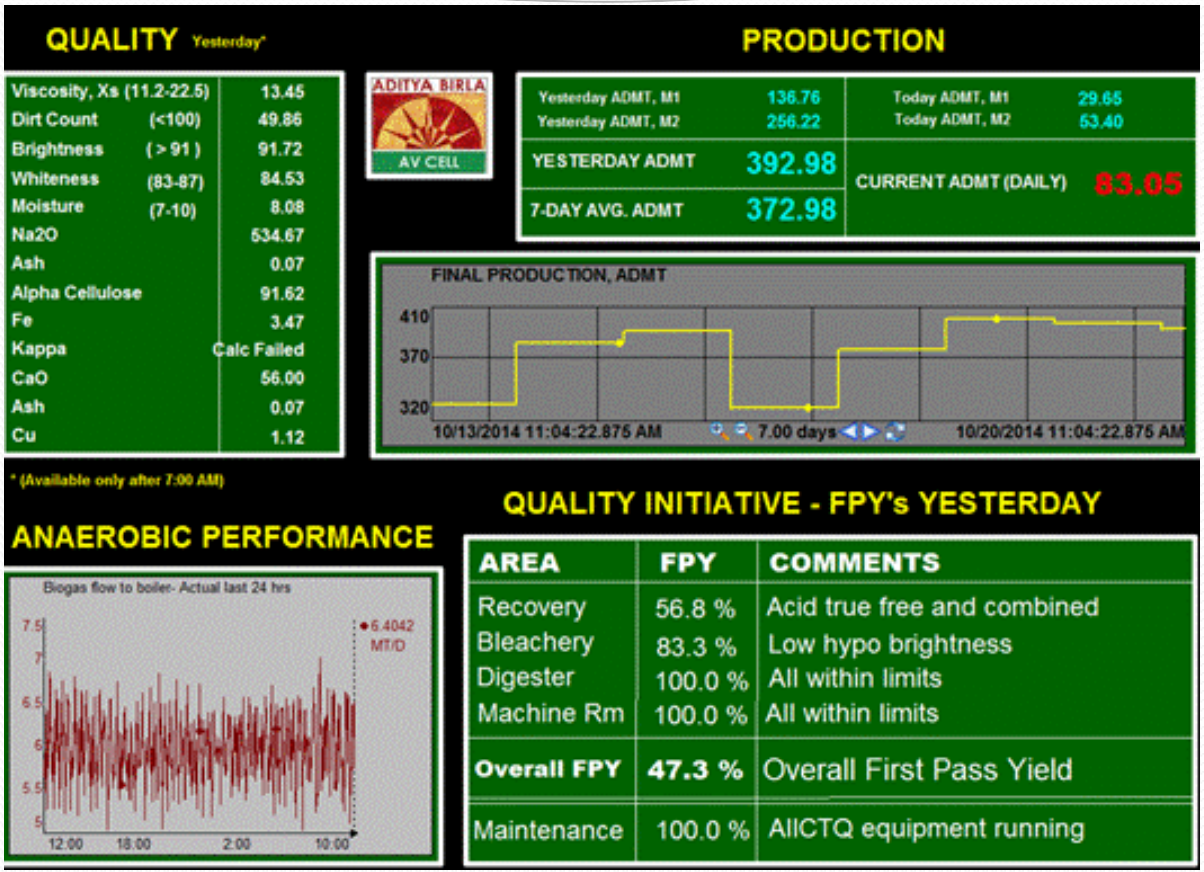
Ex: Monitoring Vapour Compressor motor vibrations



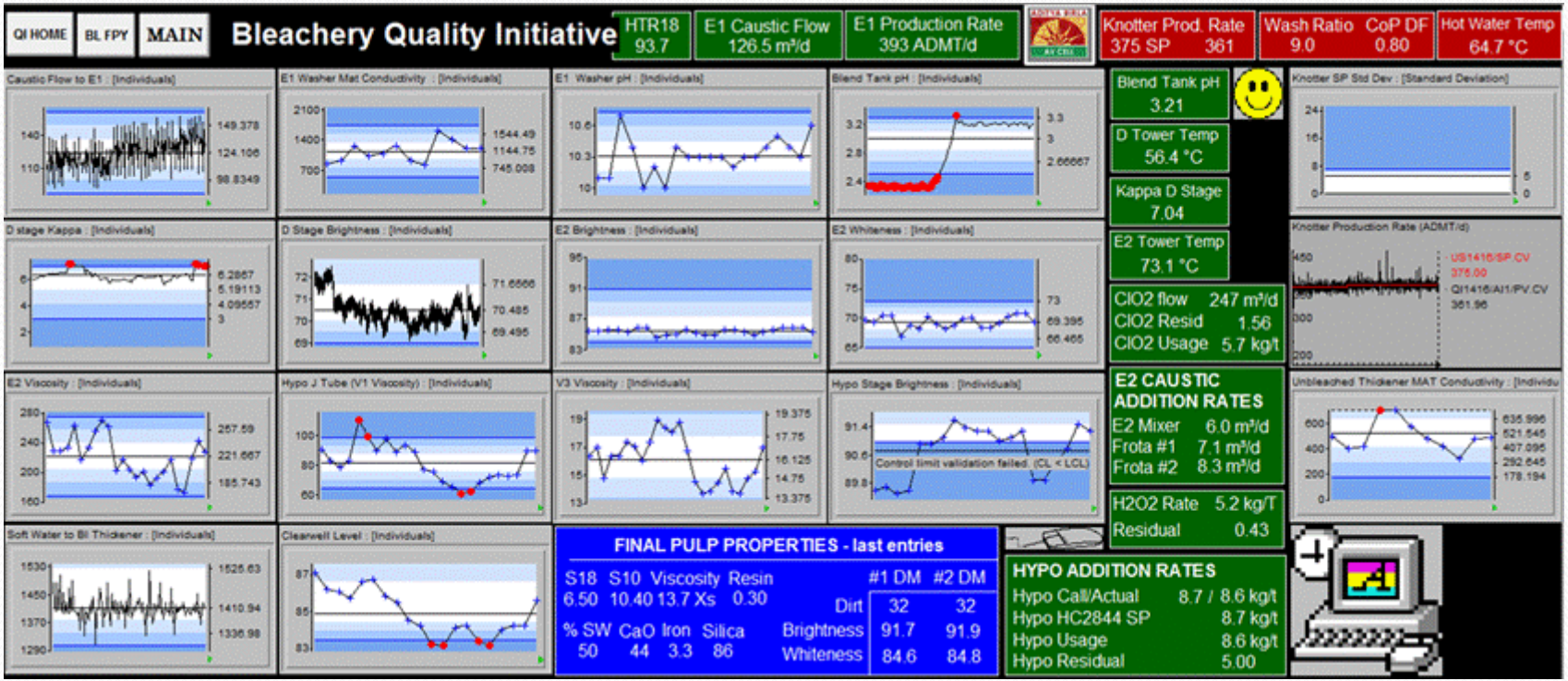
Ex: Monitoring Operator's DeltaV changes following new chemical dosages



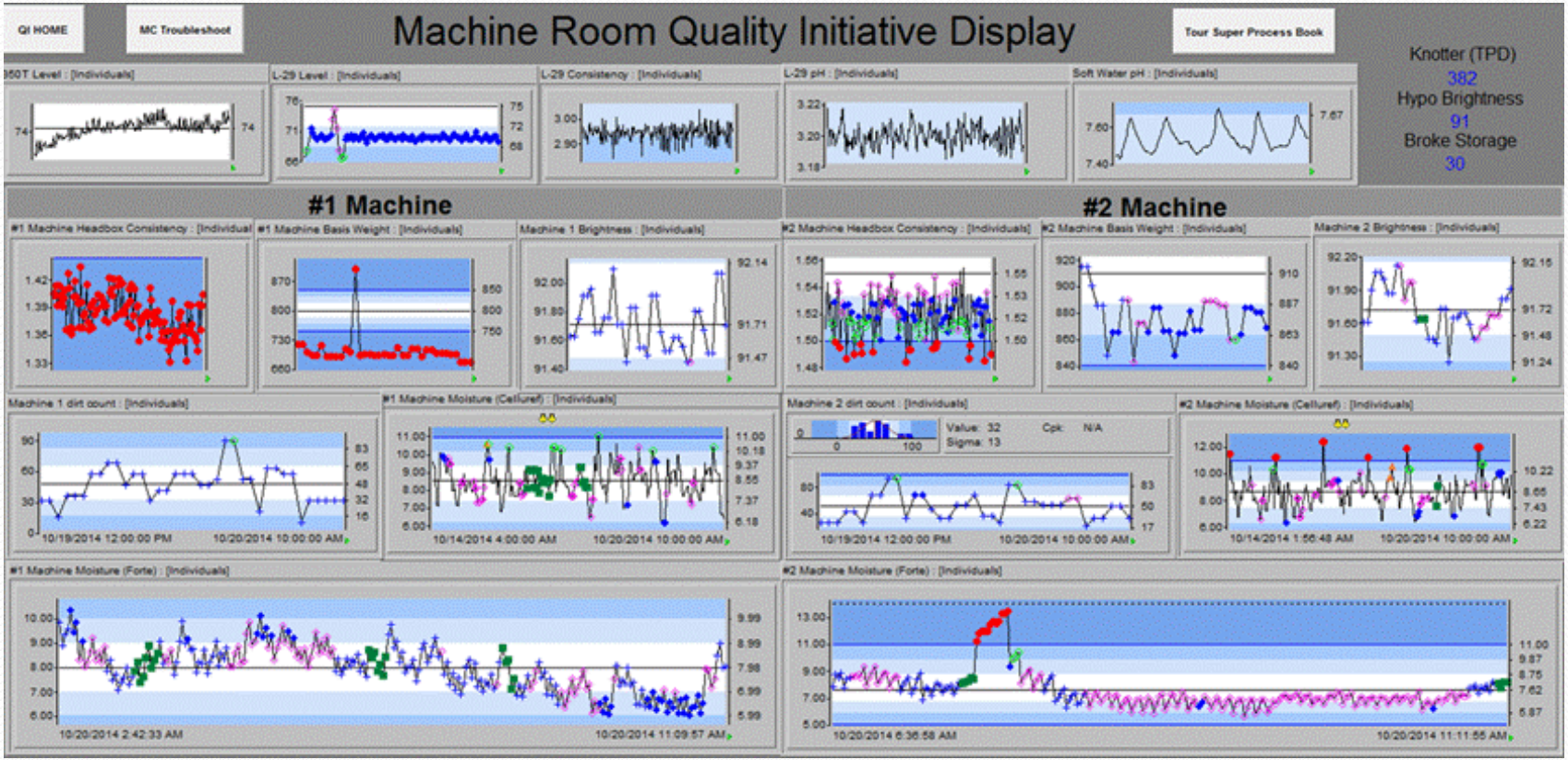
Ex: TV Displays for Quality Monitoring & Improvement



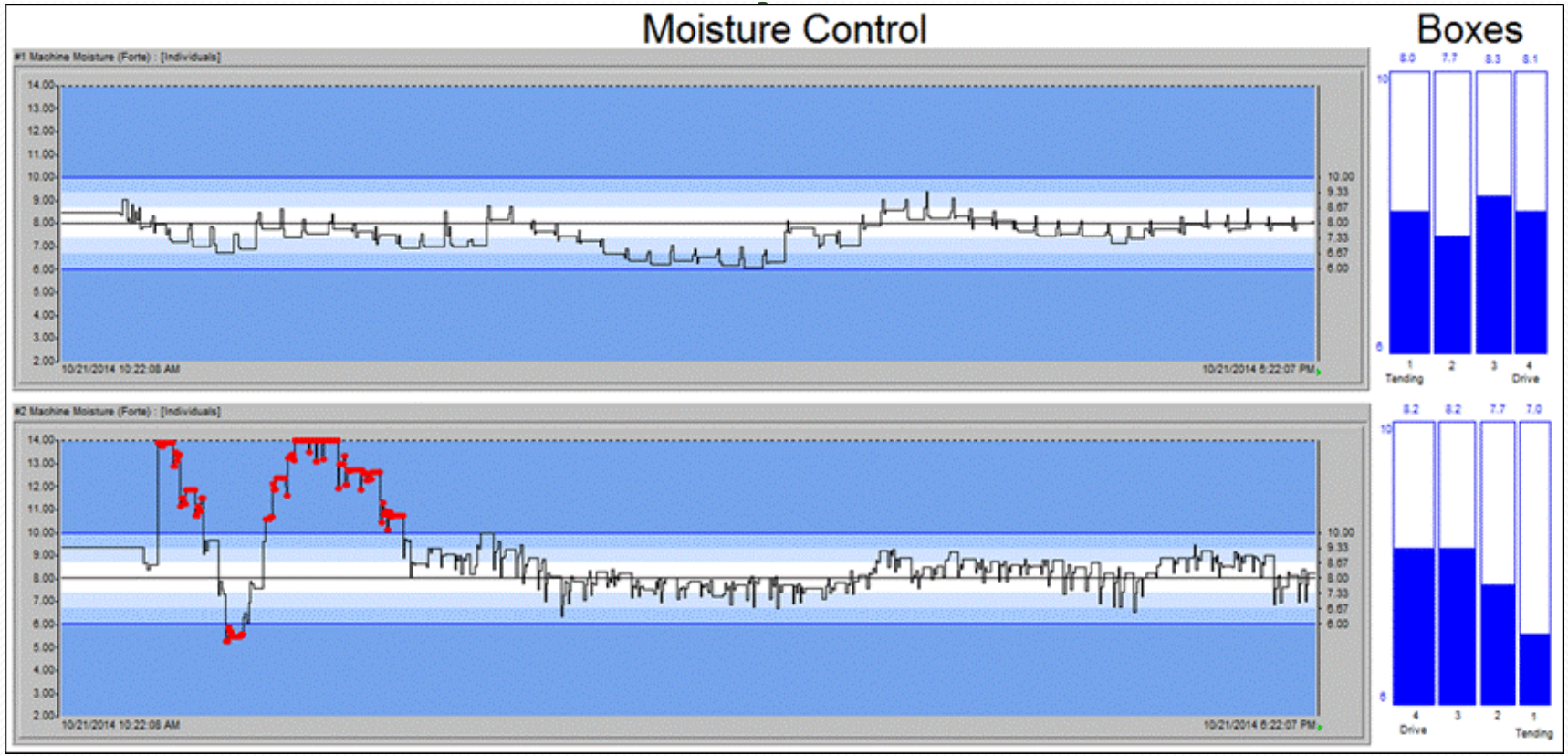
Ex: Control Room SQC Charts for Quality Initiative



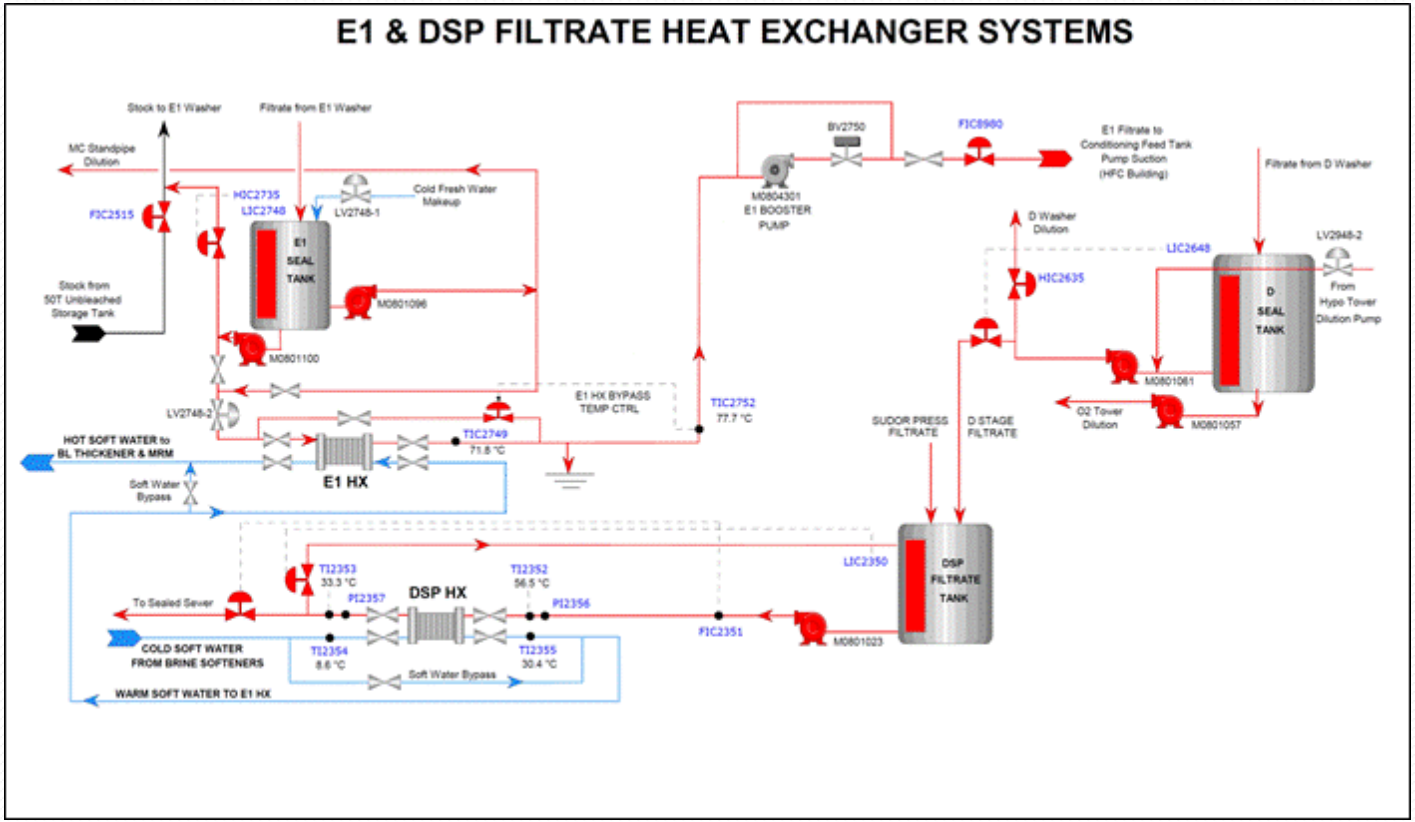
Ex: Control Room SQC Charts for Quality Initiative



Ex: Control Room SQC Charts for troubleshooting

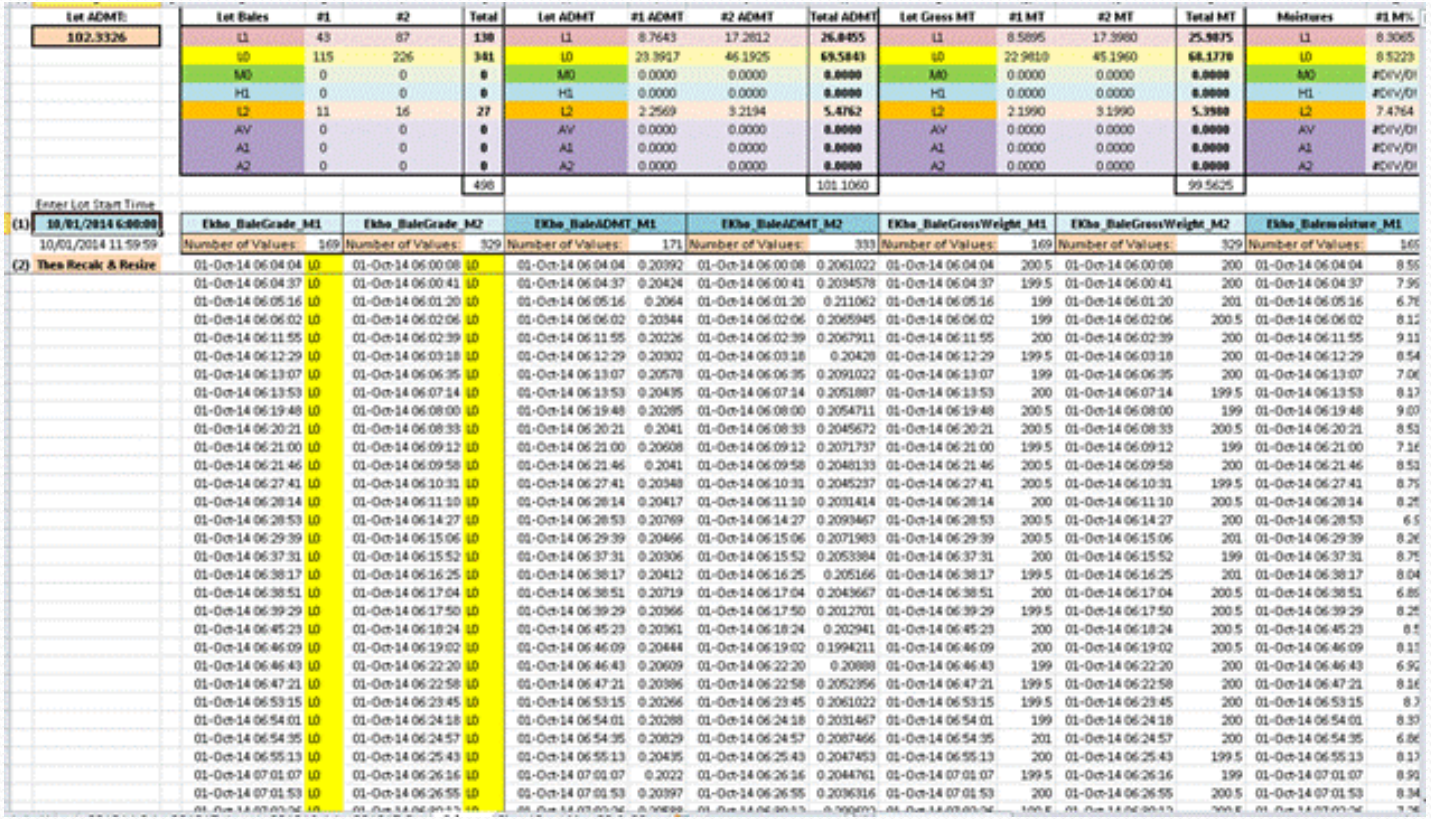


Ex: PI ProcessBook Page used for printed sign



Using PI DataLink

Ex: Bale Data Table – change Start Time & refresh



Lot ADMT:	Lot Bales	#1	#2	Total	Lot ADMT	#1 ADMT	#2 ADMT	Total ADMT	Lot Gross MT	#1 MT	#2 MT	Total MT	Moistures	#1 M%
102.3326	L1	43	87	130	L1	8.7643	17.2812	26.0455	L1	8.5895	17.3980	25.9875	L1	8.3065
	L0	115	226	341	L0	23.3917	46.1925	69.5843	L0	22.9810	45.1960	68.1770	L0	8.5223
	M0	0	0	0	M0	0.0000	0.0000	0.0000	M0	0.0000	0.0000	0.0000	M0	#DIV/0!
	H1	0	0	0	H1	0.0000	0.0000	0.0000	H1	0.0000	0.0000	0.0000	H1	#DIV/0!
	L2	11	16	27	L2	2.2569	3.2194	5.4762	L2	2.1990	3.1990	5.3980	L2	7.4764
	AV	0	0	0	AV	0.0000	0.0000	0.0000	AV	0.0000	0.0000	0.0000	AV	#DIV/0!
	A1	0	0	0	A1	0.0000	0.0000	0.0000	A1	0.0000	0.0000	0.0000	A1	#DIV/0!
	A2	0	0	0	A2	0.0000	0.0000	0.0000	A2	0.0000	0.0000	0.0000	A2	#DIV/0!
				498				101.1060				99.5625		

Enter Lot Start Time

(1)	10/01/2014 6:00:00	Ekho_BaleGrade_M1		Ekho_BaleGrade_M2		EKho_BaleADMT_M1		EKho_BaleADMT_M2		EKho_BaleGrossWeight_M1		EKho_BaleGrossWeight_M2		Ekho_Balemoisture_M1	
	10/01/2014 11:59:59	Number of Values:	169	Number of Values:	329	Number of Values:	171	Number of Values:	333	Number of Values:	169	Number of Values:	329	Number of Values:	165
(2)	Then Recalc & Resize	01-Oct-14 06:04:04	L0	01-Oct-14 06:00:08	L0	01-Oct-14 06:04:04	0.20392	01-Oct-14 06:00:08	0.2061022	01-Oct-14 06:04:04	200.5	01-Oct-14 06:00:08	200	01-Oct-14 06:04:04	8.55
		01-Oct-14 06:04:37	L0	01-Oct-14 06:00:41	L0	01-Oct-14 06:04:37	0.20424	01-Oct-14 06:00:41	0.2034578	01-Oct-14 06:04:37	199.5	01-Oct-14 06:00:41	200	01-Oct-14 06:04:37	7.95
		01-Oct-14 06:05:16	L0	01-Oct-14 06:01:20	L0	01-Oct-14 06:05:16	0.2064	01-Oct-14 06:01:20	0.211062	01-Oct-14 06:05:16	199	01-Oct-14 06:01:20	201	01-Oct-14 06:05:16	6.78
		01-Oct-14 06:06:02	L0	01-Oct-14 06:02:06	L0	01-Oct-14 06:06:02	0.20344	01-Oct-14 06:02:06	0.2065945	01-Oct-14 06:06:02	199	01-Oct-14 06:02:06	200.5	01-Oct-14 06:06:02	8.12
		01-Oct-14 06:11:55	L0	01-Oct-14 06:02:39	L0	01-Oct-14 06:11:55	0.20226	01-Oct-14 06:02:39	0.2067911	01-Oct-14 06:11:55	200	01-Oct-14 06:02:39	200	01-Oct-14 06:11:55	9.11
		01-Oct-14 06:12:29	L0	01-Oct-14 06:03:18	L0	01-Oct-14 06:12:29	0.20302	01-Oct-14 06:03:18	0.20428	01-Oct-14 06:12:29	199.5	01-Oct-14 06:03:18	200	01-Oct-14 06:12:29	8.54
		01-Oct-14 06:13:07	L0	01-Oct-14 06:06:35	L0	01-Oct-14 06:13:07	0.20578	01-Oct-14 06:06:35	0.2091022	01-Oct-14 06:13:07	199	01-Oct-14 06:06:35	200	01-Oct-14 06:13:07	7.06
		01-Oct-14 06:13:53	L0	01-Oct-14 06:07:14	L0	01-Oct-14 06:13:53	0.20435	01-Oct-14 06:07:14	0.2051887	01-Oct-14 06:13:53	200	01-Oct-14 06:07:14	199.5	01-Oct-14 06:13:53	8.17
		01-Oct-14 06:19:48	L0	01-Oct-14 06:08:00	L0	01-Oct-14 06:19:48	0.20285	01-Oct-14 06:08:00	0.2054711	01-Oct-14 06:19:48	200.5	01-Oct-14 06:08:00	199	01-Oct-14 06:19:48	9.07
		01-Oct-14 06:20:21	L0	01-Oct-14 06:08:33	L0	01-Oct-14 06:20:21	0.2041	01-Oct-14 06:08:33	0.2045672	01-Oct-14 06:20:21	200.5	01-Oct-14 06:08:33	200.5	01-Oct-14 06:20:21	8.51
		01-Oct-14 06:21:00	L0	01-Oct-14 06:09:12	L0	01-Oct-14 06:21:00	0.20608	01-Oct-14 06:09:12	0.2071737	01-Oct-14 06:21:00	199.5	01-Oct-14 06:09:12	199	01-Oct-14 06:21:00	7.16
		01-Oct-14 06:21:46	L0	01-Oct-14 06:09:58	L0	01-Oct-14 06:21:46	0.2041	01-Oct-14 06:09:58	0.2048133	01-Oct-14 06:21:46	200.5	01-Oct-14 06:09:58	200	01-Oct-14 06:21:46	8.51
		01-Oct-14 06:27:41	L0	01-Oct-14 06:10:31	L0	01-Oct-14 06:27:41	0.20348	01-Oct-14 06:10:31	0.2045237	01-Oct-14 06:27:41	200.5	01-Oct-14 06:10:31	199.5	01-Oct-14 06:27:41	8.75
		01-Oct-14 06:28:14	L0	01-Oct-14 06:11:10	L0	01-Oct-14 06:28:14	0.20417	01-Oct-14 06:11:10	0.2031414	01-Oct-14 06:28:14	200	01-Oct-14 06:11:10	200.5	01-Oct-14 06:28:14	8.25
		01-Oct-14 06:28:53	L0	01-Oct-14 06:14:27	L0	01-Oct-14 06:28:53	0.20769	01-Oct-14 06:14:27	0.2093467	01-Oct-14 06:28:53	200.5	01-Oct-14 06:14:27	200	01-Oct-14 06:28:53	6.5
		01-Oct-14 06:29:39	L0	01-Oct-14 06:15:06	L0	01-Oct-14 06:29:39	0.20466	01-Oct-14 06:15:06	0.2071983	01-Oct-14 06:29:39	200.5	01-Oct-14 06:15:06	201	01-Oct-14 06:29:39	8.26
		01-Oct-14 06:37:31	L0	01-Oct-14 06:15:52	L0	01-Oct-14 06:37:31	0.20306	01-Oct-14 06:15:52	0.2053384	01-Oct-14 06:37:31	200	01-Oct-14 06:15:52	199	01-Oct-14 06:37:31	8.75
		01-Oct-14 06:38:17	L0	01-Oct-14 06:16:25	L0	01-Oct-14 06:38:17	0.20412	01-Oct-14 06:16:25	0.205166	01-Oct-14 06:38:17	199.5	01-Oct-14 06:16:25	201	01-Oct-14 06:38:17	8.04
		01-Oct-14 06:38:51	L0	01-Oct-14 06:17:04	L0	01-Oct-14 06:38:51	0.20719	01-Oct-14 06:17:04	0.2043667	01-Oct-14 06:38:51	200	01-Oct-14 06:17:04	200.5	01-Oct-14 06:38:51	6.86
		01-Oct-14 06:39:29	L0	01-Oct-14 06:17:50	L0	01-Oct-14 06:39:29	0.20366	01-Oct-14 06:17:50	0.2012701	01-Oct-14 06:39:29	199.5	01-Oct-14 06:17:50	200.5	01-Oct-14 06:39:29	8.25
		01-Oct-14 06:45:23	L0	01-Oct-14 06:18:24	L0	01-Oct-14 06:45:23	0.20361	01-Oct-14 06:18:24	0.202941	01-Oct-14 06:45:23	200	01-Oct-14 06:18:24	200.5	01-Oct-14 06:45:23	8.5
		01-Oct-14 06:46:09	L0	01-Oct-14 06:19:02	L0	01-Oct-14 06:46:09	0.20444	01-Oct-14 06:19:02	0.1994211	01-Oct-14 06:46:09	200	01-Oct-14 06:19:02	200.5	01-Oct-14 06:46:09	8.13
		01-Oct-14 06:46:43	L0	01-Oct-14 06:22:20	L0	01-Oct-14 06:46:43	0.20609	01-Oct-14 06:22:20	0.20888	01-Oct-14 06:46:43	199	01-Oct-14 06:22:20	200	01-Oct-14 06:46:43	6.92
		01-Oct-14 06:47:21	L0	01-Oct-14 06:22:58	L0	01-Oct-14 06:47:21	0.20386	01-Oct-14 06:22:58	0.2052956	01-Oct-14 06:47:21	199.5	01-Oct-14 06:22:58	200	01-Oct-14 06:47:21	8.16
		01-Oct-14 06:53:15	L0	01-Oct-14 06:23:45	L0	01-Oct-14 06:53:15	0.20266	01-Oct-14 06:23:45	0.2061022	01-Oct-14 06:53:15	199.5	01-Oct-14 06:23:45	200	01-Oct-14 06:53:15	8.7
		01-Oct-14 06:54:01	L0	01-Oct-14 06:24:18	L0	01-Oct-14 06:54:01	0.20288	01-Oct-14 06:24:18	0.2031467	01-Oct-14 06:54:01	199	01-Oct-14 06:24:18	200	01-Oct-14 06:54:01	8.33
		01-Oct-14 06:54:35	L0	01-Oct-14 06:24:57	L0	01-Oct-14 06:54:35	0.20829	01-Oct-14 06:24:57	0.2087466	01-Oct-14 06:54:35	201	01-Oct-14 06:24:57	200	01-Oct-14 06:54:35	6.86
		01-Oct-14 06:55:13	L0	01-Oct-14 06:25:43	L0	01-Oct-14 06:55:13	0.20435	01-Oct-14 06:25:43	0.2047453	01-Oct-14 06:55:13	200	01-Oct-14 06:25:43	199.5	01-Oct-14 06:55:13	8.13
		01-Oct-14 07:01:07	L0	01-Oct-14 06:26:16	L0	01-Oct-14 07:01:07	0.2022	01-Oct-14 06:26:16	0.2044761	01-Oct-14 07:01:07	199.5	01-Oct-14 06:26:16	199	01-Oct-14 07:01:07	8.92
		01-Oct-14 07:01:53	L0	01-Oct-14 06:26:55	L0	01-Oct-14 07:01:53	0.20397	01-Oct-14 06:26:55	0.2036316	01-Oct-14 07:01:53	200	01-Oct-14 06:26:55	200.5	01-Oct-14 07:01:53	8.34

Ex: Data Study – Averages over different time intervals

C115942 =PIAdvCalcVal('5 min data'!C$2,'5 min data'!$B115942,'5 min data'!$B115943,"average","time-weighted",0,1,0,)

	A	B	C	D	E	F	G	H	I	J	K	L	M
			E1 Stock Temp (°C)	Hi-Shear Mixer Steam Flow (MT/d)	Hi-Shear Mixer Steam Valve (%)								
	10/01/2013							41519.20					
	10-Oct		TIC2250/PID1 /PV.CV	FIC2230/PID1 /PV.CV	FIC2230/PID1 /OUT.CV			41922.36					
		9/2/13 4:50 AM	89.0	1.2	0.0								
0		10/9/14 6:15 PM	94.8	80.2	76.7								
1		10/9/14 6:20 PM	95.0	78.9	75.7								
2		10/9/14 6:25 PM	95.7	80.1	76.5								
3		10/9/14 6:30 PM	94.5	78.8	75.5								
4		10/9/14 6:35 PM	94.6	81.2	76.9								
5		10/9/14 6:40 PM	95.3	81.5	77.0								
6		10/9/14 6:45 PM	95.5	79.5	76.8								
7		10/9/14 6:50 PM	95.0	76.1	75.8								
8		10/9/14 6:55 PM	95.3	75.5	75.2								
9		10/9/14 7:00 PM	94.4	77.2	75.7								
0		10/9/14 7:05 PM	94.4	79.0	76.3								
1		10/9/14 7:10 PM	95.4	81.8	76.8								
2		10/9/14 7:15 PM	94.7	79.2	76.1								
3		10/9/14 7:20 PM	95.3	80.8	76.0								
4		10/9/14 7:25 PM	95.7	76.6	74.2								
5		10/9/14 7:30 PM	96.4	69.3	71.6								
6		10/9/14 7:35 PM	95.0	64.8	69.5								
7		10/9/14 7:40 PM	95.1	61.3	68.5								
8		10/9/14 7:45 PM	94.7	66.4	71.1								
9		10/9/14 7:50 PM	94.6	68.7	72.6								
0		10/9/14 7:55 PM	95.0	69.1	72.4								

Calculated Data

- Data item
- Expression

Root path (optional)

Data item(s)
'5 min data'!$C$2

Start time
'5 min data'!$B115942

End time
'5 min data'!$B115943

Time interval (optional)

Filter expression (optional)

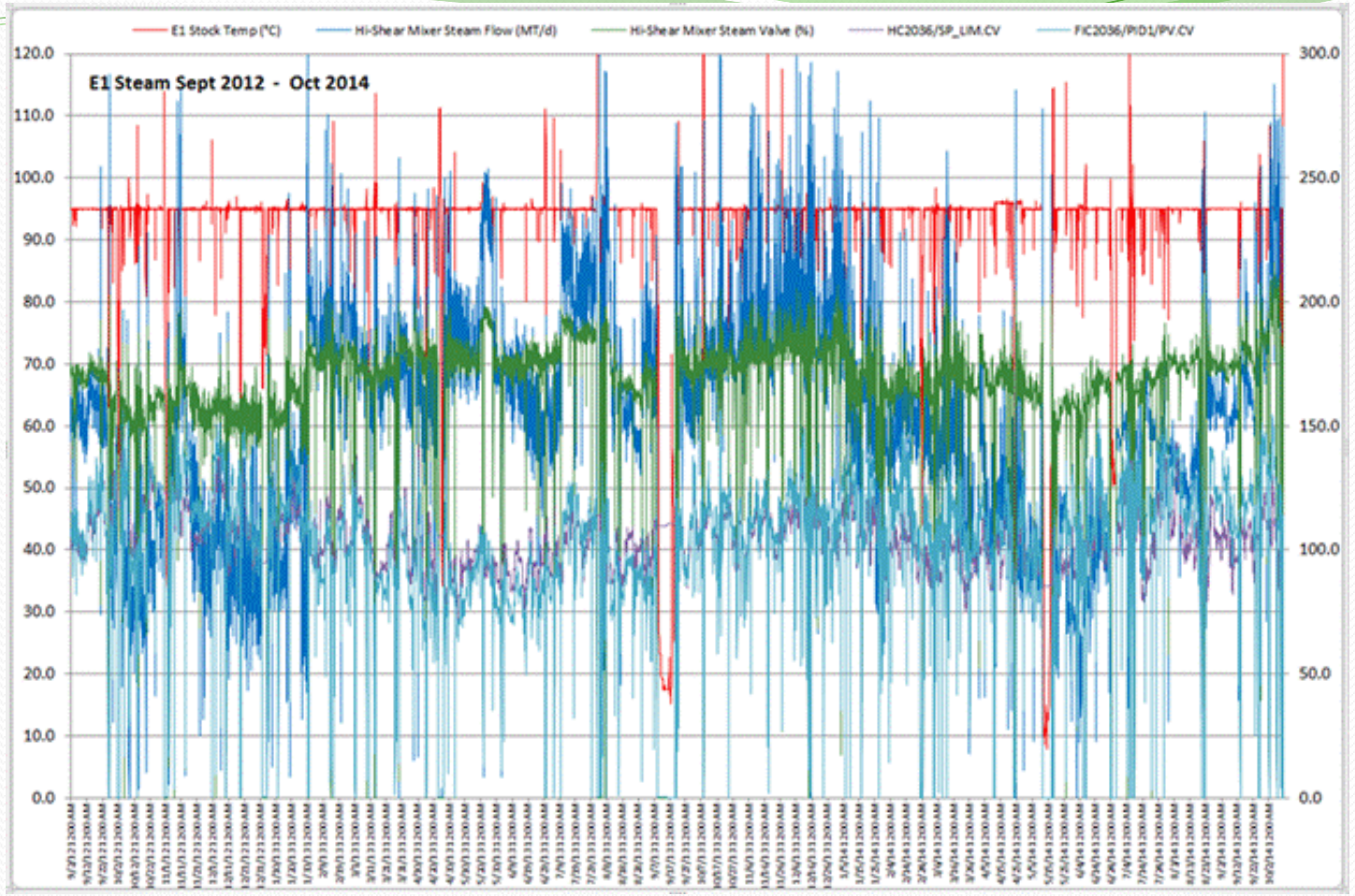
Conversion factor
1

Calculation mode
average

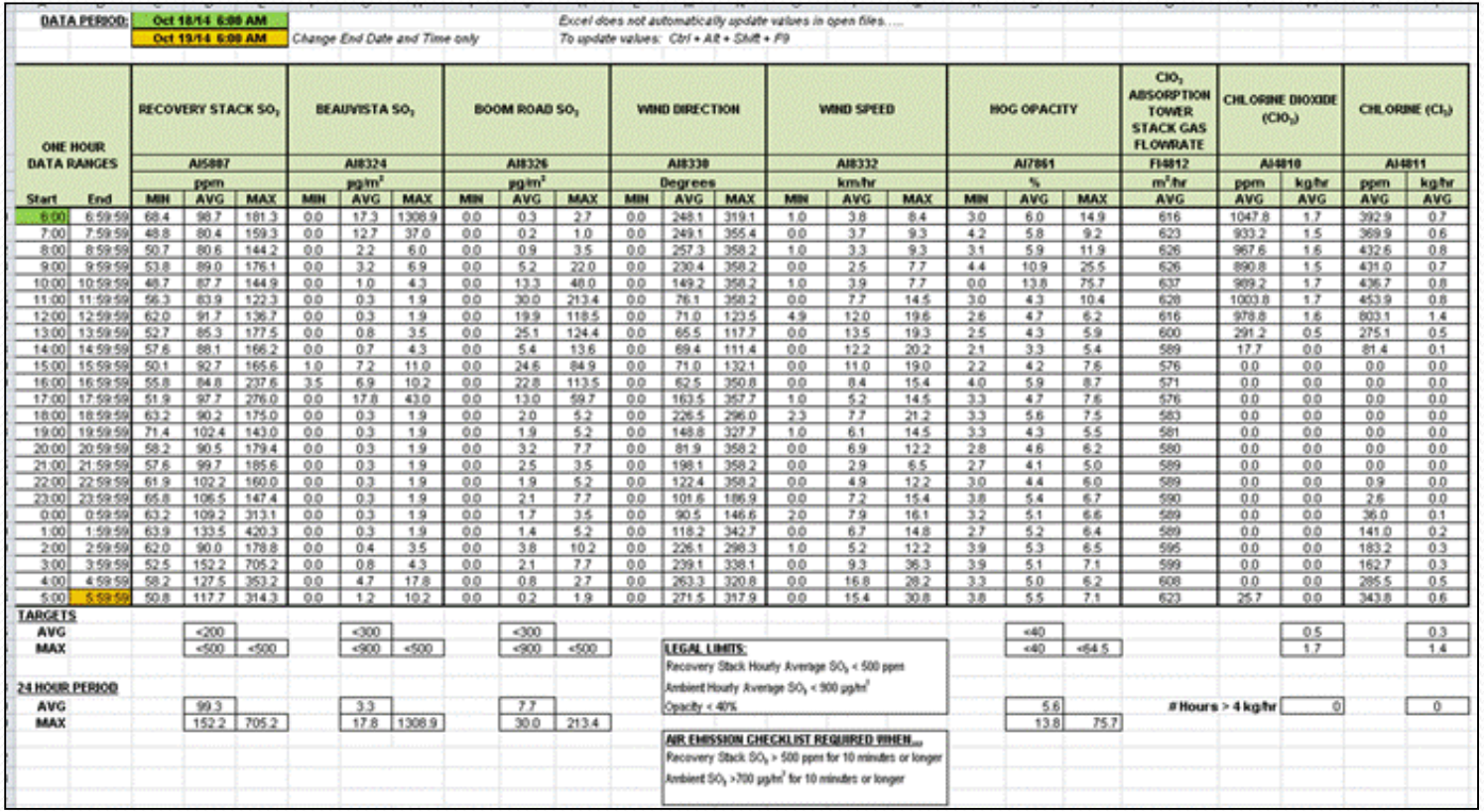
Advanced

Output cell
'5 min data'!$C$115942

Ex:
2 Years of data averages at 2 hour intervals



Ex: Daily Environment Info – change Start Time & refresh



DATA PERIOD: Oct 18/14 6:00 AM — Oct 19/14 6:00 AM (Change End Date and Time only)

Excel does not automatically update values in open files.... To update values: Ctrl + Alt + Shift + F9

ONE HOUR DATA RANGES		RECOVERY STACK SO_2			BEAUVISTA SO_2			BOOM ROAD SO_2			WIND DIRECTION			WIND SPEED			HOG OPACITY			ClO_2 ABSORPTION TOWER STACK GAS FLOWRATE	CHLORINE DIOXIDE (ClO_2)		CHLORINE (Cl_2)	
		AI5807			AI8324			AI8326			AI8330			AI8332			AI7861			FI4812	AI4810		AI4811	
		ppm			$\mu g/m^3$			$\mu g/m^3$			Degrees			km/hr			%			m^3/hr	ppm	kg/hr	ppm	kg/hr
Start	End	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	AVG	AVG	AVG	AVG	AVG
6:00	6:59:59	68.4	98.7	181.3	0.0	17.3	1308.9	0.0	0.3	2.7	0.0	248.1	319.1	1.0	3.8	8.4	3.0	6.0	14.9	616	1047.8	1.7	392.9	0.7
7:00	7:59:59	48.8	80.4	159.3	0.0	12.7	37.0	0.0	0.2	1.0	0.0	249.1	355.4	0.0	3.7	9.3	4.2	5.8	9.2	623	933.2	1.5	369.9	0.6
8:00	8:59:59	50.7	80.6	144.2	0.0	2.2	6.0	0.0	0.9	3.5	0.0	257.3	358.2	1.0	3.3	9.3	3.1	5.9	11.9	626	967.6	1.6	432.6	0.8
9:00	9:59:59	53.8	89.0	176.1	0.0	3.2	6.9	0.0	5.2	22.0	0.0	230.4	358.2	0.0	2.5	7.7	4.4	10.9	25.5	626	890.8	1.5	431.0	0.7
10:00	10:59:59	48.7	87.7	144.9	0.0	1.0	4.3	0.0	13.3	48.0	0.0	149.2	358.2	1.0	3.9	7.7	0.0	13.8	75.7	637	989.2	1.7	436.7	0.8
11:00	11:59:59	56.3	83.9	122.3	0.0	0.3	1.9	0.0	30.0	213.4	0.0	76.1	358.2	0.0	7.7	14.5	3.0	4.3	10.4	628	1003.8	1.7	453.9	0.8
12:00	12:59:59	62.0	91.7	136.7	0.0	0.3	1.9	0.0	19.9	118.5	0.0	71.0	123.5	4.9	12.0	19.6	2.6	4.7	6.2	616	978.8	1.6	803.1	1.4
13:00	13:59:59	52.7	85.3	177.5	0.0	0.8	3.5	0.0	25.1	124.4	0.0	65.5	117.7	0.0	13.5	19.3	2.5	4.3	5.9	600	291.2	0.5	275.1	0.5
14:00	14:59:59	57.6	88.1	166.2	0.0	0.7	4.3	0.0	5.4	13.6	0.0	69.4	111.4	0.0	12.2	20.2	2.1	3.3	5.4	589	17.7	0.0	81.4	0.1
15:00	15:59:59	50.1	92.7	165.6	1.0	7.2	11.0	0.0	24.6	84.9	0.0	71.0	132.1	0.0	11.0	19.0	2.2	4.2	7.6	576	0.0	0.0	0.0	0.0
16:00	16:59:59	55.8	84.8	237.6	3.5	6.9	10.2	0.0	22.8	113.5	0.0	62.5	350.8	0.0	8.4	15.4	4.0	5.9	8.7	571	0.0	0.0	0.0	0.0
17:00	17:59:59	51.9	97.7	276.0	0.0	17.8	43.0	0.0	13.0	59.7	0.0	163.5	357.7	1.0	5.2	14.5	3.3	4.7	7.6	576	0.0	0.0	0.0	0.0
18:00	18:59:59	63.2	90.2	175.0	0.0	0.3	1.9	0.0	2.0	5.2	0.0	226.5	296.0	2.3	7.7	21.2	3.3	5.6	7.5	583	0.0	0.0	0.0	0.0
19:00	19:59:59	71.4	102.4	143.0	0.0	0.3	1.9	0.0	1.9	5.2	0.0	148.8	327.7	1.0	6.1	14.5	3.3	4.3	5.5	581	0.0	0.0	0.0	0.0
20:00	20:59:59	58.2	90.5	179.4	0.0	0.3	1.9	0.0	3.2	7.7	0.0	81.9	358.2	0.0	6.9	12.2	2.8	4.6	6.2	580	0.0	0.0	0.0	0.0
21:00	21:59:59	57.6	99.7	185.6	0.0	0.3	1.9	0.0	2.5	3.5	0.0	198.1	358.2	0.0	2.9	6.5	2.7	4.1	5.0	589	0.0	0.0	0.0	0.0
22:00	22:59:59	61.9	102.2	160.0	0.0	0.3	1.9	0.0	1.9	5.2	0.0	122.4	358.2	0.0	4.9	12.2	3.0	4.4	6.0	589	0.0	0.0	0.9	0.0
23:00	23:59:59	65.8	106.5	147.4	0.0	0.3	1.9	0.0	2.1	7.7	0.0	101.6	186.9	0.0	7.2	15.4	3.8	5.4	6.7	590	0.0	0.0	2.6	0.0
0:00	0:59:59	63.2	109.2	313.1	0.0	0.3	1.9	0.0	1.7	3.5	0.0	90.5	146.6	2.0	7.9	16.1	3.2	5.1	6.6	589	0.0	0.0	36.0	0.1
1:00	1:59:59	63.9	133.5	420.3	0.0	0.3	1.9	0.0	1.4	5.2	0.0	118.2	342.7	0.0	6.7	14.8	2.7	5.2	6.4	589	0.0	0.0	141.0	0.2
2:00	2:59:59	62.0	90.0	178.8	0.0	0.4	3.5	0.0	3.8	10.2	0.0	226.1	298.3	1.0	5.2	12.2	3.9	5.3	6.5	595	0.0	0.0	183.2	0.3
3:00	3:59:59	52.5	152.2	705.2	0.0	0.8	4.3	0.0	2.1	7.7	0.0	239.1	338.1	0.0	9.3	36.3	3.9	5.1	7.1	599	0.0	0.0	162.7	0.3
4:00	4:59:59	58.2	127.5	353.2	0.0	4.7	17.8	0.0	0.8	2.7	0.0	263.3	320.8	0.0	16.8	28.2	3.3	5.0	6.2	608	0.0	0.0	285.5	0.5
5:00	5:59:59	50.8	117.7	314.3	0.0	1.2	10.2	0.0	0.2	1.9	0.0	271.5	317.9	0.0	15.4	30.8	3.8	5.5	7.1	623	25.7	0.0	343.8	0.6
TARGETS																								
AVG			<200			<300			<300									<40				0.5		0.3
MAX			<500	<500		<900	<500		<900	<500								<40	<64.5			1.7		1.4
24 HOUR PERIOD																								
AVG			99.3			3.3			7.7									5.6			# Hours > 4 kg/hr	0		0
MAX			152.2	705.2		17.8	1308.9		30.0	213.4								13.8	75.7					

LEGAL LIMITS:
Recovery Stack Hourly Average SO_2 < 500 ppm
Ambient Hourly Average SO_2 < 900 $\mu g/m^3$
Opacity < 40%

AIR EMISSION CHECKLIST REQUIRED WHEN...
Recovery Stack SO_2 > 500 ppm for 10 minutes or longer
Ambient SO_2 >700 $\mu g/m^3$ for 10 minutes or longer

Benefits of a Digital System

Benefits of a Digital System

- **Digital data archives back to 2007 accessible on mill network (analog/digital auto data & manually entered).**
- **Process monitoring - trouble shooting, tracking changes, reporting (i.e. Environment & Business).**
- **Pulp Quality – bale & lot information, weighted averages and lot totals.**
- **Investigating areas for possible improvements – quality improvement, process changes, chemical & energy savings.**
- **Displays set up to improve communication with employees regarding mill operation and pulp quality.**

Future Plans

Future Plans

- **Mill shut down next week – upgrading Ekho Server to 64 bit processor, to handle increased processing required due to additions to existing and future logsheets.**
- **Continue development of existing and new PI ProcessBook displays, i.e. simplified mill diagram showing major equipment on/off, tank levels, and estimated residence times.**
- **Upload pre-2007 Excel data to the PI Sever database, as needed.**

Future Plans

- **Make use of other PI System applications, i.e. PI AF, PI Event Frames, PI Notifications, etc.**
- **Link remaining isolated systems to DeltaV and PI Systems, i.e. Fresh Water Treatment System, Water Softeners, and Recovery & Hog Boiler Precipitators.**
- **Install more instrumentation wherever possible and set DeltaV to transfer to the PI System database, i.e. Machine Room.**

Questions

Please wait for the microphone before asking your question

Please state your name and your company

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Thank you