Screw Press Lessons

Presented by:
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Chief Operator Town Of Merrimack NH

Background

- Population of 28,000
- Home of Anheuser-Busch brewery
- 5.0 MGD secondary WWTF circa 1969
- 1.8 MGD current flows
- Agitated bin composting facility circa 1993

Reasons for upgrade

- Belt press and other equipment had reached end of useful life
- Press was inefficient and 30 years old
- Some equipment was 40 years old
- Required high level of maintenance
- Staff reductions ability to run un attended 24/7

Original Belt Press

Technology Selection

- 3 proven technologies
  - Screw press
  - Rotary drum press
  - Centrifuge
- 1 week trial for each
- Life-cycle cost estimate
  - Capital, labor, spare parts, energy, polymer, disposal, trucking
  - Also noise, odor containment, filtrate capture, # of installations

Net Present Value

- Life cycle cost in NPV
  - Screw Press - $14.4 to $15.1 M
  - Rotary Drum Press - $15.61 M
  - Centrifuge - $15.64 M
- Screw press ranked highest with non-monetary factors
- Screw presses selected as best and most cost-effective dewatering option

Importance Of fiber Content

FIBER CONTENT	PERCENT OVEN DRIED SOLIDS
25% or higher	27%
20% to 24.9%	25%
15% to 19.9%	23%
10% to 14.9%	18%
5% to 9.9%	15%

ISSUES

- Did not meet performance initially (25% Cake 95% Capture)
- Flooding of polymer containment area
- Flooding concerns press containment and floc tank
- Sludge pushing out of hatches (Cake Cutter)
- High amperage on drive unit
- Premature conveyor liner wear (Not FKC)
- Loss of throughput (Importance of Inspections)
- Build up on screw
- Scaling (Water hardness)

Screw Press Reflighting

Changed from single stage to two stage and increase compression 3.0 to 3.75

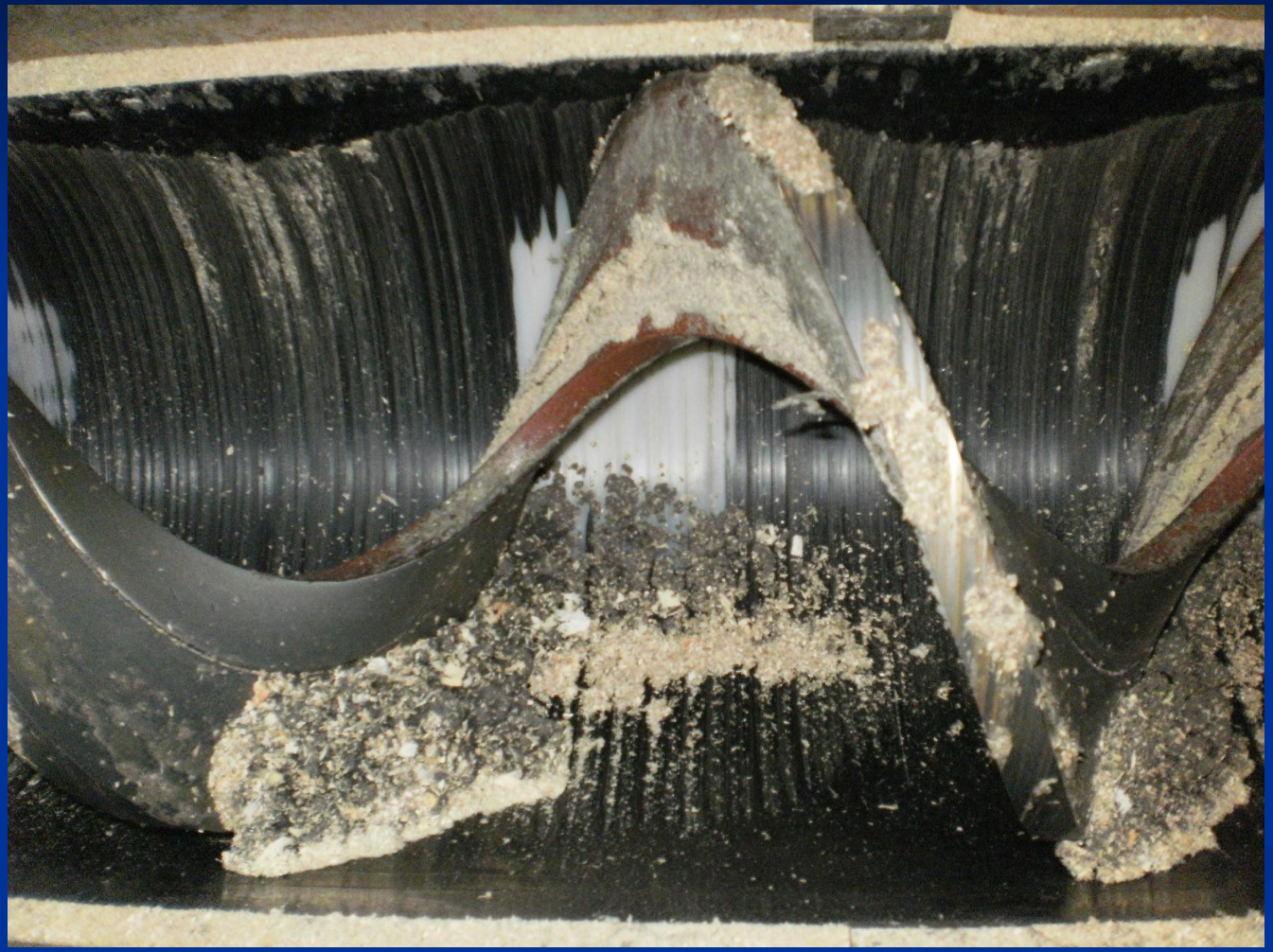
Increased open area of some of the screens

Polymer Tank Room Flood

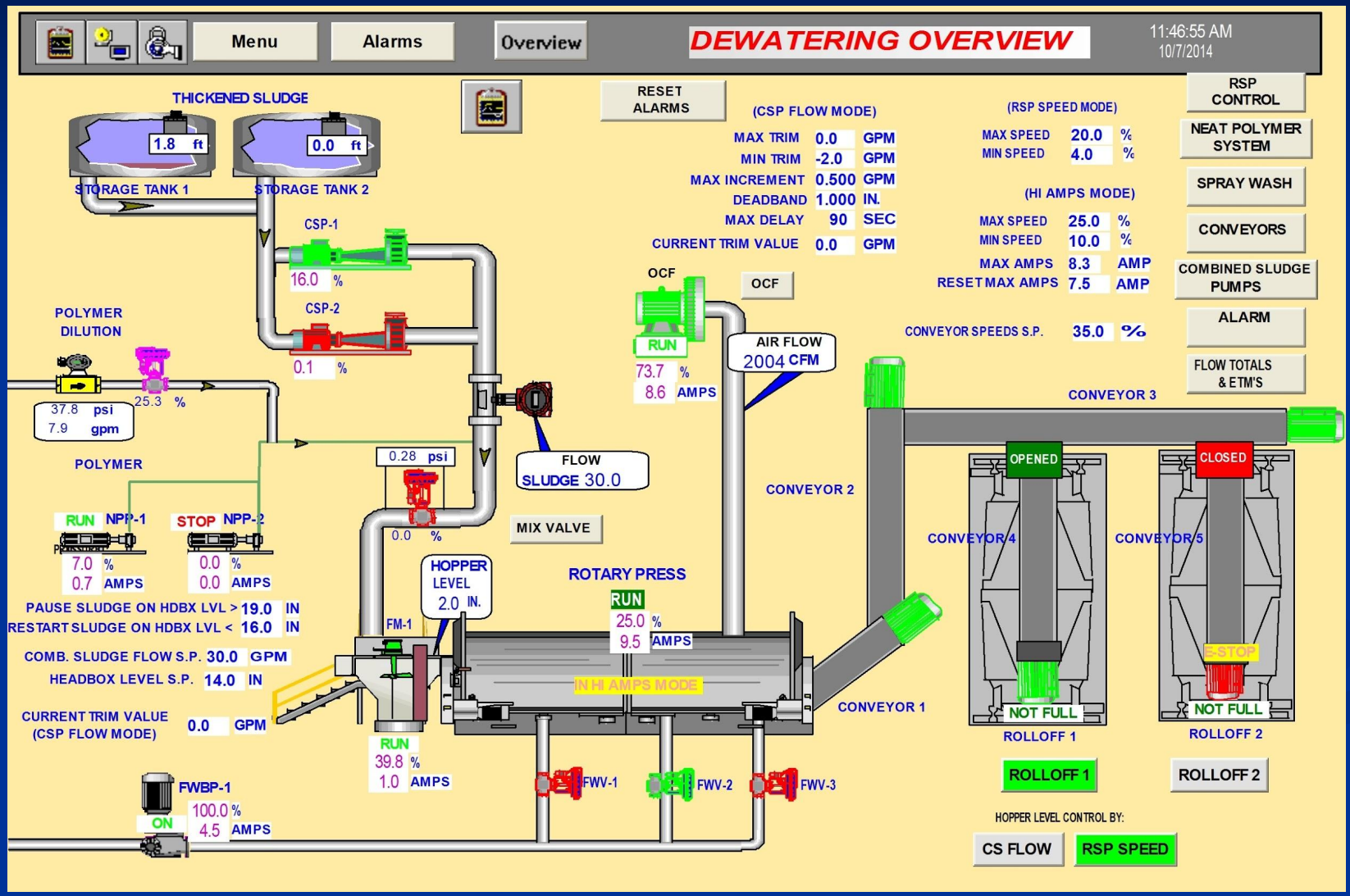
Sludge Coming Out of Hatches

Sludge Cake Cutters

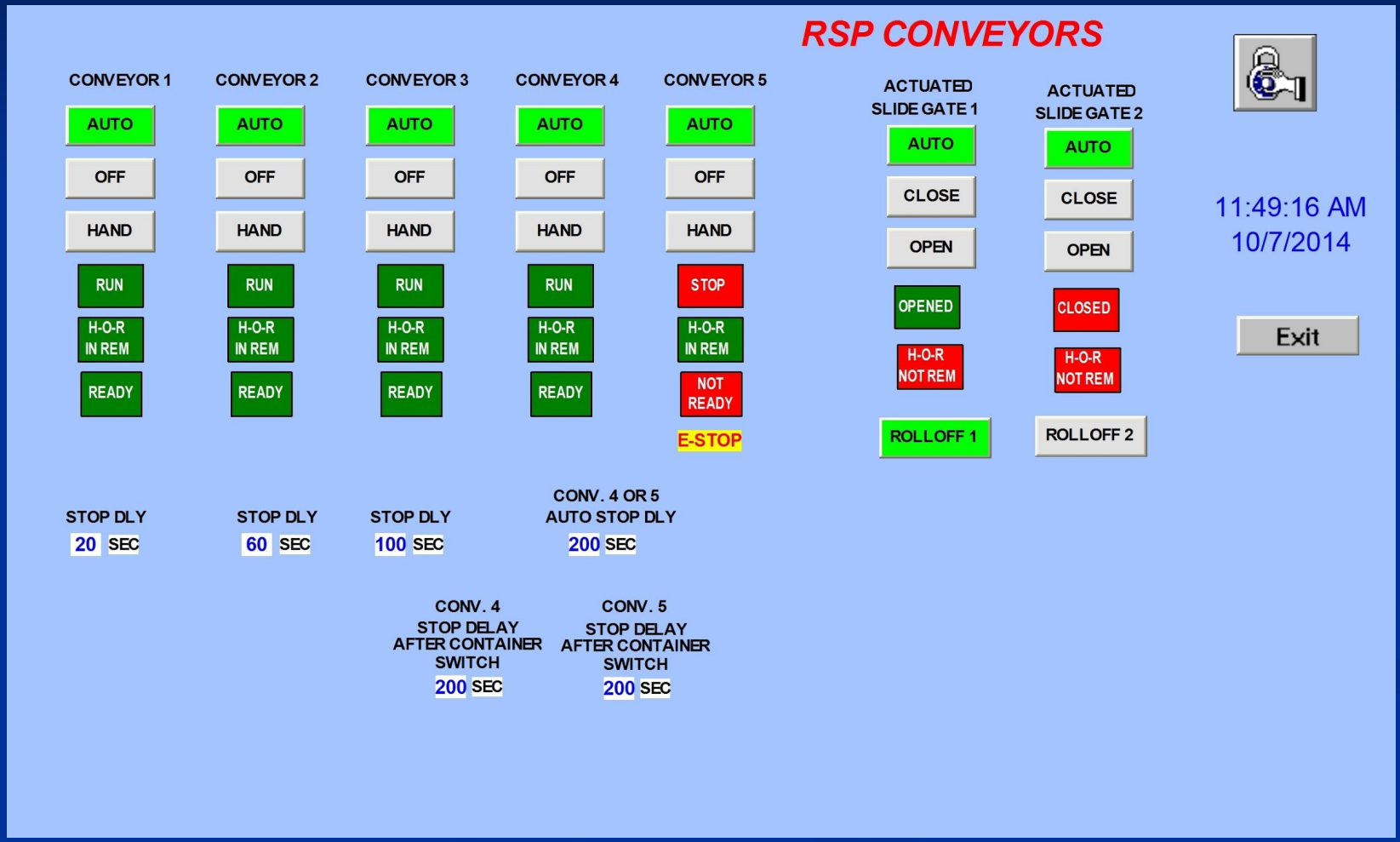
Screw Conveyor Wear



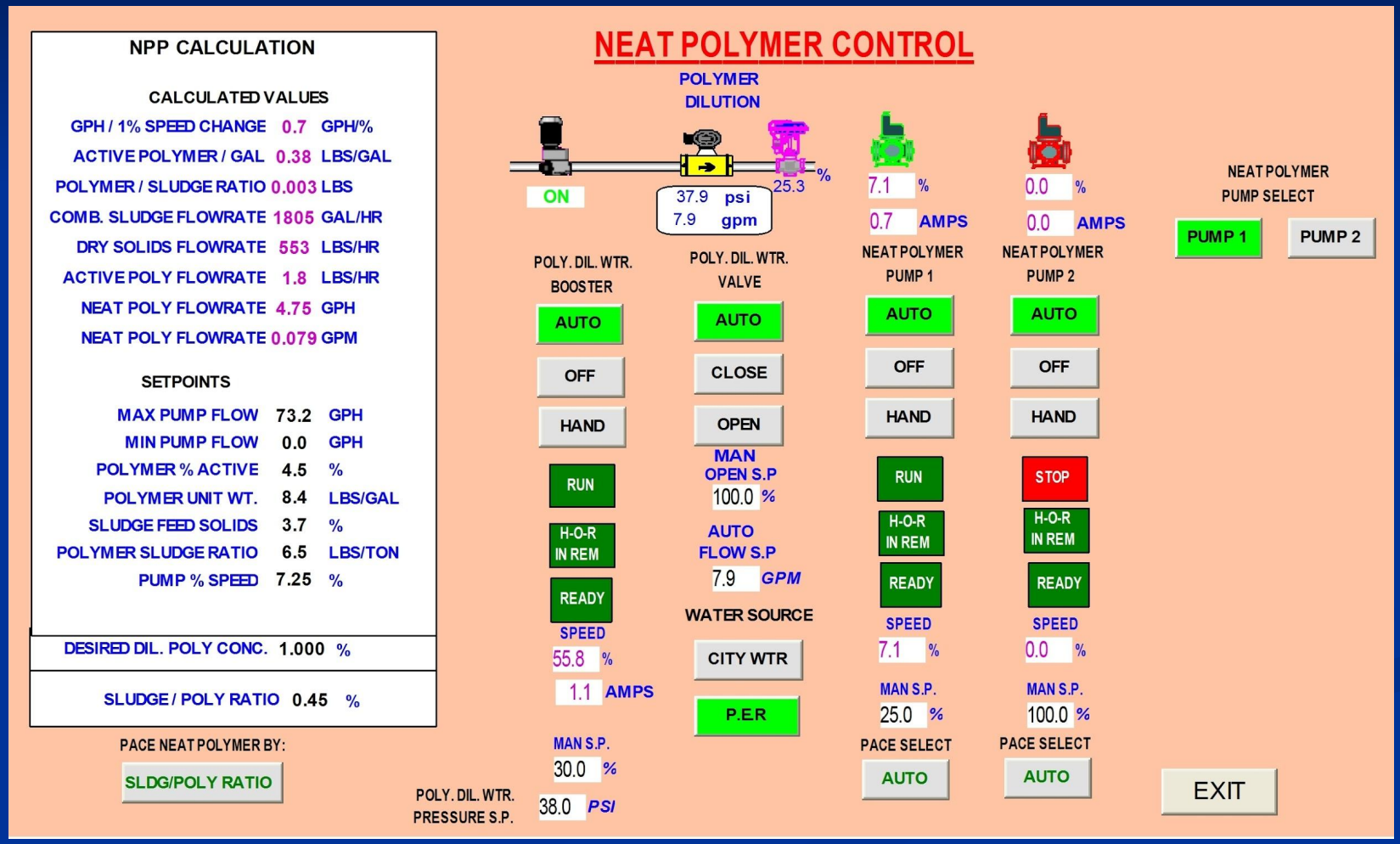
Overview Screen



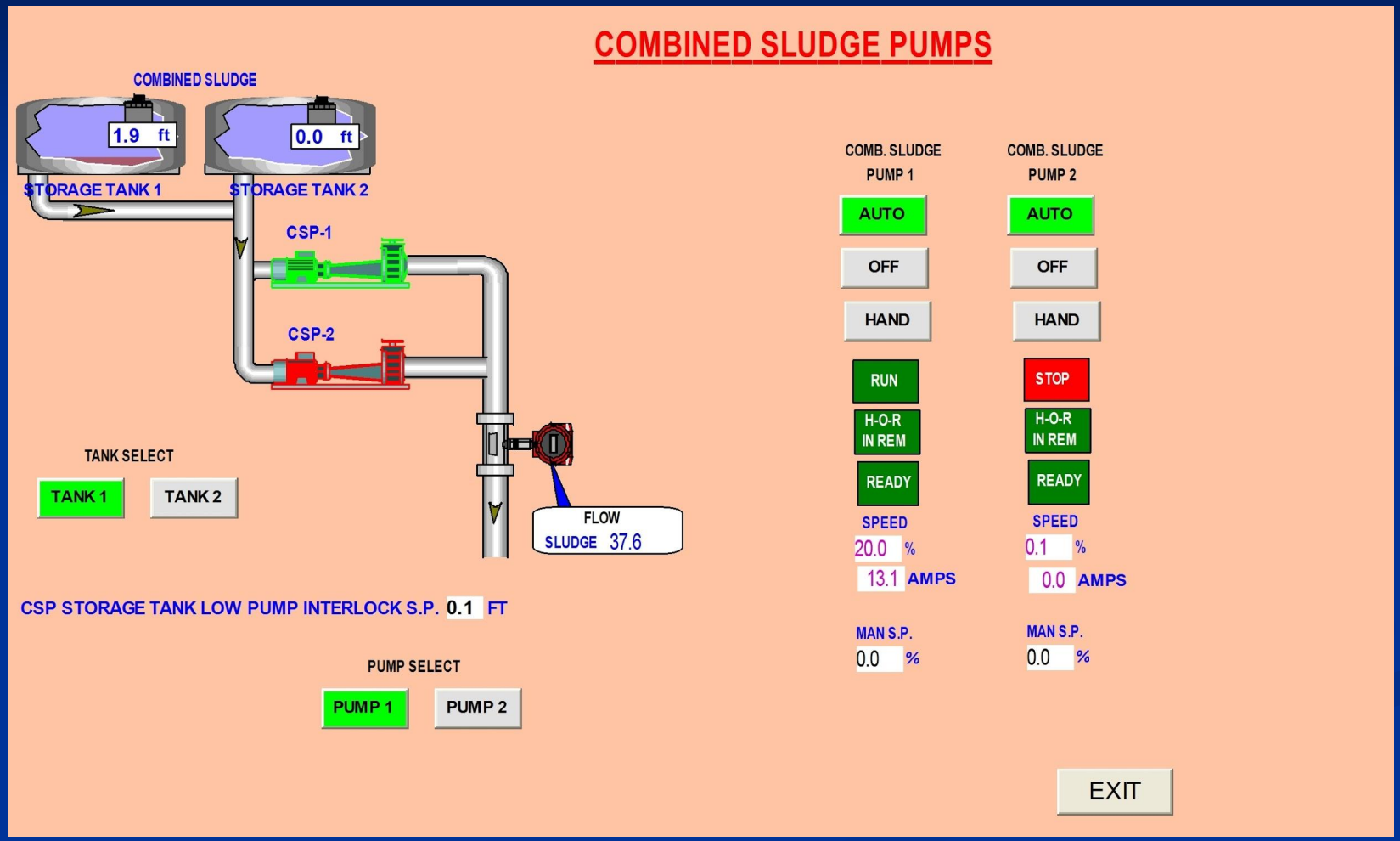
Conveyor Control



Polymer Control



Pump Controls



Flow Totals

RSP FLOW TOTALS

COMBINED SLUDGE

FLOWRATE	30.2
TODAY	6.890
YESTERDAY	36.350
THIS MONTH	213.78
THIS YEAR	7538
NON RESET	170090

POLYMER

DIL WATER		NEAT POLYMER		
7.9	GPM	FLOWRATE	0.0843	GPM
2	GAL X 1000	TODAY	27.7	GAL
8	GAL X 1000	YESTERDAY	93.3	GAL
58	GAL X 1000	THIS MONTH	13653.2	GAL
1753	GAL X 1000	THIS YEAR	37750	GAL
19	GAL X 1M	NON RESET	136	GAL

POLYMER MAKE DOWN 0.1113 %

ELAPSED TIME METERS

ROT. SCREW PRESS	22788.5	FLUSH WTR. BOOSTER	13612.0
SLUDGE FLOC MIXER	22256.8	CONVEYOR 1	22886.2
NEAT POLYMER PUMP 1	12046.1	CONVEYOR 2	22900.5
NEAT POLYMER PUMP 2	10047.6	CONVEYOR 3	22910.6
POLY WTR. BOOSTER	22.0	CONVEYOR 4	11408.4
COMB. SLUDGE PUMP 1	11514.1	CONVEYOR 5	11641.4
COMB. SLUDGE PUMP 2	10666.6		

EXIT

Alarm Controls

ROT. SCREW PRESS ALARM CONTROL

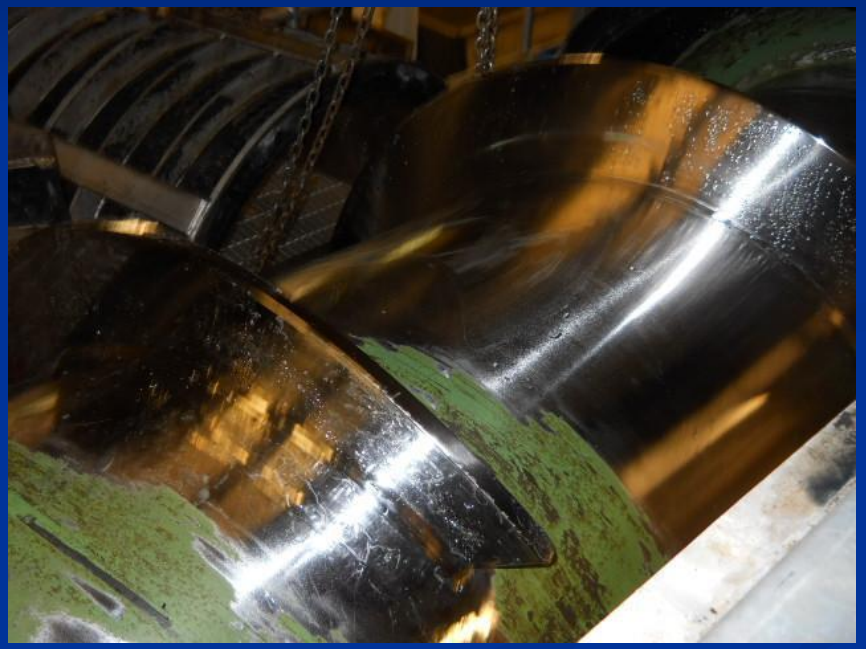
Exit

	CONTROL	DELAY (SEC)	SETPOINT	
ROTARY SCREW PRESS HI LOAD ALARM	ENABLED	60	10.0	AMPS
ROTARY SCREW PRESS HIHI LOAD ALARM	ENABLED	30	10.5	AMPS
ROTARY SCREW PRESS HEADBOX HI LEVEL ALARM	ENABLED	10	21.8	INCHES
ROTARY SCREW PRESS HEADBOX LO LEVEL ALARM	ENABLED	60	0.0	INCHES
NO SLUDGE FLOW SHUTDOWN INTERLOCK	ENABLED	60		
POLYMER DIL. WATER HI PRESS ALARM	ENABLED	10	50.0	PSI
POLYMER AREA CONTAINMENT FLOOD	ENABLED			
SCREW PRESS CONTAINMENT FLOOD	ENABLED			
FLOC TANK HIHI LEVEL SW.	ENABLED			
ROTARY SCREW PRESS LOW AMPS ALARM	ENABLED	600	5.0	AMPS

Weekly Monthly Maintenance

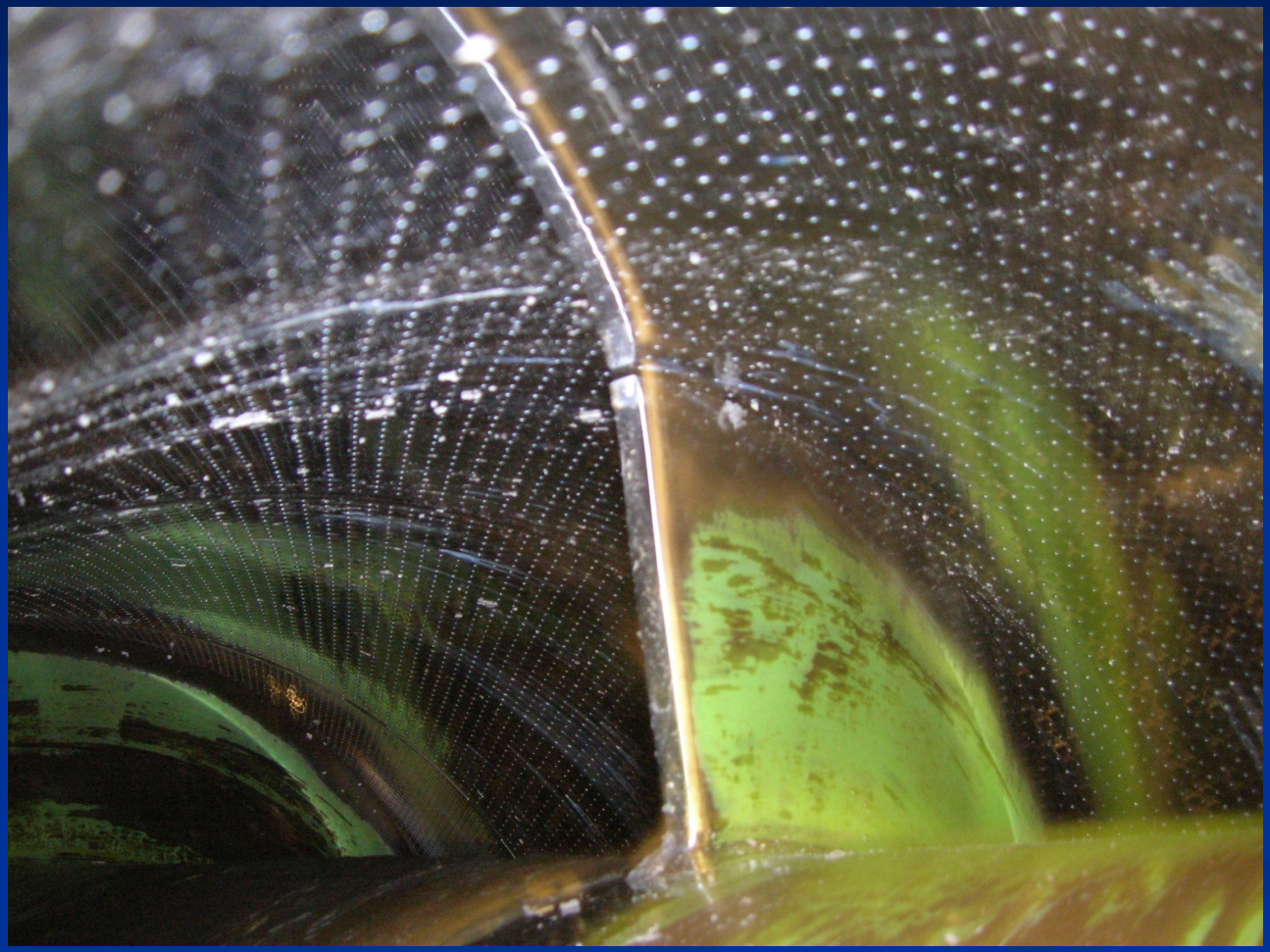
- Clean head box screens
- Clean head box and top sprayers
- Hose, pressure wash or clean outside of screens (Depends)
- Drain clean the floc tank
- Clean polymer static mixers and flush lines
- Clean covers

Yearly Inspections



Check for other unusual conditions

Yearly Inspections



Check Flight Wear and Tolerances and Screen Wear

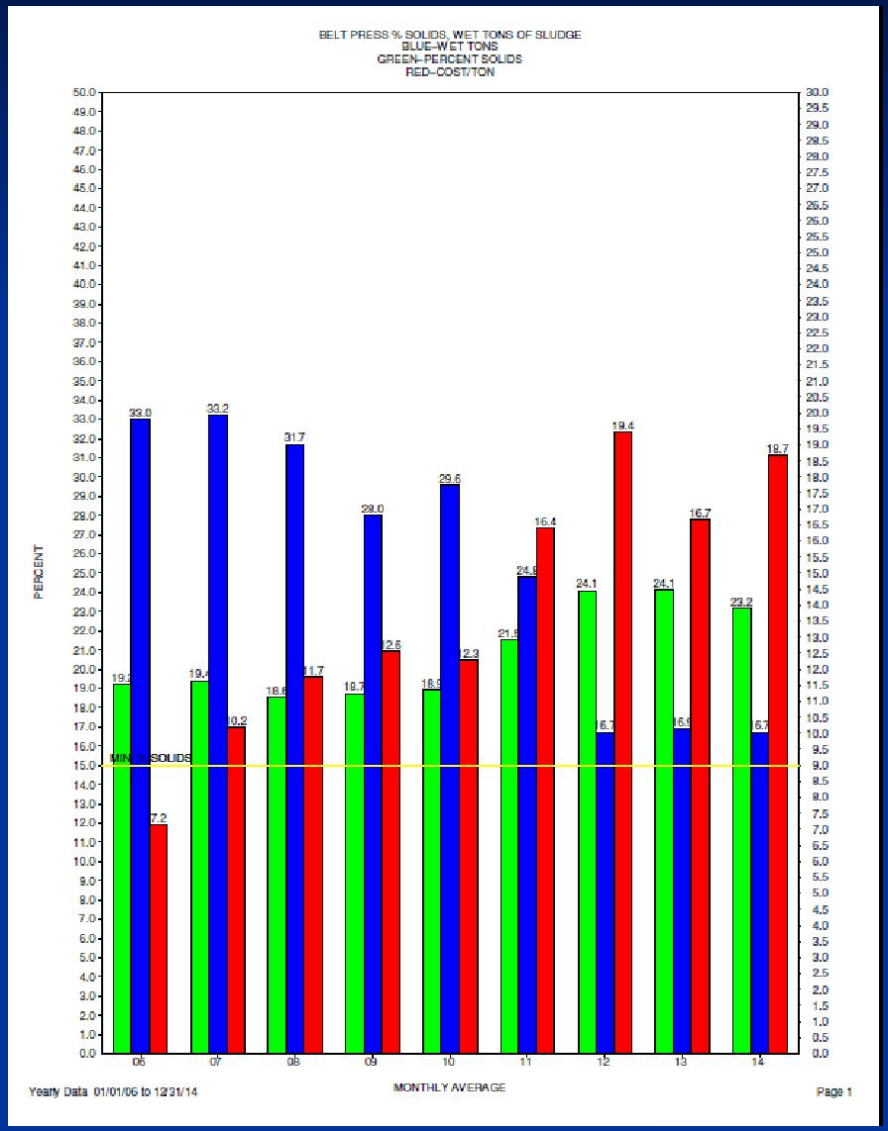
Yearly Inspections

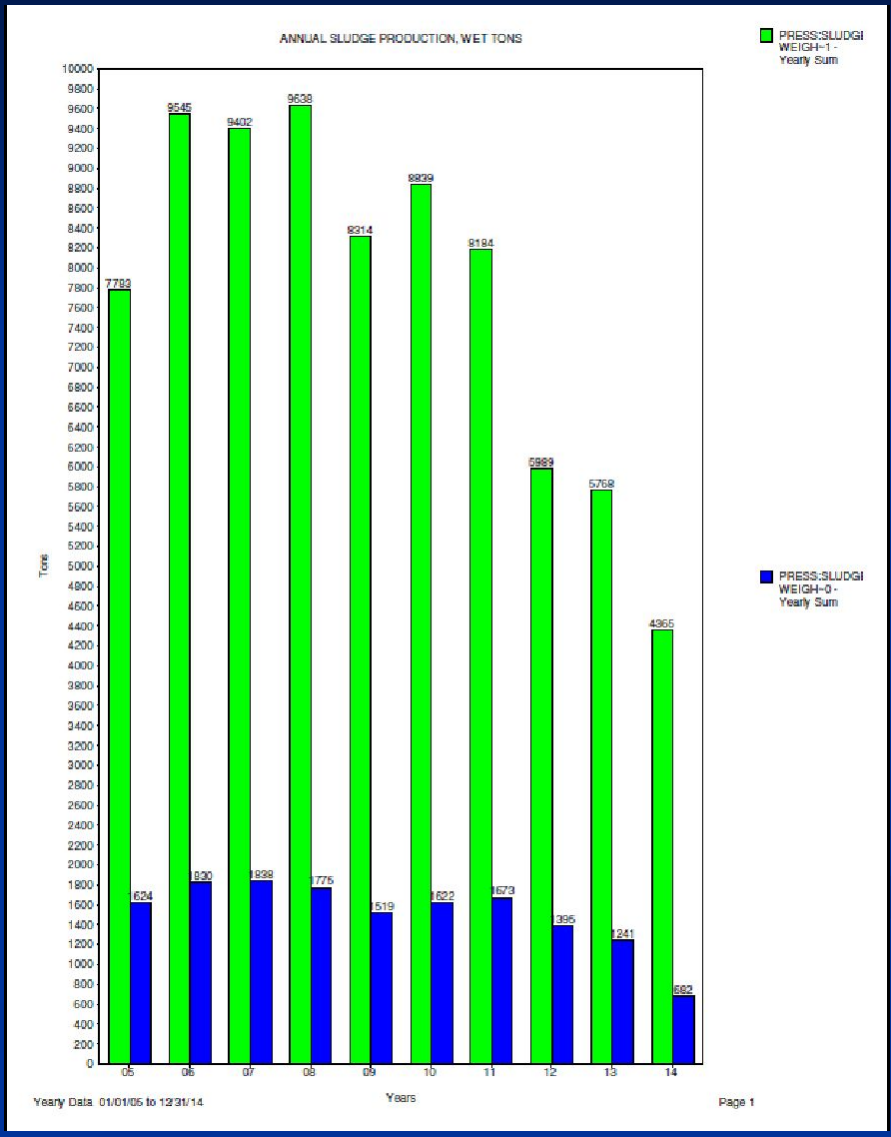
SCREW PRESS INSPECTION CHECKLIST

PRESS #: #1 **DATE:** 9/12/2014 **INSPECTOR** Keith Lawler

ITEM	CHECKPOINT DESCRIPTION	√	COMMENTS
1	SCREEN DEFORMATION/DAMAGE LOW PRESSURE DRUMS EXTERIOR SURFACE	√	No wear or damage seen
2	SCREEN DEFORMATION/DAMAGE HIGH PRESSURE DRUMS EXTERIOR SURFACE	√	No wear or damage seen
3	INSPECT FOR CORROSION OF HIGH AND LOW PRESSURE DRUM SECTIONS/BOLTS	√	OKAY, no corrosion
4	CHECK CLEARANCES BETWEEN SCREW FLIGHT AND INSIDE OF SCREEN	√	Clearance in the inlet end of press was adjusted, inlet clearances adjusted to <.1~.2 mm
5	INSPECT INTERIOR SURFACE OF HIGH PRESSURE SCREENS FOR WEAR AND THINNING	√	Screens are in good shape.
6	INSPECT INTERIOR SURFACE OF LOW PRESSURE SCREENS FOR WEAR AND THINNING	√	Screens are in good shape
7	INSPECT SCREW FLIGHT AT HIGH PRESSURE SECTION FOR EXCESSIVE WEAR	√	HP flight in good shape. Teflon coating on screw shell and flights is worn off in large area
8	INSPECT SCREW FLIGHT AT LOW PRESSURE SECTION FOR EXCESSIVE WEAR		LP flight in good shape. Teflon coating on screw shell and flights in good shape but is coated with brown thick rough material.
9	VERIFY SPRING CONE IS FREE TO MOVE. DISASSEMBLE SPRING ARBORS AND INSPECT	√	No threads showing, FKC adjusted to 4-3/4 of exposed threads. Do not readjust.
10			
11	INSPECT SPEED REDUCER, AND ALL OIL SEALS FOR OIL LEAKAGE	√	OKAY
12	VERIFY PROPER LUBRICATION OF: a) SPEED REDUCER b) INLET STAND BEARING c) SPRING CONE ARBORS	 √ √ √	 OKAY OKAY OKAY
13	VERIFY ALL BOLTS ARE TIGHT	√	OKAY

Performance





Final Thoughts

- Met or exceeded all goals and expectations
- Over 60% reduction in composting amendment - $50,000 savings
- Allowed for more merchant sludge increase revenues keep sewer rates low
- Aid in phosphorus removal (Spread out loadings)
- One operator freed up for other tasks
- Improved plant performance
- No odor control chemicals required - $10,000 savings