

TRICKS OF THE TRADE

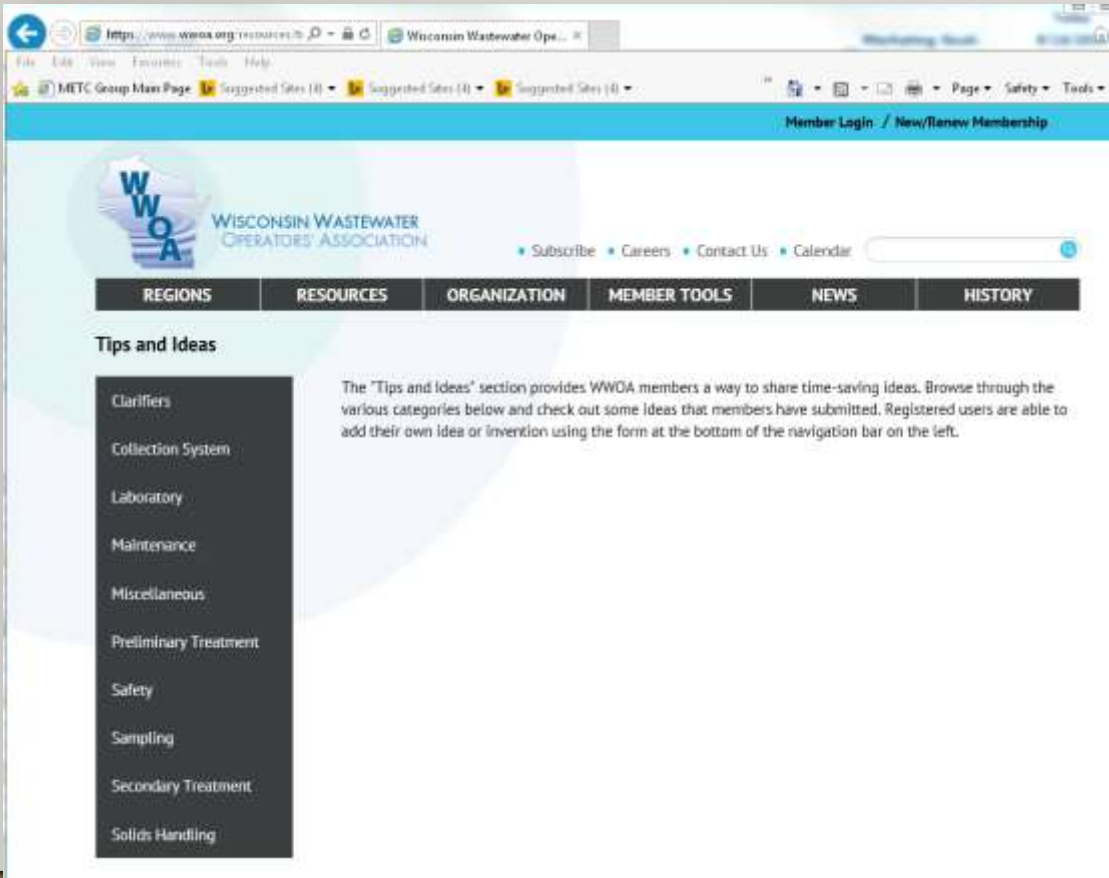
2019



OUTLINE FOR TODAY

- Opening Comments
- New for 2019
 - ~ a dozen short stories
 - La Crosse SRT Control
- Oldies but Goodies

PROFESSIONAL ORGANIZATIONS THRIVE ON SHARING OF IDEAS!



**TRICKS DON'T NEED TO BE
ELEGANT TO BE AFFECTIVE!**



Tricks don't need to be elegant to be affective!



TRICKS CAN BE A SIMPLE REPURPOSING



Tricks can be a simple repurposing.



TRICKS CAN HIDE AND PROTECT.



TRICKS CAN BENEFIT ANY NUMBER OF AREAS

- Maintenance
- Cleaning
- Monitoring/Sampling
 - Improved Visibility
- Signage and Internal Communication
- Public Relations
- Access
- Safety
- Automation
- Training
- Containment
- Data Management
- Process Improvement

2019 SUBMISSIONS HAD SOME COMMON THEMES

- Promote and Communicate
- Monitor and Control
- Winterize and Protect
- Contain and Capture
- Access and Carry

PROMOTE AND COMMUNICATE

Promote and Communicate



2017 Promotion – Dubuque, IA

TABLE WITH HYDRANT LEGS

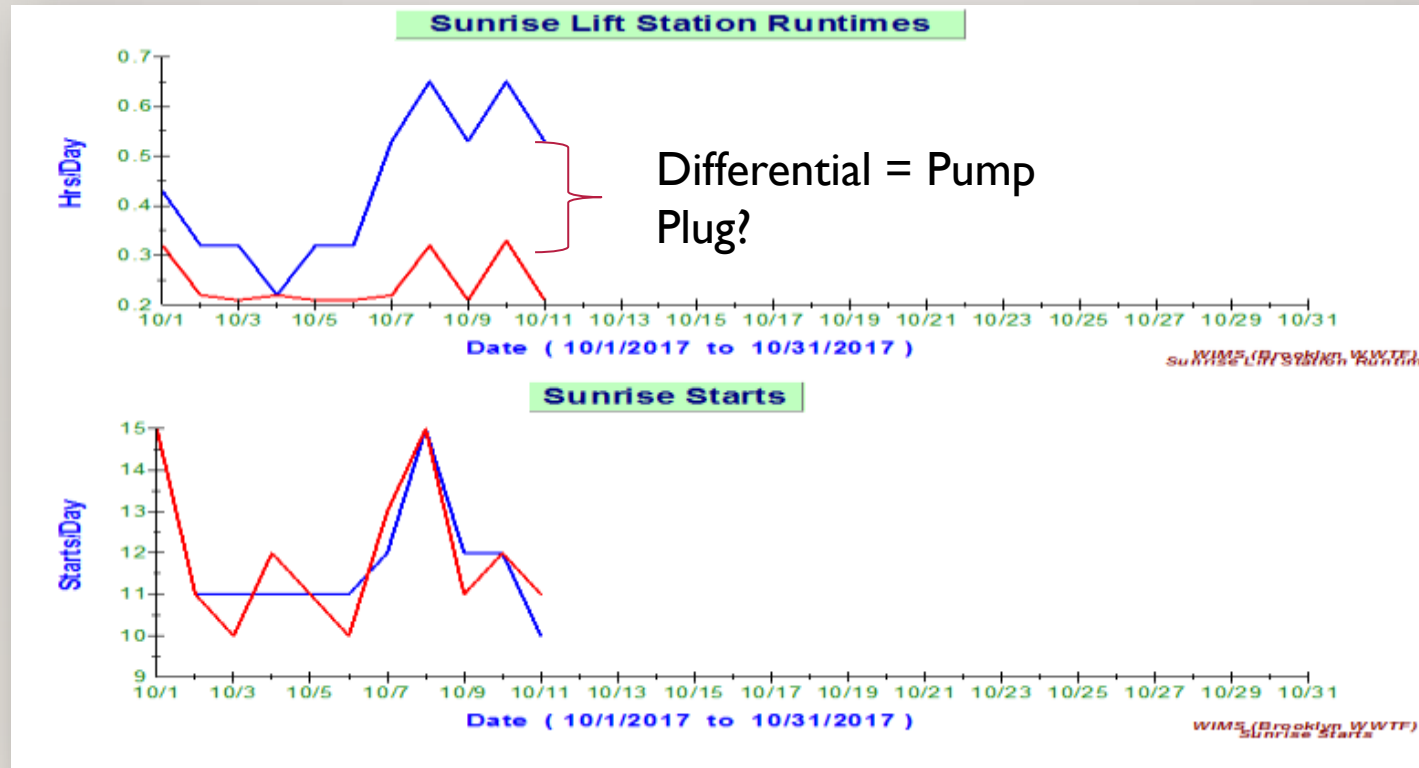


PIPE DIRECTION AND LOCATION MARKED ON PAVEMENT



MONITOR AND CONTROL

Monitor and Control

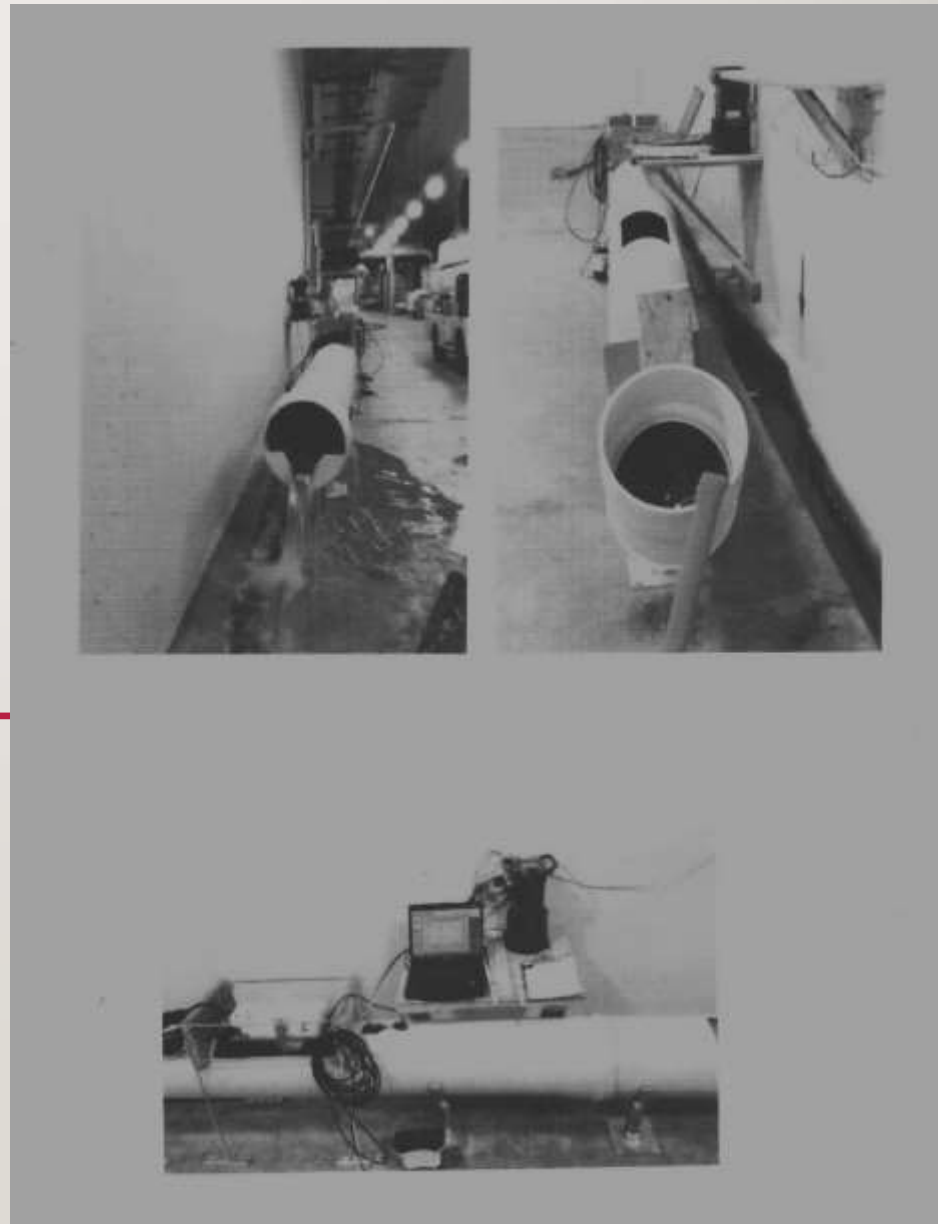


2017 Review of Trends to Identify Pump Issues – Brooklyn, WI

DRUM, LIGHT, MIXER PROVIDE SLUDGE SAMPLER AND OBSERVATIONS



Collections System – Flow Monitoring



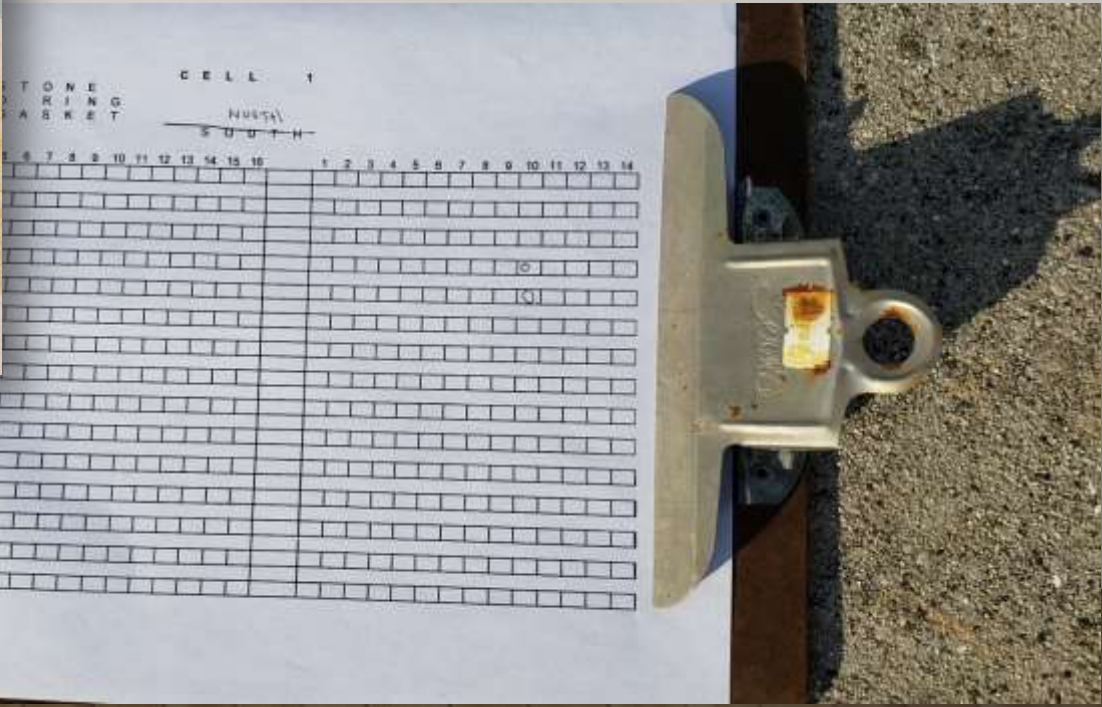
Flow simulator set up and work station for trouble shooting and verifying accuracy.

TUBE ALLOWS VISUAL INDICATION OF WET WELL LEVEL

“When and if our bubble line for the water level in the backwash waste basin fails we have a tube coming out of the inlet to the pump and the water level rises to the water level in the wet well.”



ISOLATING IN ADVANCE OF ENTRY CREATES A STRATEGICALLY TARGETED REPAIR



La Crosse WWTP Constant SRT





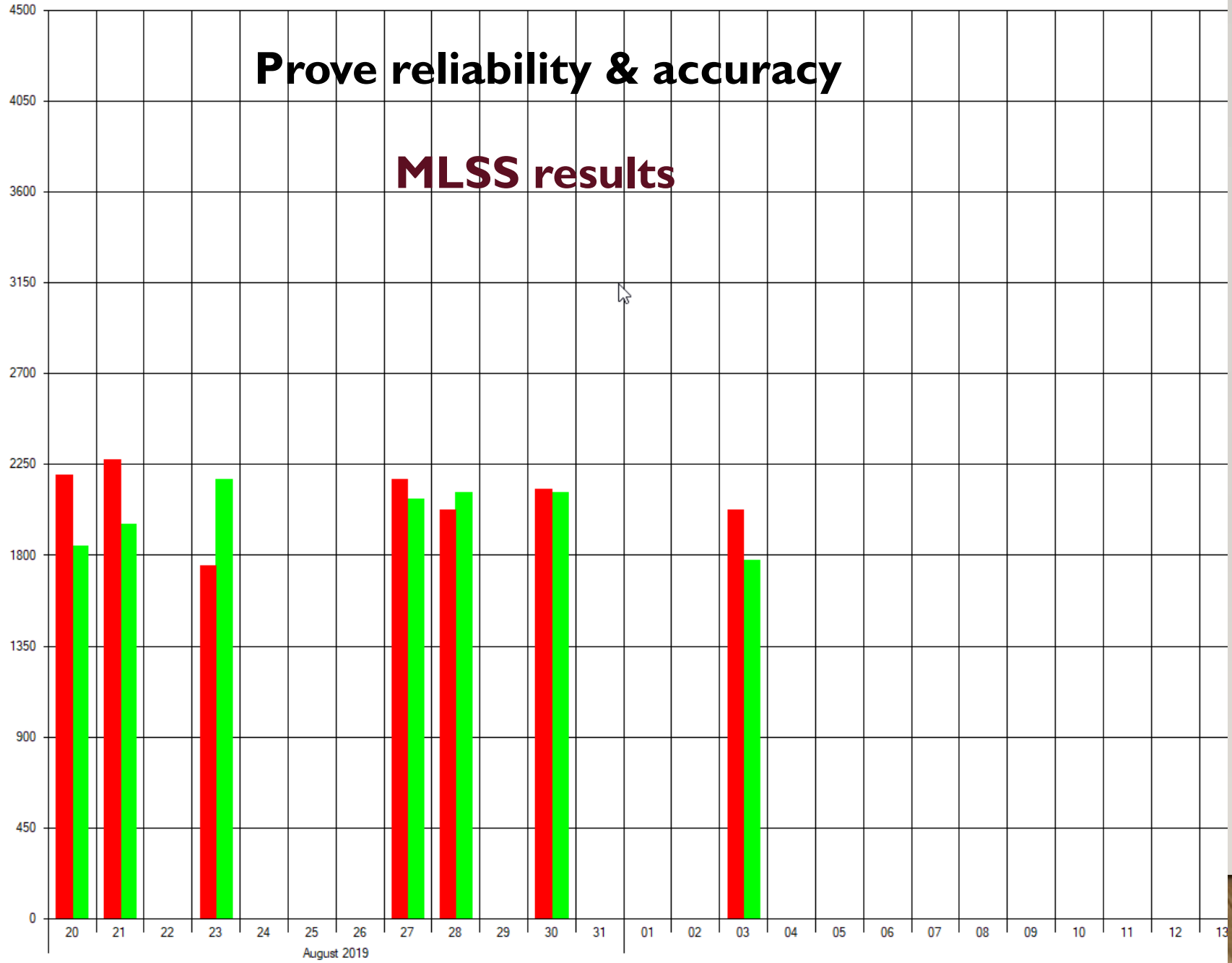
Select reliable TSS

Probe

HACH Solitax

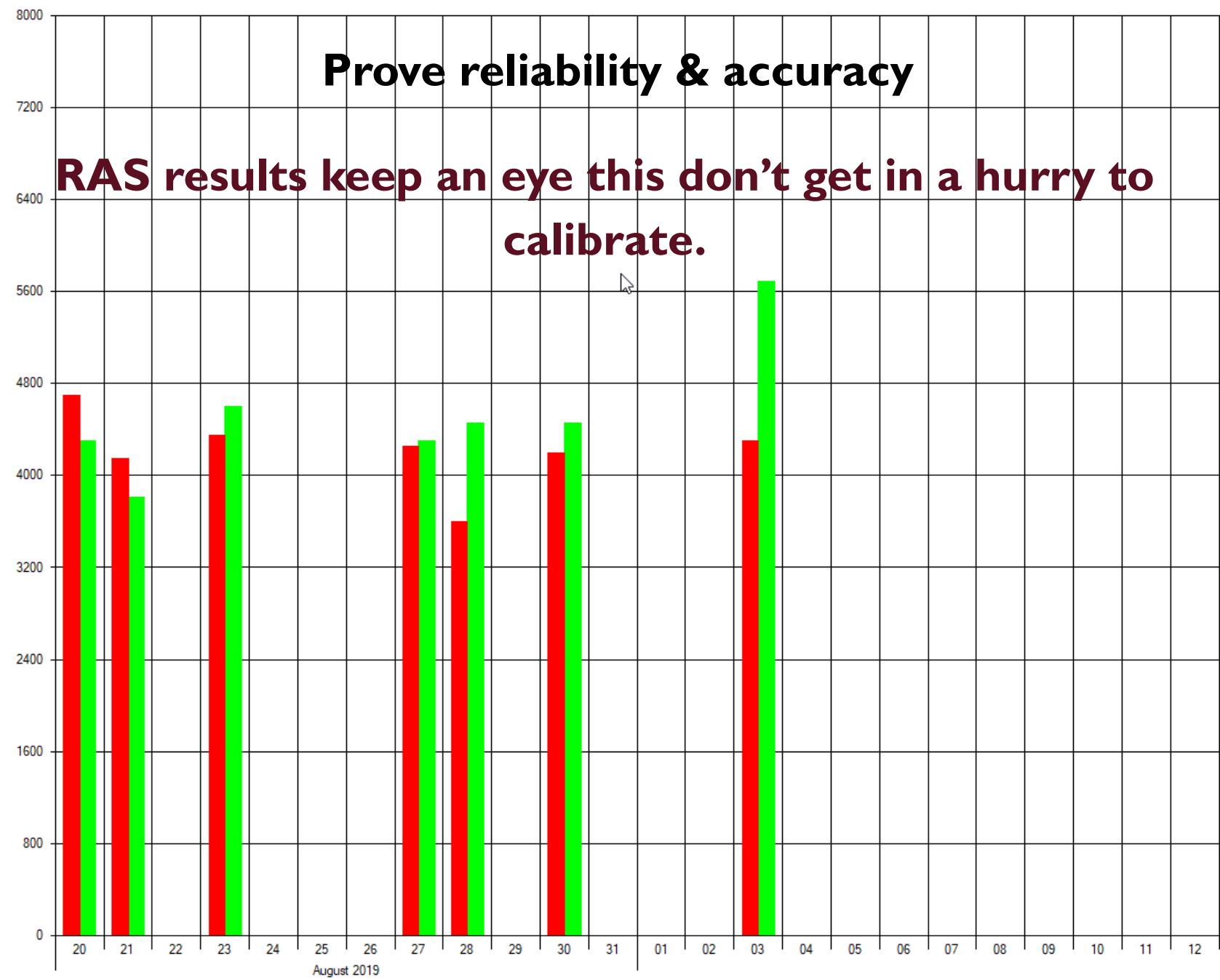
Prove reliability & accuracy

MLSS results



Prove reliability & accuracy

RAS results keep an eye this don't get in a hurry to calibrate.



Create tags for the parameters to create constant SRT program

Constant SRT Formulas

Variables	Tag Names	Remarks
	W_WASML_MGD	Is this data sent to HisData Hourly?
	R_MLSS_MGL	
	R_WAS1_FLO	
	R_WAS1_FLOT	
	R_RAS_TSS_MGL	
	W_WAS_CYC_MIN	

$$=(R_MLSS_MGL*8.34*(N_TANKS_INUSE*0.83766)*8.34)/($$

TAG NAME	DESCRIPTION	FORUMLA
R_LBS_AER_PROBE	AERATION TANKS LBS BASED ON ONLINE PROBE	$R_MLSS_MGL*(N_TANKS_INUSE*0.83766)*8.34$
R_LBS_WASML	LBS OF MIX LIQUOR WASTED	$R_WASML_MGD*8.34*R_MLSS_MGL$
R_LBS_WAS_PROBE	LBS WASTED...NEW PROBE 2010	$R_RAS_TSS_MGL*8.34*R_WAS1_FLOMGD$
R_LBS_WAS_TOT	TOTAL LBS WASTED RAS AND ML	$R_LBS_WAS_PROBE+R_LBS_WASML$
R_SRT_PROB	SLUDGE RETENTION TIME (SRT) DAYS - TSS PROBES	$R_LBS_AER_PROBE/(R_LBS_WAS_PROBE+R_LBS_WASML+F_TSS_LBS)$

Have a programmer write a program for constant SRT program

PLC-Program Flow City of LaCrosse

Step	Description
1	Make a SRT set point (operator adjustable input), name variable SRT_IN
2	Calculate last hour's average mix liquor concentration R_MLSS_MGL and assign to program variable HRLY_A_MLSS_C
3	Calculate last hour's average mix liquor waste flow W_WASML_MGD and assign to program variable HRLY_A_MLSS_F
4	Calculate last hour's average RAS concentration R_RAS_TSS_MGL and assign to program variable HRLY_A_RAS_TSS_C
5	Calculate last hour's average LBS IN AERATION $A_LBS_AER = HRLY_A_MLSS_C \times (N_TANKS_INUSE \times 0.83776) \times 8.34$
6	Calculate last hour's average lbs of sludge wasted through the surface wasting system (expressed in lbs/day) $A_LBS_SURF_WAS = HRLY_A_MLSS_C \times 8.34 \times HRLY_A_MLSS_F$
7	Calculate required wasting through the RAS system in lbs/day: $A_LB_D_RAS_WAS = [(A_LBS_AER) - (SRT_IN \times A_LBS_SURF_WAS)] / SRT_IN$
8	Convert A_LB_D_RAS_WAS to lbs/hour to be wasted through RAS system. $A_LB_H_RAS_WAS = A_LB_D_RAS_WAS / 24$
9	Calculate required gallons of waste activated sludge over the next hour. $REQ_GALS_WAS = [A_LB_H_RAS_WAS / (8.34 \times HRLY_A_RAS_TSS_C)] \times 1,000,000$
10	We need safe guards on all four sensors that are feeding this system
11	This system of wasting will be MODE C (for Constant SRT)
12	If the system sees error(s) it will alarm and switch to MODE 3
13	Have setpoints for error levels so you can adjust them
14	Error 1 two setpoints: If gpm of RAS waste system (while running for at least 2 minutes) is above or below setpoint levels
15	Error 2 two setpoints: If gpm of mix liquor waste system (while running for at least 2 minutes) is above or below setpoint levels
16	Error 3 two setpoints: If MLSS is above or below setpoint levels
17	Error 4 two setpoints: If RAS TSS is above or below setpoint levels

WAS Pump 1

H-O-A


Pump Run

Fail

CTR Fail

CTR Fail Delay

Hand



Combined Waste Flow GPM

WAS Pump 2

H-O-A


Pump Run

Fail

CTR Fail

CTR Fail Delay

Hand



WAS Weekday Pumping Mode

Mode Select

Mode 1 = 0
Mode 2 = 1
Mode 3 = 2
Mode SRT = 4

Mode 1: P2 Manual Speed
Mode 2: Gallons per Day
Mode 3: Time and Cycles per Day
Mode 4: SRT Auto Mode

Mode 1 and 3 Setpoints

P2 Weekday Manual Speed (0-60 Hz)

Mode 2 Setpoints

Total Gallons x 100 to Waste (Mode 2)
 Waste Gallons per Cycle x 100
 WAS Cycle Gallons Accumulator x 100

Mode 3 Setpoints

Minutes per Cycle (Mode 3)
 WAS Cycle Time Accumulator

Mode 1 - 2 - 3 Setpoints

of Cycles in Mode (Mode 2 and 3) (0-30)
 WAS Cycle Count
 Waste Period Start Hour
 Waste Period Start Minute
 Waste Period Stop Hour
 Waste Period Stop Minute

Mode 4 SRT Setpoints

Desired SRT (in Days) # of Tanks:
 Required Waste Gallons per Cycle x 100

Mode 4 includes Weekend Pumping

WAS Weekend Pumping Mode

Mode Select

Mode 2 = 0
Mode 3 = 1

Mode 2: Gallons per Day
Mode 3: Time and Cycles per Day

Mode 2 Setpoints

Total Gallons to Waste Weekend Setpoint (Mode 2) Gallons x 100

Mode 3 Setpoints

Minutes per Cycle Weekend Setpoint (Mode 3) (0-60.0 minutes)

ML Wasting

Mix Liquor Wasting (GPM)
 Mix Liquor Wasting (MGD)

Mode 4 Alarms

ML GPM Low Setpoint High Setpoint

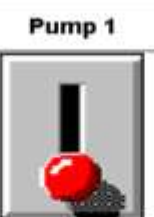
WAS GPM Low Setpoint High Setpoint

ML SS Low Setpoint High Setpoint

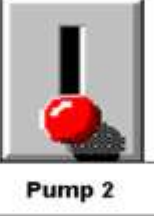
RAS TSS Low Setpoint High Setpoint

WAS Pump Selector

Pump 1

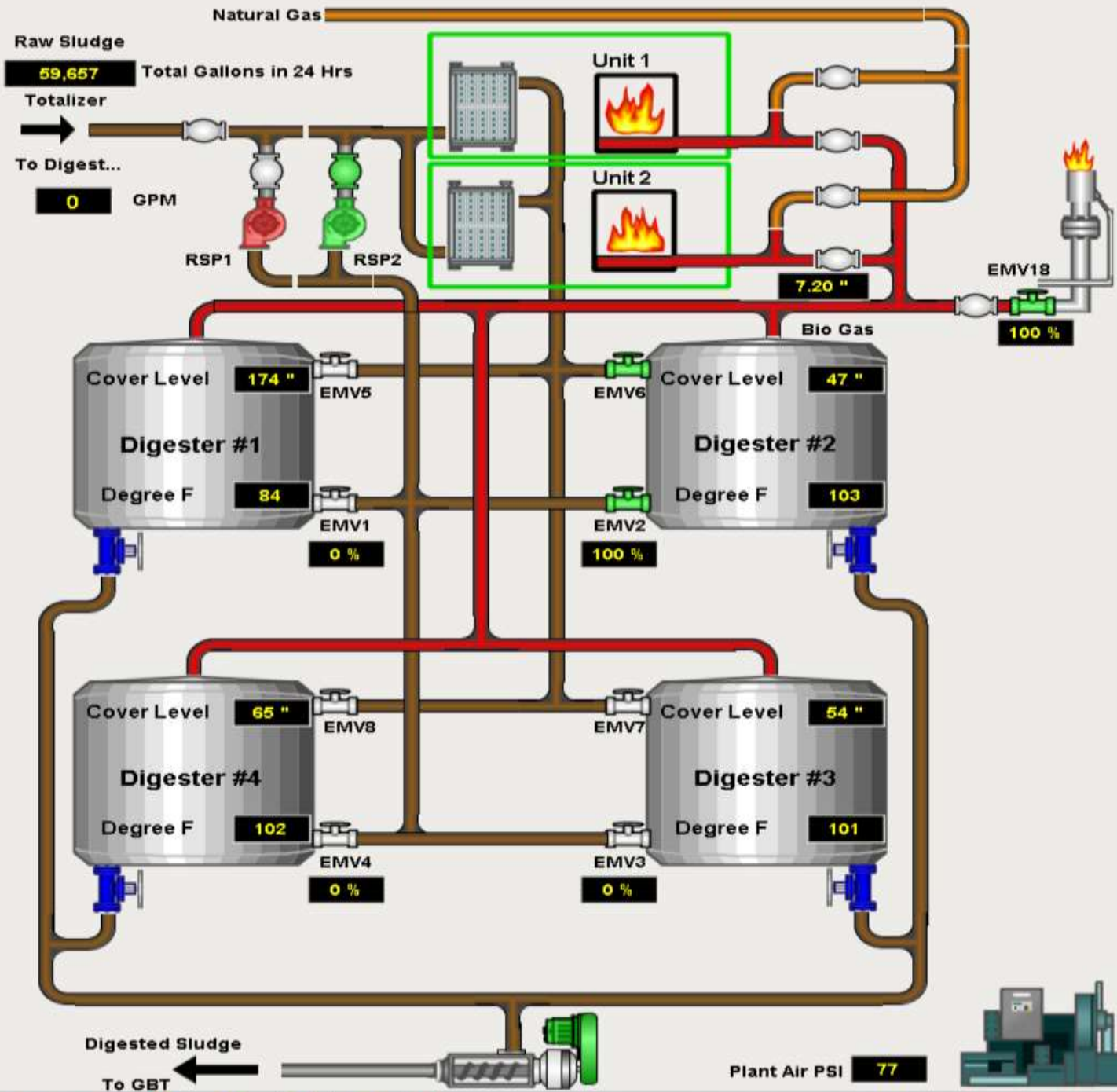


Pump 2



Once a program is written link it with SCADA create an in put box for desired SRT instead of calculating on daily bases.

With steady gravity thickener pumping rates to digester's, equals a more balanced feed to digesters.



Command windows Help

GBT Control Discharge Trends GBT Alarms GBT Notes

GBT feed Pump Speed AUTO / MANUAL

GBT Feed Pump Speed AUTO / MAN

Manual

VFD Speed 0-60.0 Hz **17.10**

Dig. Sludge Manual Speed 0-60.0 Hz **17.00**

GBT DISCHARGE PRESSURE **95.00**

GBT DISCHARGE PRESSURE SETPO... **100.00**

GBT DISCHARGE PRESSURE DEADBA... **3.00**

UPDATE INTERVAL 1 - 100 MIN. **3.00**

DISCHARGE PRESSURE ERROR M... **10.00**

DISCHARGE PRESSURE ERROR M... **1.00**

FEED PUMP SPEED CHANGE MAX 0-10... **3**

FEED PUMP SPEED CHANGE MIN 0-10... **1**

FEED PUMP SPEED MAX 0-100% **100**

FEED PUMP SPEED MIN 0-100% **0**

GBT Polymer Speed Control

SET POLY PUMP SPEED 0-6.00 G... **2.40**

POLY SPEED PUMP SPEED 0-6.00 ... **2.64**

Dig Sludge GBT Feed

HOA **AUTO**

Run

Fail

CTRF

Delay **30**

Hand Off Auto

GBT Feed Selector

WAS Feed (Thickener) = 1 **0**

Digest Sludge Feed = 0

GBT Control

RESET

GBT Control Thickener P1 P2

Thickener Manual Speed 0-60.0 Hz **60** **60**

VFD Speed 0-60.0 Hz **14** **29**

TWAS Hi Pressure Alarm Setpoint

Alarm Setpoint 0-100 psi **100**

GBT Automatic Cycle

Dig Slidg GBT FP1 ending level inches **29**

Enable

Dig Slidg GBT FP1 enable

Disable

GBT Dig select 0=None 1=1 2=2 3=3 4=4 **3**

GBT Feed Dig Slidg Level Setpoint inches **10**

Current Digester Levels

Digester	Inches	Old Cover Lev Read...
Digester 1	0	174
Digester 2	31	67.4
Digester 3	30	74
Digester 4	75	97

GBT Discharge Current Flow GPH

G_GBT_FLO_CD1 **0**

G_GBT_FLO_CD2 **0**

G_GBT_FLO_CD3 **0**

G_GBT_FLO_CD4 **0**

G_GBT_FLO_RD1 **0**

G_GBT_FLO_RD2 **0**

G_GBT_FLO_RD3 **0**

G_GBT_FLO_RD4 **0**

G_GBT_FLO_WD1 **0**

G_GBT_FLO_WD2 **0**

G_GBT_FLO_WD3 **0**

G_GBT_FLO_WD4 **0**

G_GBT_FLO_SST **2,280**

GBT Control GBT AUTO CYCLE

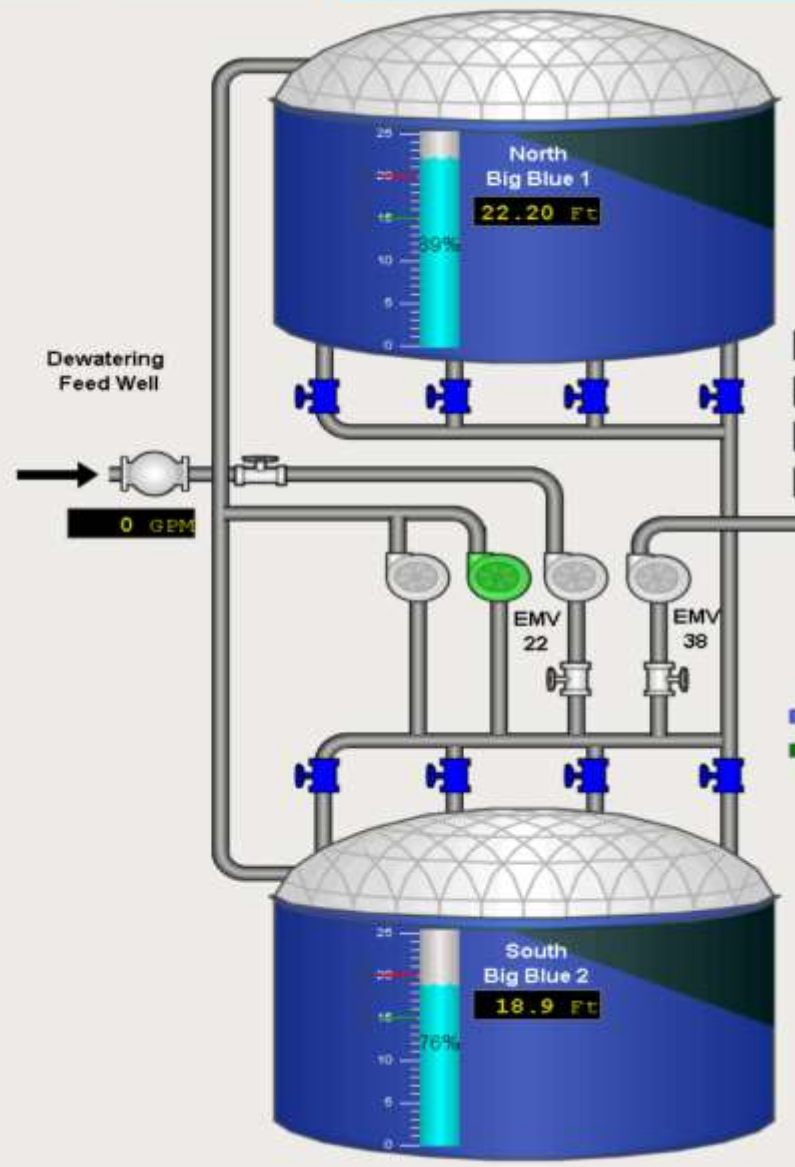
START STOP

If digesters are feed at a steady rate what this improves is: we can pull out of digestion at a constant rate feeding GBT reducing spikes of side stream Phosphorus (run it 24/7) minimize impacts of Phosphorus.

In the evening when there's nothing to watch on TV login to SCADA and watch your GBT run from home, pop some popcorn invite the family over to watch.



Have faith that automation and instrumentation will do the work for you.



0 GPM Truck Flow Fill
 0.00 Total Gallons x1000 in 24 hours
 0 GPM Truck Flow Fill South Tank
 0 Total Gallons x1000 in 24 hours South Tank

- Truck Flow Fill
- Truck Flow Fill South

Panel Key

Local
 Run/Fail
 RVSS Fail
 Flow Fail
 Seal Fail
 Hours
 Starts

Tank Mix P1	Tank Mix P2	Sludge Feed Well P1	Tanker Load P1
OFF	HAND	OFF	OFF
0	0.2	0	0
0	1	0	0

Note: The Local HOA switch for Sludge Feed and Tanker Load are from RTU 4's touchscreen.

Biosolids

VTSS Fail



Biosolids Truck Fill Flow Trend



[Go to Historical View](#)

Last Days

From GBT LaCrosse produces 12 MG annually of 6% Biosolids

WINTERIZE AND PROTECT

Winterize and Protect

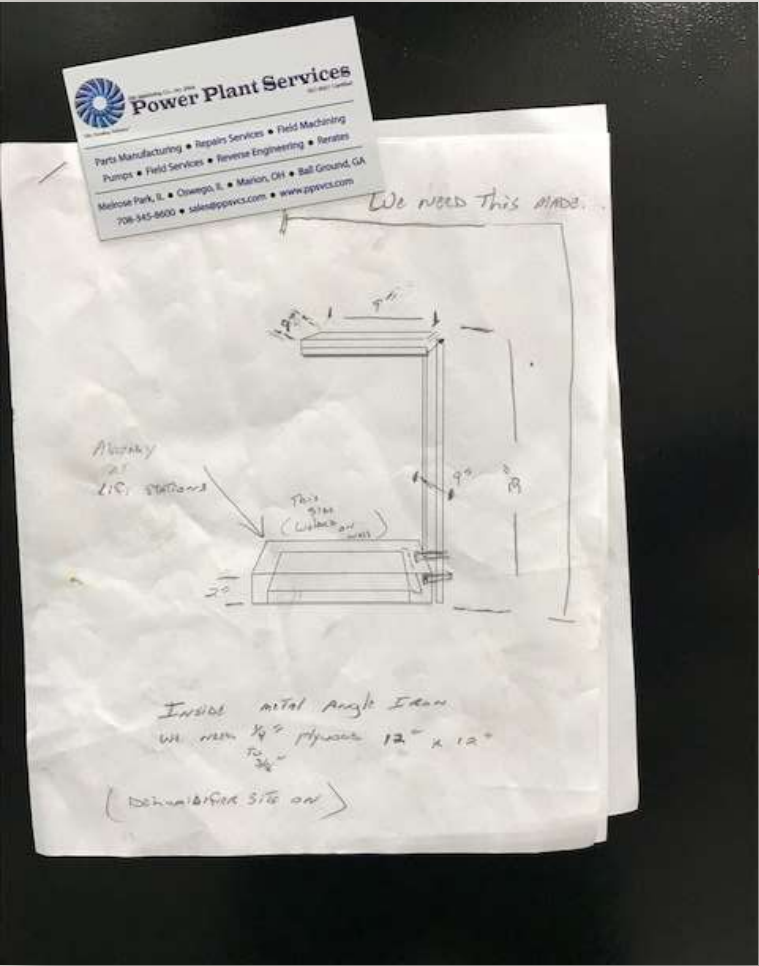


2017 Infrared Heaters – Waterloo, IA

AIR REDUCES RISK OF FREEZING



Collections System – Lift Stations



“Safety – From design to prototype. Heater stand platform at lift stations. Keeps the ceramic heaters in a safe spot.”

WATER HEATER ELEMENT PREVENTS STANDPIPE ISOLATION VALVE FROM FREEZING



STAINLESS STEEL HOOPS PROTECT INSTRUMENT



UV PROTECTION

“A cover we had made for our exterior UV installation to protect it from sun and elements”



CONTAIN AND CAPTURE

Contain and Capture



2018 Filter Fly Barrier Courtesy of Plymouth

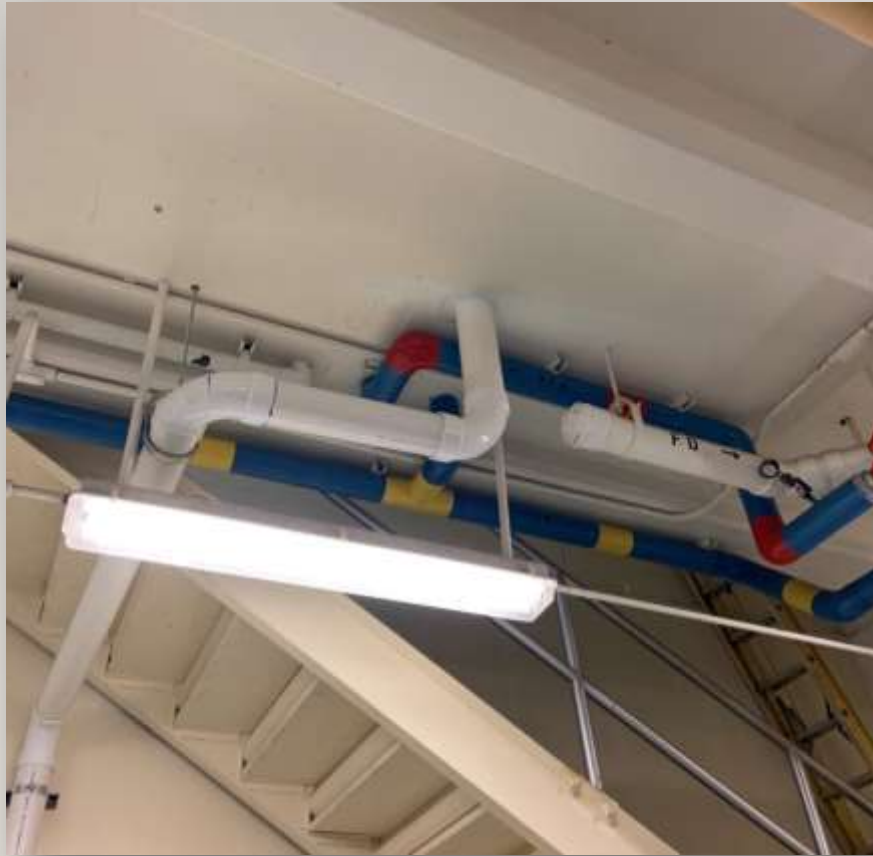
FLY CONTAINMENT – MATS SEPARATING SPACES



IN HOUSE BPR ZONE ENHANCEMENTS REDUCE AIR (OXYGEN) BACKDRAFTS



DRAIN INTERCEPTED AND DIRECTED TO TOTE



ACCESS AND CARRY

Access and Carry



2018 Access to Tools New Lenox, IL

MANHOLE ACCESS IN WET AREAS MADE POSSIBLE WITH TRACKS



WAND ACCESSES BOTTOM OF MEDIA IN BIOLOGICAL GAS SCRUBBER



BIT GAINS ACCESS TO STRUVITE IN HEAT EXCHANGERS – MADE OF TUBE STEEL



Collections System – Forcemain Air Pods



“Eliminate Confined Space - Special Adapter on handle to use with adjacent hook and extension. This can be used for opening and closing Industrial line air release pods from ground level. It can also be used to remove flow equipment sensors.

Limit Confined Space – Test air pod for leaks after cleaning before reinstalling in FM.”

IN HOUSE TELEVISIONING TRAILER DEVELOPS COLLECTION SYSTEM TOOL BOX



CREDITS

Dave Hartman	Wolf Treatment Plant	Dale Cullen & John Klein	Mount Horeb
Randy Oliphant	Strand Associates	Ray Schneider	MMSD
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Tom Steinbach	Retired		
Dean Thom	Sullivan		

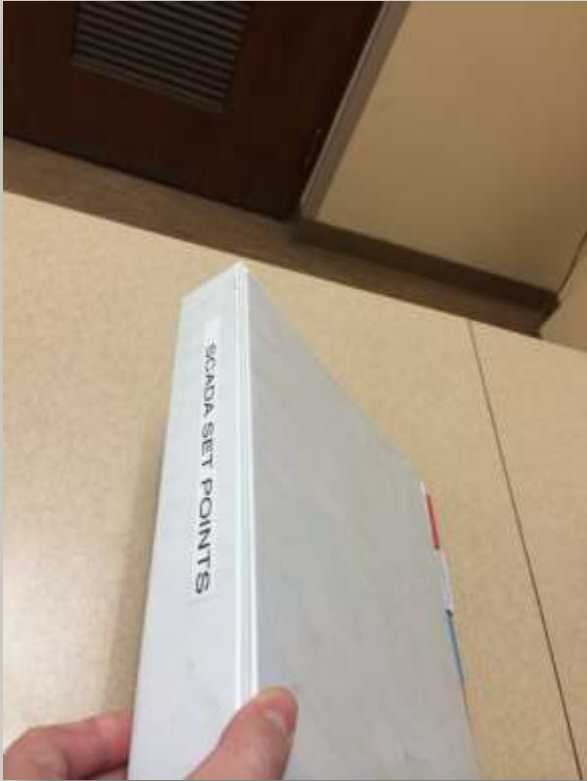
2019 THEMES – COMMENTS FROM THE CROWD

- Promote and Communicate
- Monitor and Control
- Winterize and Protect
- Contain and Capture
- Access and Carry

OLDIES BUT GOODIES



PRINT SCREEN – DOCUMENT SCADA SETTINGS



OXIDATION DITCH MOUNTING BRACKET



SEE THROUGH STEP SCREEN COVER



PROCESS IMPROVEMENTS



“OILER ON A STICK”



Inventor: Tom Dickson

CLARIFIER WASHER



TANKER WASHER

