Log Book
Campaign 12

2015-04-06

07:42 Potable, Process, Cooling, Hot, and UV Water Pumps ON
07:46 Chiller On
07:48 Heating up Steam pipes
08:02 Hot and UV Water Pumps OFF
Getting greased
08:20 UV Water Pump ON (15-minute timer)
08:35 UV Water Pump OFF
08:48 UV Water Pump back ON for good now
08:54 Hot Water Pump ON (15-minute timer)
08:55 Steam into Prop 2B's jacket
08:58 Began SIP Procedures on Prop 2B
09:01 Prop 2B @ +5 psi, Steam OFF, VacPump ON
Prop 2B @ -10 psi, VacPump OFF, Steam ON
09:22 Washing out C5 Pump, then ON @ 50%
09:30 C5 Pump OFF
09:54 C5 Pump ON
09:56 C5 Pump OFF
10:22 Reached 250°F in Prop 2B. Began 90-minute timer
11:53 Adding 30 minutes to Prop 2B SIP to sterilize Vacuum Breaker
12:26 Ended SIP on Prop 2B. Steam OFF
12:48 CV#2 ON, trouble-shooting Metal Detector issues
Joe going to check into its control box to see if it just needs to reset.
13:00 Prop 2B TC→"NORMAL" in Auto
13:04 CV#2 OFF
13:31 CV#2 ON
13:32 CV#1 ON
13:38 FBCC and FBLBs (@50%) ON, testing Metal Detector
13:42 WW Pump ON in Recirc
13:44 FBLBs OFF
13:47 FBLBs ON @ 50%
13:57 FBLBs OFF
14:03 FBLBs ON @ 50%.
14:24 PAMT AG ON (15-minute mixing timer on)
15:40 C5 Pump ON @ 25% and OFF and ON
15:41 C5 Pump→50%
15:43 C5 Pump→100%, then OFF
15:44 C5 Pump ON @ 50%, now recircing back into tote
15:53 Prop 2B TC OFF
15:54 Cooling and Hot Water Pumps OFF
Thunder outside, somewhat close
16:27 Began UV Water→Prop 2B add. Target=25.3% Level
16:32 Pausing UV→Prop 2B, level~23.0%
16:33 Doing 5-second burst of UV→Prop 2B, 0.2% increase
Doing 10-second burst now

16:34 Doing larger 5-second burst
16:36 Doing another 5-second burst
16:38 Doing a three-second burst. Level between 25.6 and 26.6%
16:41 "Mysterious leak" coming out of Prop 2B's sample port
Not sure if condensation or UV Water
Apparently has been doing it since we started SIP on Prop 2B
16:55 Prop 2B is still leaking. And not steam either.
17:07 Working on leaking Prop 2B Sample Port
Going to likely take parts from Ferm A if needed
17:13 FBLBs→100%
17:23 Hydrolyzate Tote fitting broke off. Tote has drained out.
17:25 C5 Pump OFF
17:42 Prop 2B drained empty to floor
17:45 Biomass Handling OFF
17:46 UV Water Pump OFF
17:47 WW Pump OFF
18:27 Steam OFF
19:16 Proces and Potable OFF

2015-04-07

07:01 Potable, Process, and Steam ON
07:04 WW in recirc. Pump ON
07:16 HP Seal Pump ON
07:18 Metso start up. Rev→High Shear Mix ON. Cycles start
Steam ON to Metso
Scrubber ON
Acid Hold Tank Agitator ON. Pump#2 ON @ 0% MAN
07:35 Cab#2, #1, FBCC, and FBLBs ON
07:39 Chiller ON
07:42 All vents closed.
07:49 UV Water Pump ON
WW pH=6.96 Cond=3.78 mS/cm
07:59 Heating up WW pick heater. Sending out WW, Flow~34 GPM
08:00 PSF (@100%) and PSBTC ON at 55 psi
08:06 New biomass truck just arrived.
08:14 PSBLBs ON @ 50%, Acid→3.33 GPH, FBLBS ON @ 30%. All at 105 psi
08:16 PSF→105%
08:24 PSF→100%
08:25 PSBLBs→60%
Acid→4.00 GPH
Will be running down 3% (w/w) PA solution in Hold Tank as much as possible before switching over to 2% in Mix Tank
08:33 FBLBs→40%
Metso @ Temp and Pressure
08:36 PSBLBs→70%, Acid→4.67 GPH, FBLBs→50%
08:40 FBLBs→55%
08:44 PSF→105%
08:46 PSBLBs→80%, Acid→5.33 GPH, FBLBs→60%

08:51 PSF→108%
08:55 PSF→113%
09:46 FBLBs→55%
09:54 FBLBs→50%, had noticeable spike in C5 Discharger (4.6 amps)
Got checked and all good.
10:03 Now filling bin with treated biomass for hand-squeezing (manual screw press)
10:16 FBLBs→45%
NOT squeezing with Metso Screw Press today.
10:49 PSF→118%
10:50 FBLBs→50%
10:57 PSF→115%
11:05 PSF→112%
11:09 PSF→107%
11:19 C5 Hydrolyzer vent cracked open
11:42 PSF→102%; Prop 2B AG ON @ 100%
11:59 FBLBs→55%
12:12 FBLBs→50%
13:09 Flipping CIP Header to UV Rinse; Ferm A Pump ON
13:14 PSF→105%
13:17 Ferm A Pump ON
13:31 C5 Pump ON @ 50%
13:35 C5 Pump→85%
13:36 C5 Pump OFF
13:54 Prop 2B AG OFF
13:57 PSF→110%
13:58 Cooling and Hot Water Pumps ON
13:59 Began SIP Procedures on Prop 2B
Transfer lines open to begin with
Will NOT be using VacPump
14:32 Reached 250°F Prop 2B. Began 90-minute timer
15:06 FBLBs→55%
15:13 FBLBs→50%
15:15 Metal Detector valve no longer showing "OPEN" during its cycles, only "CLOSE" and "MOVING."
15:43 PAMT Concentration=2.06%
15:58 FBLBs→55%
16:29 PSF→115%
16:36 PSF→120%
Ended SIP on Prop 2B
16:37 FBLBs→60%
17:00 FBLBs→65%
17:02 WW Pump OFF, Pump rinsed, and valve closed.
17:07 FBLBs→70%
17:09 PSF→123%
17:10 PSF→127%
17:11 Prop 2B TC→"NORMAL" in Auto
17:58 FBLBs→60%
18:06 FBLBs→65%
18:10 Cooling Prop 2B's transfer lines

18:40 PSF→124%
Began Metso Blow Tank sampling.
19:06 Prop 2B TC OFF
19:13 FBLBs→60%
19:28 Metso Sample Finished.
19:50 PSF→120%
Shift Change
20:44 PSF→115%
20:45 WW in Recirc, Flow~68GPM
20:46 PSF→110%
20:49 PSF→105→100%
21:14 PSF→105%
21:43 WW pH=6.8, Doing 5-minute Caustic
22:11 PSF→110%
22:17 WW 10.18
Cond 776 µS/cm, sending out @ 36 GPM
22:50 PSF→115%

2015-04-08
00:40 pH probe in 2B, starting UV addition
Target 25.3% (25 gallons)
2B level bouncing worse than usual
00:59 May have overshot UV, hard to tell
Level reading from 6% to 24%
01:21 Trying Agitator for 2B, see if it helps
Reported "Smooth" in tank
01:34 Doing "bursts" into tank
01:55 Still battling level
02:00 May be clogging in chute, turned up air
PSF→120%
02:01 PSF→125→130%
02:19 Still spiking in transfer
PSF→140%
02:34 PSF→130%. Maybe clearing out
02:35 2B bouncing 23→30%
Going with what we got then test later, draining a little first, rather be low than high
02:53 PSF→120%
03:01 Finally satisfied with 2B level 24.9-25.5%
Sending Hz to 40.8%
03:09 Overshot 2B 42.5%, Agitator ON
03:12 Driving 3B pH→8, had to reset pumps
03:29 2B conditioning done, pH=8.02
03:34 Hold Tank AG OFF, going to have to watch flow into Metso, Level @ 0.4%
04:34 WW done; pump secured/flushed
06:35 PSF→115%
06:38 Acid flow fluctuating, don't think its empty yet
06:42 All the cake has been collected, but still stuff in Feed Bin (couple hours)
06:56 PSF→120%

07:16 PSF→115%
07:28 PSF→117%
07:37 PSF→115%
Shift Change
08:02 PSBLBs to PSF OFF, PAMP#2 and FBLBs OFF, Metso Steam OFF
08:20 Biomass Handling OFF
09:02 WW Pump ON @ 66.6% Level
09:18 WW pH=6.89 @ 68.4% Level, Cond=471 µS/cm; Ismael OK'd.
09:24 Heating up WW pick heater. WW going out @ 68.4%
Flow~32 GPM
09:42 Metso Depressurized
09:44 PSF (@100%) and PSBTC ON
10:00 PSBTC to C5 Discharger OFF
10:01 CO_2 Scrubber Pump OFF
10:06 Metso shut down
10:07 HP Seal Water Pump OFF
10:31 Prop 2B reported to look 'very dark, rich in solids'
C5 Pump only ran for 8 minutes, no recirculation done?
10:37 Sugars sample from Prop 2B
(L) 40.3%; pH=7.26; (T) 79.5°F; 1.27 psi
12:00 Prop 2B TC→"NORMAL" in Auto
12:34 WW Pump OFF. Pump rinsed and valve closed.
12:43 HP Seal Water Pump, RevScr to BTAG ON
Kevin working on lower Metso screws
Reports that there doesn't appear to be any build-up.
13:21 BTAG to RevScr OFF, HP Seal Water Pump OFF
13:30 PSBTC ON and OFF. Confirmed no build-up.
13:54 Began SIP Procedures on Prop 3B
Will be venting to atmosphere and NOT using VacPump
14:17 RevScr and ScPr ON
14:22 ScPr, RevScr, and HP Seal Water Pump OFF
14:27 Seed Flask [Ethol]=2 g/L. Getting 2B ready for inoculation
14:28 Adding Nutrients to Prop 2B done
14:30 Reached 250°F Prop 2B. Began 90-minute timer.
14:31 Nutrient add to Prop 2B done
14:36 Inoculating Prop 2B now
Pre: (L)38.9%; pH=6.90; (T) 97.8°F; 1.39 psi
14:45 t=0hr Prop 2B Sample Taken
(L) 39.9%; pH=6.87; (T) 99.7°F; 2.01 psi
16:04 Finished Prop 3B SIP.
Steam OFF
17:38 Prop 3B TC→"NORMAL" in Auto
19:22 Cooling down Prop 3B's transfer lines
Shift Change
22:35 t=8hr Prop 2B Sample Taken 1.28 g/L
(L) 38.6%; pH=6.42; (T) 97.9°F; 0.09 psi
22:46 Calibrating 3B pH probe, TC→OFF
Hoping "mystery level" in 3B clears when we start adding UV

23:14 UV Addition to 3B, Target=26.4%, 240 gallons
23:15 3B level looks better
23:17 2B pH control in Auto @ 6.37, will play with pump speed to prevent recent "spikes"
23:32 Overshot UV by 1%, drained some to 26.4%
23:48 Antifoam in 3B, mixing 1 minute with Agitator (level drop 2% with Agitator ON)
23:55 "Stirring" Hz tote, pumping to 3B, Target 37.7%, pump @ 85%

2015-04-09

00:08 C5 Pump to 95%
2B spiked to 6.5 with pump only set to 3%, turned pump→2%
Base Pump shouldn't even be turning over at those speeds. Line over-pressurized?
00:11 3B level stopped going up, checking lines
00:54 No rise in 3B for 40 min, field confirms pumping from tote and into tank, level stuck at 33.7%. There was ~140 gallons in tote, will stop a little short of emptying it.
01:32 C5 Pump OFF, that took 1 and ½ hours, tote just about empty, 3B agitator ON @ 34.6% Level
01:35 Started conditioning 3B, pump#8→95%
01:44 Finished conditioning 3B, pH=8.01 (fast)
01:48 2B Base Pump#5 now set to 6.37 @ 5% speed, holding~6.32
01:54 Steam into jacket of Liq, BBP#5→7→10%
01:56 Steam to Liq
02:03 Pulling Vac on Liq
02:11 Stopped at -7, Steam back ON
02:29 Steaming Liq→pH transfer line, enzyme lines, etc.
03:05 Liq @ 250°F, start 90-minute hold
04:36 SIP complete on Liq, Steam OFF
04:48 Steam to pHA
04:52 Vac on pHA
04:53 Vac OFF pHA, Steam back ON
05:10 Opened Slurry Valve to Ferm C
05:55 pHA @ 250°F, start 90-minute hold
06:35 t=16hr Prop 2B Sample Taken
(L) 37.7%; pH=6.31; (T) 99.6°F; 0.01 psi
5.57 g/L
07:18 3B TC ON, looking like early inoculation
07:26 Steam OFF to pHA, SIP complete
Shift Change
08:02
08:03 t=17.5hr Prop 2B Sample Taken
(L) 37.0%; pH=6.32; (T) 97.9°F; 0.03 psi
Will be inoculating Prop 3B within the hour.
08:07 Began adding UV→Liq Tank @ 3.5 GPM (22.6% Target Level)
08:08 Began nutrient addition→Prop 3B
08:18 Inoculating Prop 2B now
Pre 3B: (L)36.5%; pH=7.00; (T) 96.4°F; 1.26 psi
08:21 Prop 2B AG, TC, pH Control OFF. Also, Empty now.
08:23 Inoculation of Prop 3B DONE
08:24 CIP Systems ON, heating up Tanks, Rinse @100°F currently.
08:32 HP Seal Water Pump ON

08:42 t=0hr Prop 3B Sample Taken
(L) 38.9%; pH=6.86; (T) 96.5°F; 1.05 psi
08:44 Having issues with BBD and pressures gauges on it.
08:56 Liq Tank TC→"NORMAL" in Auto
RevScr to BTAG ON
08:59 C5 Discharger to HSMC ON
09:02 CO_2 Scrubber Pump ON
09:06 Draining PAHT to Blue Chemical Drum(s?)
09:12 T-pipe Vent CLOSED @ T_U=216°F
09:16 Ferm C Pump ON
09:18 Ferm C Pump OFF, CV#2 ON
09:19 CV#1 and FBCC ON
09:25 All Metso Vents CLOSED
09:29 Putting steam into Ferm C's jacket
09:34 Acid Flowrate into Metso @ 80% PSBLBs will be 8.00 GPH
GPH for every 10% PSBLBs speed
Began PAMT→PAHT transfer
09:38 PSF (@100%) and PSBTC ON
09:51 PSBLBs ON @ 50%
Acid→3.33 GPH, PAMP#2 ON, FBLBs ON @ 35%
Done at 108 psi
Need more time for filling PAHT
09:54 FBLBs→30%, PSF→105%
10:03 PSF→102%
10:04 Paused Liq Tank UV Add.
Metso @ Temp and Pressure
10:06 Resuming UV→Liq Tank @ 3.5 GPM for 13 minutes
10:07 PSF→98%; Acid→4.00 GPH
PSBLBs→60%
Slight leak between SPFS and ScPr reported.
10:16 FBLBs→35%
10:17 Began SIP Procedures on Ferm C
10:19 PAHT AG ON, Paused UV→Liq Tank (still bad level reading though)
10:26 Ferm C @ +5 psi, Steam OFF, VacPump ON
10:30 PSBLBs→70%, Acid→4.67 GPH, FBLBs→40%
10:32 WW Pump ON in Recirc Loop @ 47.5% Level
10:40 FBLBs→45%
10:47 FBLBs→50%
10:48 PSBLBs→80%, Acid→8.00 GPH, FBLBs→55%
10:49 PSF→103%
10:53 PSF→108%
10:58 FBLBs→60%
10:59 PSF→111%
11:01 PAMP#2→60%, just going to re-prime the line/push out the steam
And we now have a new leak in the acid line by MP#2
11:03 PAMP#2→55%
11:05 Ferm C @ -10 psi, VacPump OFF, Steam ON
11:07 PAMP#2→52%

11:10 FBLBs→65%, PAMT AG OFF
11:11 PAMP#2→40%
11:13 PAMP#2→45%
11:17 PAMP#2→35%
11:19 FBLBs→70%
11:23 WW pH=5.34 @ 61.0 % Level
11:26 UV drain ¼ open, 15-minute Caustic addition to WW sump
11:27 FBLBs→75→80%, Acid Flow~5.9 GPH steady
11:31 PAMP#2→35.2%
11:33 PSF→115%
11:37 PAMP#2→35.5%
11:40 FBLBs→90%
11:42 Caustic drain to WW Sump CLOSED
11:45 PAMP#2→36%
11:46 Ferm C @ 250°F.
Began 90-minute timer
11:48 FBLBs→95%
11:50 PAMP#2→36.5%
11:55 PAMP#2→37%
12:02 PAMP#2→37.5%
12:05 FBLBs→90%
12:08 PAMP#2→38%
PAMT→PAHT transfer DONE. Level~81%
12:12 FBLBs→85%; PAMP#2→38.5%
12:13 FBLBs→75%
12:15 FBLBs→65%
12:20 PAMP#2→39%
12:21 WW pH=9.98; Cond=1.21 mS/cm; Level=77.3%
12:23 Heating up WW pick heater. Sending out @ 78.4% Level and 32 GPM Flow
12:25 PAMP#2→39.5%
12:31 PAMP#2→40.5%
12:38 PAMP#2→41%
12:43 FBLBs→65%; PAMP#2→41.5%
12:47 PSF→120%
12:50 PAMP#2→42→41.5%, Flow went crazy immediately
12:56 FBLBs→60%
12:59 FBLBS→55%
13:02 PSF→115%
Field attempting to empty out Feed Bin some to make room for new biomass.
13:08 PAMP#2→41.6%
13:11 PAMP#2→41.4%, delayed freak out by Acid Flow
13:21 Ended SIP of Ferm C
Joe adjusted PAMP#2 stroke length to 95%
13:24 PSF→120%; PSB Vibrator→80 psi
PSBTC starting to act up.
13:25 FBLBs→45%
13:26 PSF→125%
13:27 FBLBs→40%

13:30 FBLBs→35%
13:31 FBLBs→30%
13:32 FBLBs→40%, PSF→130%
13:34 PSF→135%; Acid→7.00 GPH
PSBLBs→70%
13:38 PSBLBs→60%
Acid→6.00 GPH
13:41 FBLBs→45%, PSF→130%
13:42 FBLBs→55%
13:43 PSBLBs→50%
Acid→5.00 GPH
13:44 PSF→135%
13:46 PSF→125%
13:47 PSBLBs→60%
Acid→6.00 GPH, FBLBs→50%
13:48 FBLBs→35%, PSF→130%
13:49 PSBLBs→40%
Acid→4.00 GPH, FBLBs→20%
13:51 FBLBs OFF (too full)
13:53 FBLBs ON @ 20%
13:56 FBLBs→25%
13:58 PSF→125%; Acid→4.50 GPH
PSBLBs→45%
14:00 PSF→128→130%
14:01 PSBLBs→40%
Acid→4.00 GPH, FBLBs→20%
14:03 FBLBs OFF
14:04 PSF→135%
14:05 PSBLBs to PSF OFF, Acid→0.00 GPH, Steam OFF
Vents OPEN
14:13 Prop 3B pH Control→Auto, BBP#8 @ 10%
14:16 Dump Chamber OPEN
14:46 PSBTC ON and OFF
15:06 Rinse Tank FINALLY @ Temp
Took almost SEVEN HOURS @ 75% Level and initially @ 100^{o}F
15:10 PSF ON @ 100%
15:14 PSBTC ON
15:21 PSF and PSBTC OFF; Metso Steam ON, BBD set @ 51 psi
15:22 Dump Chamber Cycle started
15:32 All Metso vents CLOSED
15:39 PSF (@100%) and PSBTC ON at 54 psi
15:49 PSB Vibrator ON @ 40 psi, FBLBs ON @ 20%
PSBLBs ON @ 50%
Acid→3.33 GPH
15:51 FBLBs→25%
15:52 PSF→105%
15:53 PSF→110
15:59 PSF→107%

16:00 PSBLBs→60%
Acid→6.00 GPH
16:02 FBLBs→30%
Metso @ Temp and Pressure
16:10 Acid→7.00 GPH
16:16 PSBLBs→70%, FBLBs→35%, PSBVib reported to making non-normal sounds
16:22 Acid→7.10 GPH
16:25 Acid→7.20 GPH
16:29 Acid→7.30 GPH
16:31 PSBLBs→80%, Acid→8.00 GPH
16:37 PAMP#2 stroke length→100%
16:39 t=8hr Prop 3B Sample Taken 0.5 ACFM
(L) 38.7%; pH=6.32; (T) 98.7°F; 0.56 psi
16:43 FBLBs→40%
16:45 GP ON @ 75%
16:48 Acid Flow lower than it should be @ 43.6% pump speed
16:49 PAMP→44→45%
16:51 PAMP#2→44.5%
16:52 GP OFF
16:54 FBLBs→50%, PAMP#2→45%
16:56 PAMP#2→50%
16:57 Acid Flow (meter) is ALL over the place.
16:59 Joe adjusting PAMP#2 stroke length→90%
PAMP#2→45%
17:03 PAMP#2→52%
17:05 GP ON @ 75%, priming enzyme addition line
17:06 PAMP#2→40→50%
17:08 GP ON @ 26%
17:09 GP→75% for final purge
t=8hr Prop 3B [Ethol]=3.14 g/L
17:11 GP OFF; PAMP#2→35%
17:18 Calculations done for PAMP#2, set @ 840 RPMs
Pretty much ignoring Acid Flow meter right now
17:22 GP ON @ 75% and OFF
17:33 LT AG ON @ 100%
17:34 Now Feeding Liquefaction Tank
Knifegate to Liq Tank OPEN
RevScr→"STOP"
Direction set to "FORWARD"
RecScr→"RUN FORWARD"
Knifegate to C6 Storage Dumpster CLOSED
17:37 PSF→112%
17:43 FBLBs→45%
17:45 LTAG→50%
17:46 GP ON @ 28% for priming line and checking flow
17:49 GP→75→30%, line primed.
LT pH Control→Auto, AAP#1 ON in CAS
GP→18.34%

17:57 Ferm C TC→"NORMAL" in Auto
18:09 LTAG →75%
18:12 pHAT TC→"NORMAL" in Auto
18:27 FBLBs→50%
18:28 Began 5-minute Rinse CIP of Prop 2B through sprayballs
Rinse Pump→85%, Ferm A Pump ON
18:36 FBLBs→55%
18:38 Finished Prop 2B Initial Rinse, Rinse Pump→55%
18:39 Refilling Rinse Tank→85% and reheating as well
18:42 Ferm A Pump OFF
19:05 Began cooling Ferm C transfer lines
19:41 Liquefaction Tank Notes:
Initial Volume=450 gallons
GP@ 18.34%, 0.0155 GPM flow rate
Fill Volume=743.4 gallons=34.5% Level
UV Flow set @ 1.16 GPM→1.2 GPM
Shift Change
20:02 PSBLB bypassed in case Liq Level flips out.
20:27 Metso Blow Tank Sample
150 psi/185°C/365°F
Acid-varies, target of 8 GPH
20:50 PSF→110%
21:45 Both CIP tanks @ temp, leaving in Auto
21:53 PSF→115%
22:50 Trying PAMP#2 in Cascade, flow suddenly not spiking for 2 hours, aiming for 8 GPH
22:59 Liq Agitator @ 100%
23:10 Pumping forward from Liq regardless of level, will pump slower manually at first and Liq rise to 34.5% then switch to cascade
pHA pH probe calibrated
23:19 PSF→112%
23:28 WW Pump OFF/secured/rinsed
23:30 Acid spiking again, trying 7.5 GPH
23:40 Liq→pHA
UV water on 1.2 GPM
23:46 PSF→110%
23:50 t=0hr Liq Sample Taken
(L) 31.8%; pH=5.00; (T) 122.1°F; 0.55 psi
23:53 Confirmed flow into pHA, Liq Pump set in Auto @ 1.9 GPM (actual=1/8) until Liq gets to 34.5%
23:54 Acid Pump still in Cascade @ 7.5 GPM, a little erratic but no spikes
23:59 pHA AG ON

2015-04-10
00:12 pH Control ON pHA
00:23 Dropped Liq Water 1.2 GPM→1.1 GPM to thicken slurry (from going early)
00:24 Liq Water Flow to 1.0 GPM for 2 ½ hours
00:25 t=16hr Prop 3B Sample Taken
(L) 38.9%; pH=6.38; (T) 98.7°F; 0.35 psi
00:37 pHA→3B

pHA @ 40.6% ; 3B @ 38.9%
Liq and pHA pumps being run manually (in auto, but changing inputs) keep pHA level and Liq increased to 34.5%

00:45 t=0hr pHA Sample Taken
(L) 39.1%; pH=6.53; (T) 99.4°F; 2.78 psi

00:54 BB#8 (3B) to 18%

01:07 Set 3B pH control to 6.39, pump 22%

01:39 BBP#8 now @ 25%, set for 6.40

02:36 WW in Recirc~37 GPM→60 GPM

02:57 UV Addition to Liq set back 1.0→1.2 GPM

03:18 Nutrients added to 3B (600 gallons)

03:48 Sending out WW ~ 32 GPM

05:04 Liq FINALLY @ 34.5%, Level in Auto, pump in Cascade

05:20 3B @ 79.3%
Sending to Ferm C.
Level dropped ~1% in 3B when stopped pumping to it, bouncing.

05:42 3B pH Control @ 6.39, pump @ 20%

05:52 t=6hr Liq Sample Taken
(L) 34.8%; pH=4.97; (T) 121.9°F ;0.47 psi

06:11 Foam reported in 3B, probably level is a little erratic.

06:30 t=22hr Prop 3B Sample Taken
(L) 78.9%; pH=6.32; (T) 98.2°F; 0.87 psi
3B Sparger was changed 0.5→1.0 ACFM

07:30 On rounds, it was reported that the Vibrator doesn't seem to be working anymore.

Shift Change

08:05 FBLBs→60%

08:15 pAP→2.0 GPM

08:17 FBLBs→55%

08:28 pAP→2.1 GPM

08:31 Metso Blow Tank Sample started.
150 psi, 185°C, 80% PSBLB speed, 7.50 GPH, 2% Acid Solution, 7.5-minute retention

08:38 Leaks reported by field in Nutrient Totes.

08:40 pAP→2.0 GPM
Acid flow is starting to get weird.

09:08 pAP→1.9 GPM

09:10 Metso Sample DONE

09:29 FBLBs→50%; UV→Liq reduced to 1.1 GPM
Liq Solids @ 13%

09:40 FBLBs→55%

09:57 UV→Liq reduced further to 1.0 GPM. Hold at that flow for sic hours

10:04 FBLBs→60%

10:10 pAP→1.8 GPM

10:23 pAP→1.7 GPM

10:25 FBLBs→55%

10:38 FBLBs→50%

10:47 NP#1 ON @ 100%

10:51 NP OFF

10:53 NP ON @ 100%

10:54 NP#1 OFF
10:58 pAP→1.8 GPM
11:10 WW Pump OFF. Pump rinsed.
11:35 Ferm C @ 10.5% Level NOW!
Getting ready to inoculate. Pre-inoculation:
Prop 3B: (L) 79.5%; pH=6.34; (T) 98.2°F; 2.17 psi
Ferm C: (L) 10.5%; pH=6.21; (T) 97.8°F; 0.30 psi
11:39 Pressurizing Prop 3B
Inoculating Ferm C with Prop 3B
11:40 Prop 3B pH Control OFF
11:45 pAP→1.7 GPM
11:50 Checking Ferm C Agitation @ 15.3%, Ferm C AG ON and OFF
Could not be seen if mixing occurred.
11:52 Prop 3B TC OFF, Ferm C AG ON @ 50% (17.2% Level)
11:55 Prop 3B AG OFF, tank still has liquid, but there is foaming.
11:57 Ferm C AG→75%, field confirmed agitation @ 17.6% Level
11:58 Ferm C Nutrient Valves OPEN, NP#1&2 ON @ 100%
11:59 Ferm C AG→100%, Prop 3B confirmed empty.
12:00 Ferm C pH Control→Auto. BBP#3 set @50%, pH SP @ 6.39
12:09 NP#2→10%
12:14 PSF→115%, PSBTC acting up; FBLBs→55%
12:16 PSBLBs→70%, not going to wait as long this time.
12:17 PSF→120%
12:18 NP#1→20%, PSF→123%. Field hitting PSBTC manually.
PAMP#2 @ 49.2%
12:19 FBLBs→50%
12:21 FBLBs→45%
12:52 t=12hr Liq Sample Taken UV @ 1.0 GPM
(L) 34.3%; pH=5.02; (T) 121.8°F; 0.76 psi
12:24 PSF→120%; FBLBs→35%
PSBLBs→60%
12:26 PA Flow→6.00 GPH, FBLBs→30%
12:29 pAP→1.8 GPM
12:37 t=12h Fermentation (t=0hr Ferm C) Sample Taken
Air @ 6.0 ACFM; (L) 17.8%; pH=6.35; (T) 98.6°F; 0.02 psi
12:38 NP#1→10%, NP#2→9%
12:43 PSBLBs→70%
Acid→7.00 GPH
12:52 FBLBs→35%, PSF→118%
12:56 PSBLBs→80%
Acid→7.50 GPH
13:01 FBLBs→40%
13:07 PSF→120%
13:08 Initial Ferm C/t=12hr Fermentation [Ethol]=6.1 g/L
13:15 FBLBs→45%
13:28 pAP→1.7 GPM
13:33 FBLBs→40%
13:51 FBLBs→45%

14:06 Began Initial Rinse CIP of Prop 3B through sprayballs
Rinse Pump→85%, Ferm C Pump ON
14:07 Rinse Pump→55%
14:10 Ferm C Pump OFF
14:11 pAP→1.6 GPM
14:12 Resuming Initial Rinse CIP of Prop 3B, Rinse Pump→85%
14:16 Rinse Pump→55%, Finished Initial Rinse of Prop 3B
14:23 t=14hr pHAT Sample Taken
(L) 35.6%; pH=6.48; (T) 98.9°F; 2.77 psi
14:33 pAP→1.5 GPM
14:37 NP#2→10%
14:40 WW Pump ON @ 66.0% Level
14:48 pAP→1.6 GPM
14:51 FBLBs→40%
14:55 WW pH=10.18 Unknown Conductivity Level=72.9%
14:56 FBLBs→35%
14:59 Began Rinse CIP of Prop 3B through sprayballs
Rinse Pump→85%,
15:01 Heating up WW pick heater. Sending out @ 77.0% Level
15:02 NP#1→9%
15:09 Finished Rinse CIP of Prop 3B, Rinse Pump→55%
15:15 Field working on unclogging Ferm C Pump.
15:25 pAP→1.7 GPM
15:27 FBLBs→40%
15:28 Ferm C Pump ON and OFF
15:29 PSF→123%
15:33 NP#1 OFF, corresponding valve for Ferm C CLOSED
15:42 Ferm A and C Pumps ON. Rinse CIP of Prop 2B vent lines
15:52 Ferm A and C Pumps OFF
15:54 Ferm A and C Pumps ON
15:57 Ferm A and C Pumps OFF
16:01 Ferm A/ C Pumps ON
16:02 NP#1 and its valve to Ferm C are ON and OPEN
16:07 Began Rinse CIP of Prop 2B through sprayballs
Rinse Pump→85%
16:08 FBLBs→45%
16:10 pAP→1.8 GPM
16:14 pAP→1.9 GPM
16:22 Finished Began Rinse CIP of Prop 2B. Rinse Pump→55%
16:25 Ferm A/ C Pumps OFF
16:31 NP#1 and valve OFF and CLOSED
16:35 NP#1 and valve ON and OPEN
16:38 FBLBs→40%
16:48 Flipping CIP Header to Caustic
16:51 Ferm A Pump ON
16:55 pAP→2.0 GPM; Ferm A Pump OFF
16:59 Leaving UV→Liq Tank Flow @ 1.0 GPM until next sample
17:09 Caustic CIP of Prop 3B Vent. Ferm A/ C Pumps ON

17:36 Began Caustic CIP of Prop 2B through sprayballs for 15 minutes.
Caustic Pump→85%
17:38 Paused Caustic CIP of Prop 2B. Caustic Pump→55%
17:42 pAP→1.9 GPM
17:44 PAMP#1 ON for Caustic and UV rinse line-popping
17:50 NP#1&2→9%
17:52 Began Caustic CIP of Prop 3B through sprayballs for 15 minutes.
Caustic Pump→85%
17:53 Popping Prop 3B Base Line. BBP#8 @ 30% and OFF
17:54 Paused Caustic CIP of Prop 3B. Caustic Pump→55%. Prop 2B sprayballs were left OPEN
17:57 pAP→1.8 GPM
18:02 Ferm A/ C Pumps OFF
18:06 FBLBs→45%
18:09 Began Caustic CIP of Prop 3B through Sprayball#1 for 15 minutes.
Caustic Pump→85%; Ferm A/ C Pumps ON
18:11 t=18hr Liq Sample Taken
UV @ 1.0 GPM
(L) 33.9%; pH=4.97; (T) 122.0°F; 0.85 psi
18:13 FBLBs→50%
18:18 pAP→1.7 GPM, PSF→127%
18:19 Popping Prop 2B Base Line. BBP#5 @ 30% and OFF
Prop 2B SV→50% and CLOSED
18:25 Switched to Sprayball#2 for Prop 2B
18:32 t=18h Fermentation (t=6hr Ferm C) Sample Taken
Air @ 5.0 ACFM; (L) 23.4%; pH=6.32; (T) 98.5°F; 0.04 psi
18:39 Ferm C Nutrient Valves CLOSEd. NP#1&2 OFF
18:41 Finished Caustic CIP of Prop 2B.
18:42 Popping Prop 3B Acid Line
18:51 t=18hr Fermentation [Ethol]=8.26 g/L
18:55 Began Caustic CIP of Prop 3B through sprayballs for 15 minutes.
Caustic Pump→85%
18:59 FBLBs→45%
19:01 Popping Prop 3B Acid Line. Prop 3B SV→50% and CLOSED
19:04 FBLBs→40%
19:10 Finished Caustic CIP of Prop 3B. Caustic Pump→55%
19:12 pAP→1.5 GPM
19:16 BBP#-->60%
19:17 Ferm A/ C Pumps OFF
19:28 FBLBs→45%
19:42 Ferm C Nutrient Valves OPEN and NP#1&2 ON @ 20%
19:45 NP#1&2→9%
19:50 pAP→1.6 GPM
Shift Change
20:20 PSF→125%
20:35 Flipping Header to UV, back to Rinse
20:40 UV Cycle 2B. C5, Prep, Vent, around Back
20:57 2B Sprayballs, Acid/Base/Steam ETC.
21:05 Metso Sample Taken

21:29 2B Complete. (Used Ferm A Pump)
21:42 Starting 3B UV, using Ferm C Pump, flipping to UV
22:29 E-Stopped the system.
Three Consecutive Failures on Bottom Dump Valve. Water/Enzyme OFF
Metso into dumpster.
23:38 Indicator failed, steam going back into the system.
A lot of scrambling with interlocks, don't know why Discharger, Transfer, and Screw Press were bypassed. Put to normal as well as Plug Screw.
All interlocks OFF except PSBLBs and Rev Screw.
23:01 Bracket needs to be cut off and shortened.
23:13 Holding ~93 psi, waiting on repair. Little worried we may already be plugged up.
23:28 Dump chamber going, HP Pump and conveyors to High-Shear ON.
23:34 Feeding Metso again.
23:30 t=24hr Liq Sample Taken; UV OFF
(L) 29.9%; pH=5.03; (T) 122.2°F; 3.53 psi
23:52—Feeding Liq again, Enzyme ON, Water ON.
Going to hold Liq @ 28.5%, the level we came back at to keep flow consistent.
In total, lost 1 hour and 23 minutes.

2015-04-11
00:05 Reversed pHA Pump
00:15 Bumped Ferm C pH set point to 6.40
00:25 NP#1 from 9→10%
NP#2 from 9→11%
00:32 t=24hr Fermentation Sample (t=12hr Ferm C) Sample Taken
(L) 29.4%; pH=6.31; (T) 98.7°F; 0.12 psi
[Ethol]=12.7 g/L
02:08 NP#2- from 11→10%
02:13 WW done; pump secured/flushed
02:27 Reversed Liq Pump
02:40 t=26hr pHA Sample Taken
(L) 36.2%; pH=6.56; (T) 98.1°F; 1.92 psi
03:29 Both Nutrient Pumps back to 9%
03:46 Reversed pHA
04:24 Sett BBP#1 to 65%
05:00 NP#2→10%
05:28 t=30hr Liq Sample Taken
(L) 28.4%; pH=4.98; (T) 121.8°F; 1.18 psi
05:36 Reversed Liq Pump (tried bumping, didn't work)
05:46 WW in Recirc
05:53 pH for C back to 6.39
06:35 t=30hr Fermentation Sample (t=18hr Ferm C) Sample Taken
(L) 34.8%; pH=6.30; (T) 98.5°F; 0.27 psi
[Ethol]=13.7 g/L
06:47 pH Control Ferm C back to 6.40, running a steady 6.30 but close if it takes off. Pump to 70%
07:03 WW pH=7.1, Cond=5.71 mS/cm
07:14 WW going out
07:29 pH S.P. adjusted (?)

Shift Change

08:08 NP#2→9%. Noticed an issue with seals. Field adjusted flow, and issue was resolved.
08:11 pAP→1.5 GPM
08:12 FBLBs→65%
08:13 LP reversed
08:15 PSF→125%
08:16 LT→pHAt line clogged? LP→MAN@75% to hopefully blow it clear
08:20 LP reversed
08:21 pHAT Level going up again, LP→50%
08:22 BBP#3→85%, LP→40%
08:23 LP→30%→CAS
08:24 pAP→1.8 GPM
08:30 Metso Sample Taken
08:33 pAP→2.1 GPM
08:42 pAP reversed (Line pressure had spiked to 24 psi)
08:50 Began draining C5 Tank to the floor
09:11 pAP→1.9 GPM
09:14 FBLBs→60%
09:22 pAP reversed
09:27 pAP→2.0 GPM
09:42 NP#1&2 OFF, Ferm C Nutrient Valves CLOSED
09:51 NP#1 ON @ 100%
09:56 NP#1 OFF
09:58 NP#2 ON @ 100%
10:01 pAP→1.8 GPM
10:03 pAP→1.6 GPM
10:05 NP#1&2 OFF
10:06 NP#1&2 ON @ 20%, Ferm C Valves OPEN
10:08 NP#1&2 OFF, Ferm C Valves CLOSED
10:09 NP#1&2 ON @ 100%, Ferm C Valves OPEN
10:19=C5 Tank AG OFF
11:15 LP→MANUAL @ 70% and reversed.
11:16 LP→50→40%
11:17 NP#1&2 OFF. Ferm C Valves CLOSED
11:19 LP→30%→CAS
11:20 Field reports that Blow Tank is constantly leaking steam
Dump Chamber might be leaking steam
11:22 pAP→1.8 GPM
11:27 pAP→2.0 GPM
11:28 pAP reversed.
11:40 FBLBs→65%
11:42 pAP→2.2 GPM
11:45 FBLBs and FBCC OFF, spiking in FBCC
11:46 PSBLBs→70%
PSF→120%
11:47 Acid→7.00 GPH
11:49 FBCC ON and OFF
11:50 pAP➔2.4 GPM, FBCC ON

11:51 FBLBs ON @ 100%
11:52 PSBLBs→80%
Acid→7.50 GPH
11:55 pAP→75% and reversed
11:56 pAP→40%→Auto @ 3.6 GPM
11:57 FBLBs→75%
12:00 pAP→5.0 GPM
12:01 pAP→6.5 GPM
12:02 pAP→7.4 GPM
12:03 pAP reversed and →6.1 GPM
Ferm C @ level
12:04 pAP→3.5 GPM
12:06 pAP→2.5 GPM
12:09 pAP→3.0 GPM
12:10 pAP OFF, LP OFF, Ferm C slurry CLOSED
GP OFF, UV OFF
12:13 STOP Feed to Liquefaction Tank
Knifegate to C6 Storage Sumpster
RevScr→"STOP"
Direction set to "REVERSE"
RevScr→"RUN FORWARD"
12:20 Flushing Liq→pHAT; Liq and pHAT TC and pH Controls OFF
12:21 t=36.5hr Liq Sample Taken; UV OFF
(L) 28.0%; pH=4.98; (T) 122.1°F; 0.55 psi
12:23 AAP#1 and 3 OFF
12:31 Will be draining Liq Tank and pHAT to the floor
12:34 t=36hr Fermentation Sample (t=24hr Ferm C) Sample Taken
12:56 PSF→123%
12:58 FBLBs→80%
13:05 FBLBs→75%
14:00 FBLBs→65%
14:04 LT AG OFF
14:22 FBLBs→60%
14:40 POWER LOST
Ferm C AG remained ON
14:41 All Water Pumps ON
14:43 Metso back online
14:44 Acid Systems ON
14:45 Scrubbers and CIP Systems ON
14:46 pHAT AG ON
14:47 WW Pump ON
15:12 FBLBs→65%
15:22 FBLBs OFF. FBCC acting up; FBLBs ON @65%
15:30 Began rinsing out Liq Tank with UV Water
16:41 FBLBs→70%
16:51 pHAT AG OFF
16:52 Valves set for squeezing with ScPr to floor
16:54 ScPr→6.0 RPMs

17:04 ScPr→4.5 RPMs; PSF→125%
17:13 Looks like Metso is leaking steam through Dump Chamber
Boiler is fine though
Maybe more biomass going into Metso now?
17:17 PSF→128%
17:25 ScPr→4.0 RPMs
17:35 ScPr→3.8 RPMs
17:37 FBLBs→75%
17:43 Flipping CIP Header to Rinse
17:44 Metso DOWN?!?
Got random seal alarms.
17:45 All of Metso back up. Field bleeding part of high-pressure water a bit.
17:52 ScPr→3.6 RPMs
18:02 ScPr→3.3 RPMs
18:10 ScPr→3.1 RPMs
18:18 Steam ON to Ferm C Sample Port
t=30hr [Ethol]~15 g/L
18:20 ScPr→2.8 RPMs
18:28 Began Rinse CIP of Liq Tank through sprayballs for 15 minutes
Rinse Pump→85%
18:30 ScPr→2.6 RPMs
18:36 Pausing Rinse CIP of Liq Tank (9 minutes left). Rinse Pump→55%
18:40 FBLBs→80%
18:44 t=42hr Fermentation (30hr Ferm C) Sample Taken
40.6% pH=6.34; (T) 98.2°F; 0.06 psi
18:45 BBP#3→75%
18:46 Resuming Rinse CIP of Liq Tank. Rinse Pump→85%
18:48 ScPr→2.5 RPMs
18:55 Finished Rinse CIP of Liq Tank. Rinse Pump→55%
19:02 Began Rinse CIP of pHAT lines
19:08 ScPr→2.4 RPMs
19:17 Began Rinse CIP of pHAT through sprayball for 15 minutes
Rinse Pump→85%
19:18 ScPr→2.3 RPMs
19:32 Finished Rinse CIP of pHAT. Rinse Pump→55%
19:39 ScPr→2.2 RPMs
20:00 ScPr→2.1 RPMs
Shift Change
20:20 ScPr→1.9 RPM
20:29 Flipping Header to Caustic
20:48 ScPr→1.8 RPM
Caustic Cycle of Transfer/Enzyme Lines
20:58 Sprayball Caustic for pHA
21:20 Spraybal Caustic for Liq (1st)
ScPr→1.7 RPM. Some flow noticed, not much
21:34 ScPr→1.9 RPM. Feed Screw spiking
21:42 ScPr→2.1 RPM
21:47 2nd Liq Sprayball

21:50 ScPr→9.0 RPM, bin is full, squeezing wasn't successful.
21:55 Steam/Feed OFF Metso, Acid OFF
22:02 Handling OFF
22:19 Flipping Header to UV
22:28 Dump Chamber OPEN
22:53 UV of Transfer/Enzyme Lines
22:57 Rest of Metso DOWN, CO_2 Scrubber OFF
23:30 UV of sprayballs for Liq/pHA, steam popped

2015-04-12
00:16 Draining Cooling Water Tank to 35%
00:30 t=48hr Fermentation (36hr Ferm C); 16.9 g/L
40.7% pH=6.34; (T) 98.3°F; 0.02 psi
Level fluctuating in Hot Water Tank, keeps refilling but no other tank is moving. Where's it going?
Bad plate in exchanger, we'd see it out of condenser drains. Stopped when kill put on>no Resistance to force it elsewhere.
01:09 Ferm C set to 140°F, Hot Water to 185°F. pH Control to Manual
02:04 WW OFF, pump secured and flushed
05:47 Caustic Tanks @ Temp
06:28 Ferm C @ Temp (Kill)
Shift Change
09:27 Ferm C killed. Ferm C TC OFF
09:28 Hot and Cooling Water Pumps OFF
10:07 Sending Rinse Water to C5 Tank (and cleaning ScPr deadleg)
10:12 C5 Tank AG ON
10:15 Flipping CIP Header to Rinse. Ferm A Pump ON
10:16 Scrubbers and Ferm A Pump OFF
10:18 C5 Pump ON @ 50% and OFF
10:39 C5 Pump ON @ 50%
10:41 C5 Pump OFF
10:43 C5 Pump ON @ 50% and OFF and ON
10:46 C5 Pump→80% and OFF. Major clog in C5 Pump.
10:55 Pressurizing Ferm C to prepare for transfer to Ferm A
10:57 Ferm C Pump ON.
Transferring Ferm C→Ferm A
11:00 Rocks and charcoal heard by field banging aroung in pipes
Level rising in Ferm A now
11:40 Ferm A level @ 15.1%, switching ON AG @ 50%
11:45 Ferm A AG→75%
12:23 Ferm C AG OFF, Level not reading right, possibly 9.8% though
13:00 Lost level reading for Ferm C
13:09 Ferm A AG→100%
13:13 Flushing line Ferm C→Ferm A with UV Water
13:14 Ferm C Pump OFF, Ferm A Level @ 38.4% (4028.4 gallons on level sheet)
13:32 Ferm A Pump ON
13:33 Ferm A Pump OFF
13:44 Began Initial Rinse of Ferm C through sprayballs for 5 minutes
Rinse Pump→85%

13:46 Cooling Water Pump ON
13:49 Finished Initial Rinse of Ferm C. Rinse Pump→55%
14:18 Rinsing all Fermentor nutrients lines (A, B, & C)
14:25 Finished rinsing Ferm nutrient lines
14:33 Did Rinse of Ferm C Slurry Line
14:41 Draining C5 Tank
14:48 Began Rinse CIP of Ferm C through sprayballs for 10 minutes
Rinse Pump→85%
14:58 Finished Rinse CIP of Ferm C. Rinse Pump→55%
14:59 Rinse Pump OFF
15:11 Flipping CIP Header to Caustic.
Ferm A Pump ON
15:19 Ferm A Pump OFF. Caustic CIP of Ferm C Nutrient Line
15:23 Caustic CIP of Ferm C Slurry Line
15:25 Ferm C Pump ON
15:40 Began Caustic CIP of Ferm C through sprayballs for 15 minutes
Caustic Pump→85%
15:42 PAMP#1 ON for popping Ferm C lines
15:43 Popping Ferm C Base Line
15:44 Ferm C Acid Lines
15:48 Ferm C SV→50% and CLOSED
15:56 Finished Caustic CIP of Ferm C.
Caustic Pump→55%
16:06 Taking far too long to return Caustic to tank.
16:15 Ferm C Pump OFF
16:16 Ferm C Pump ON
16:17 Ferm C Pump OFF
16:30 Ferm C Pump ON and OFF
16:31 Ferm A Pump ON
16:34 Field reports that CIP filters are being highly problematic
16:36 Ferm A Pump OFF
16:37 Refilling Rinse Tank, pump ON
16:38 Flipping CIP Header to Rinse. Ferm A Pump ON
16:47 Ferm A Pump OFF. Ferm C Pump ON
17:04 CIP Systems OFF
17:05 Ferm A Pump ON
17:10 Ferm A Pump OFF
17:22 Ferm C Pump ON, UV Rinse of Ferm C
17:26 UV Water coming out og Ferm reported as “gross”
17:28 Ferm C Pump OFF, draining Ferm C to the floor
17:31 WW Pump ON @ 63% Level
17:33 Sending out WW @ 63.0% Level and 32 GPM
17:35 Ferm C Pump ON
17:41 Cooling Water and Ferm C Pumps OFF
17:43 Began UV Rinse through sprayballs for 25 minutes
Ferm C Pump ON
17:45 Popping Ferm C Base Line
17:46 Popping Ferm C Acid Line

17:52 C5 Pump ON @ 75% and OFF
17:53 PAMP#1 OFF
17:57 Ferm C SV→50% and CLOSED
18:11 Ferm C Pump OFF, Ferm C Steam Trap “MEGA-clogged”
WW pH=12.21; Cond=18.2 mS/cm
18:16 UV Pump, WW Pump, and C5 Tank AG OFF
18:19 Steam OFF

Log Book Keys

Color Coding

blue text	tank refill log (i.e., bleach, caustic acid)
green text	notes from field
purple text	problems
red text	sampling/inoculation-related information
yellow highlight	process notes, major issues

Abbreviations

AAP	Aqueous Ammonia Pump
AG	Agitator
BT	Blow Tank
BW	Beerwell
BWP	Beerwell Pump
C5 Discharger	Hydrolyzer Discharge Screw
CIP	Clean in Place
CV	CableVey-Cable conVeyors
DFP	Decanter Feed Pump
FBLBs	Feed Bin Live Bottoms
FBTC/FBCC	Feed Bin Transfer/Collection Conveyor
GP	Gluconase Pump
HPSWP	High Pressure Seal Water Pump
HSMC	High Shear Mixing Conveyor
LIQ	Liquefaction Tank
LP/LIQP	Liquefaction Tank Pump
PA	Phosphoric Acid
PAHT	Phosphoric Acid Holding Tank
PAMP	Phosphoric Acid Metering Pump
PAMT	Phosphoric Acid Mix Tank
pAP	pH Adjustment Tank Pump
PATP	Phosphoric Acid Tote Pump
pHA	pH Adjustment Tank
Prop	Propagator
PSBLBs	Pre-Steam Bin Live Bottoms
PSF	Plug Screw Feeder
RevSc	Reversing Screw
ScPr	Screw Press
SIP	Sterilize in Place
SV	Steam Valve
WW	Waste Water