

# Campaign 5

## Problems & Resolutions

UF Stan Mayfield Biorefinery Pilot Plant

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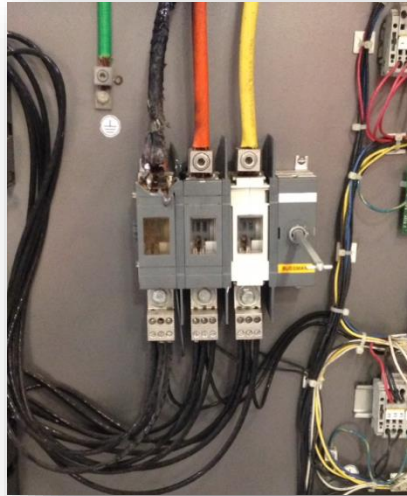
### Table of Contents

|       |   |   |
|-------|---|---|
| I.    | Lattner Boiler .....                                | 2 |
| II.   | Fulton Boiler .....                                 | 2 |
| III.  | Contamination .....                                 | 3 |
| IV.   | Metso System Pre-Steam Xfer to Plug Screw .....     | 3 |
| V.    | Liquefaction & pH Adjustment Level Indicators ..... | 3 |
| VI.   | Loadsure Elements & Trouble Pumping .....           | 4 |
| VII.  | Blow Back Dampner .....                             | 4 |
| VIII. | Beerwell Pump .....                                 | 4 |
| IX.   | Beerwell Tank .....                                 | 5 |

## I. Lattner Boiler

### Problem

After liquefaction was complete, one leg of the 3-phase power wires burnt up which caused the power transmission box to melt.



### Resolution

Had to replace all 3 wires plus ground back to the local disconnect on the wall. Total cost of wire was about ~\$400. Had to replace the power distribution box for a total cost of ~\$1,300. The original was non-fused, and I bought another non-fused, but I should have bought fused. Must routinely check amperage draw on incoming wires, tightness of all lugs/connections, and continuity on all fuses. Need to order more replacement fuses.

### Status

Fixed.

## II. Fulton Boiler

### Problem

Once the Lattner went down, we tried switching over to the Fulton. It started to increase pressure in Metso, but then started giving up. The control screen started acting strange at about the same time. The PV was fixed at 250 psi when it was really atmospheric.

### Resolution

Spoke with Chad from Fulton and he walked me through an entire reset to factory settings, but it didn't work. He said it had to be a bad controller, and said the only fix was a new one. Total cost of a new controller is ~\$600.

#### Status

Not fixed.

### III. Contamination

#### Problem

The propagators grew well, given that there was no air for prop 3B. No contamination in props. Contamination was however evident in the fermentors. Likely sources are either slow growth of our organisms, air-line sterilization, vacuum breaker failure on pH adj., non-sterile UV water, opening transfer lines to replace ruptured pump elements, non-sterile inoculation of prop 2B., remaining films on void in steam injection line to tank, dirty vent lines, or the clogged fermentor C steam trap line. The transfer lines were likely not the cause since we CIP'd and sterilize them (except for the potential from the steam traps). The VB on pH. A. had dried biomass plugged in it. Could've also been a source of contamination, however it did get sterilized. Note that the air spargers were left out for this campaign.

#### Resolution

Possible solutions include adding air to vessel during fermentation, re-sterilizing the airlines, fix pH adj. vacuum breaker, ensure we have sterile bottle caps with barbed fittings, do a cip on all vent lines all the way back to beerwell, ensure steam trap lines are checked and cleaned before every campaign. Maybe perform another full CIP procedure prior to Campaign 6.

#### Status

Not fixed.

### IV. Metso System Pre-Steam Xfer to Plug Screw

#### Problem

The variability in feed rate for this current batch of sugarcane bagasse (10023) was hard to deal with. The biomass feed into the chute between the pre-steam transfer conveyor and plug screw would sometimes spike, which caused the chute to stack up and promote bridging. We had to decrease our pre-steam live bottoms to account for this.

#### Resolution

Unfortunately, our plug screw feeder can only go so fast. A new chute design might help eliminate bridging/clogging though.

#### Status

Not fixed.

### V. Liquefaction & pH Adjustment Level Indicators

#### Problem

When these agitators get splashed with slurry, they do not read correctly. When the liquefaction tank level reads 100%, Metso shuts down. This happened several times. The reason pH A. level sensor

becomes dirty is due to the incoming slurry feed hitting a baffle near the top of the tank and splashing slurry everywhere.

#### Resolution

For liquefaction, keeping the level below 80% should fix the problem. For pH adjustment, the slurry flow into the tank must be changed.

#### Status

The slurry flow line has been changed.

## VI. Loadsure Elements & Trouble Pumping

#### Problem

We broke two elements. One had been in a 4% peroxide solution for over a week—it broke immediately. The other one broke once we got to a lower level in the liquefaction tank. The liq. and pH adj. pumps seemed to struggle the most once the level in liquefaction became low.

#### Resolution

Don't leave the marprene in peroxide for so long. Must keep a close eye on the transfer line pressures as level in liquefaction starts to decrease.

#### Status

Fixed.

## VII. Blow Back Dampner

#### Problem

The new seals were replaced prior to this campaign, but the BBD still showed a lagged response after we shut down from a trial run. It seems like when pressure is applied, and things are hot the seals expand and slow the response. We did not lose a plug during this campaign, but it's still a concern.

#### Resolution

Chris Kaizer approved the idea of only using one or maybe two seals and filling the rest of the void with a different type of packing material. This should allow the shaft to move freely.

#### Status

Not fixed. Wait to see if we lose another plug?

## VIII. Beerwell Pump

#### Problem

The beerwell was about 75% full, with most of the contents being post fermentation 15% vanasse. It could not pump at all.



#### Resolution

We probably need a new pump. I can't imagine this pump head was designed for high solids slurry. Our portable diaphragm pump was handling it well though.

#### Status

Not fixed.

### IX. Beerwell Tank

#### Problem

It appears to be leaking.

#### Resolution

First identify the leak and then handle the situation from there.

#### Status

Not fixed.