STANDARD OPERATING PROCEDURE
STAN MAYFIELD BIOREFINERY PILOT PLANT

TITLE: Base B System

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A. Scope

This SOP describes the procedure to operate the Base B system during normal operation in order to deliver base and adjust pH of the propagators and fermentors.

B. Safety and Training Requirements

Refer to UF lab safety policies regarding equipment listed in section D below before starting any process work.

Review the location of fire extinguishers, fire blankets, safety showers, spill cleanup equipment and protective gear before beginning any process work.

During operations in the plant, the following safety gear will be utilized at all times:

- Safety Goggles
- Protective Gloves
- Hard Hat

When handling base solution:

- Chemical Resistant coveralls
- Face shield
- Chemical resistant gloves
- Respirator fitted with ammonia vapor cartridge (If using aqueous ammonia) (Product number)

C. Related Documents and SOPs

1. Fermentation Tank A SOP-3230
2. Fermentation Tank B SOP-3235
3. Fermentation Tank C SOP-3240
4. Primary Propagator 2A SOP-3210
5. Primary Propagator 2B SOP-3215
6. Secondary Propagator 3A SOP-3220
7. Secondary Propagator 3B SOP-3225

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D. Preparation/Materials/Equipment

1. Tote Bung wrench
2. Base B Solution
3. Fork lift

E. Detailed Procedure

1. The base solution is stored in two separate totes of 330 and 275 gallons respectively.The top tote drains by gravity and pressure equalization between the totes.

   CAUTION: Wear appropriate PPE when connecting/disconnecting aqueous base lines.

2. The totes are connected and filled by:
   a. The bottom tote has a capacity of 330 gal and is filled from the 275 gal top tote.
   b. When empty, the top tote is replaced with a new tote by:
      i. Make sure the new tote to be placed on top is ready.
      ii. Close the drain valve on the top tote.
      iii. Unhook the drain line between the totes at the top tote.
      iv. Disconnect the vent line from the top tote.
      v. Remove the empty top tote with the fork lift.
      vi. Remove the vent fitting from the empty top tote.
      vii. Set in place the new top tote with the fork lift.
      viii. Set in place the vent fitting in the top new tote.
      ix. Reconnect vent line to the top tote.
      x. Connect the drain line to the new top tote.
      xi. Open the drain valve on the new top tote.
      xii. Visually check for leaks.

E.1 Start-up

1. Make sure that the valves shown in the initial table are placed in the indicated position before continuing.

Base B System				
Line	Line Number	Valve	Position	Check
Base to Base B Storage Tote	Base-8301-01-SS10	8502-V-01	Closed	
Base Supply Line	Base-8502-01-SS10	8502-V-02	Closed	

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	Drain	8502-V-12 8502-V-19 8502-V-26	Closed Closed Closed
Base to Base B Metering Pump 1	Base-8502-02-SS10	8502-V-03	Open
Base to Base B Metering Pump 2	Base-8502-04-SS10	8502-V-06	Open
Base to Base B Metering Pump 3	Base-8502-06-SS10	8502-V-09	Open
Base to Base B Metering Pump 4	Base-8502-08-SS10	8502-V-13	Open
Base to Base B Metering Pump 5	Base-8502-11-SS10	8502-V-16	Open
Base to Base B Metering Pump 6	Base-8502-17-SS10	8502-V-20	Open
Base to Base B Metering Pump 7	Base-8502-18-SS10	8502-V-23	Open
Base to Fermenter A	Base-8502-03-SS10	8502-V-05	Open
Base to Fermenter B	Base-8502-05-SS10	8502-V-08	Open
Base to Fermenter C	Base-8502-07-SS10	8502-V-11	Open
Base to Propagator 2A	Base-8502-09-SS10	8502-V-15	Open
Base to Propagator 2B	Base-8502-10-SS10	8502-V-18	Open
Base to Propagator 3A	Base-8502-12-SS10	8502-V-22	Open
Base to Propagator 3B	Base-8502-13-SS10	8502-V-25	Open

2. Ensure that the power switch is ON (in the back of the pumps)for all the pumps: PT-8504, -8505, -8506, -8507, -8508, -8510, and -8511.
3. At the HMI, set the speed controller SIC-8504-01 to CASCADEmode and turn on the Base B Metering Pump 1 (PT-8504).
4. At the HMI, set the speed controller SIC-8505-01 to CASCADE modeand turn on the Base B Metering Pump2 (PT-8505).
5. At the HMI, set the speed controller SIC-8506-01 to CASCADE modeand turn on the Base B Metering Pump3 (PT-8506).
6. At the HMI, set the speed controller SIC-8507-01 to CASCADE modeand turn on the Base B Metering Pump4 (PT-8507).
7. At the HMI, set the speed controller SIC-8508-01 to CASCADE modeand turn on the Base B Metering Pump5 (PT-8508).

8. At the HMI, set the speed controller SIC-8510-01 to CASCADE modeand turn on the Base B Metering Pump6 (PT-8510).
9. At the HMI, set the speed controller SIC-8511-01 to CASCADE modeand turn on the Base B Metering Pump7 (PT-8511).
10. Open valve 8502-V-02 in order to provide base to the base pumps.

E.2 Shutdown

1. At the HMI, turn off the Base B Metering Pump 1 (PT-8504).
2. At the HMI, turn off the Base B Metering Pump 2 (PT-8505).
3. At the HMI, turn off the Base B Metering Pump 3 (PT-8506).
4. At the HMI, turn off the Base B Metering Pump 4 (PT-8507).
5. At the HMI, turn off the Base B Metering Pump 5 (PT-8508).
6. At the HMI, turn off the Base B Metering Pump 6 (PT-8510).
7. At the HMI, turn off the Base B Metering Pump 7 (PT-8511).
8. Close valve 8502-V-02.