STANDARD OPERATING PROCEDURE
STAN MAYFIELD BIOREFINERY PILOT PLANT

TITLE: Lime Slurry System

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A. Scope

This SOP describes the procedure to operate the Lime Slurry System in order to provide lime for plant processes to raise the pH for conditioning of the pretreated biomass or for pH control.

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.

Prior to the start of the procedure, make sure to familiarize yourself with the Material Safety Data Sheet (MSDS) to understand what to do in case of exposure and what is the appropriate PPE to be worn when handling lime.

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

- Safety Glasses
- Protective Gloves
- Hard Hat

C. Related Documents and SOPs

1. Lime Material Safety Data Sheet (MSDS)
2. Process Water System Operation SOP-9505
3. Air Supply System Operation SOP-9405
4. Potable Water System Operation SOP-9705

D. Preparation/Materials/Equipment

1. Lime Bags

E. Detailed Procedure

1. The initial valve configuration settings are given in the table below.

Lime Slurry System				
Line	Line Number	Valve	Position	Check
Process Water to Lime Slurry Tank	RCW-9501-07-SS10	9501-V-26	Open	
		8403-V-02	Closed	
	RCW-8403-03-SS10	8403-V-01	Closed	
		8403-V-03	Closed	

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Process Water to Fermenters and Propagators	RCW-9501-47-SS98	9501-V-23	Open
to Propagator 3A		8403-V-23	Open
to Propagator 3B		8403-V-21	Open
to Fermenter A		8403-V-19	Open
to Fermenter B		8403-V-16	Open
to Fermenter C		8403-V-14	Open
Process Water to Screw Press Conveyor	RCW-9501-37-SS98	9501-V-24	Open
		8403-V-10	Open
Lime Slurry to Lime Slurry Pump	LMS-8403-04-SS10	8403-V-05	Open
	Drain	8403-V-06	Close
	Drain	8403-V-07	Close
Lime Slurry Loop	LMS-8403-01-SS10	8403-V-08	Open
		8403-V-09	Open
	Spare Valves	8403-V-12	Close
		8403-V-18	Close
		8403-V-24	Closed
		8403-V-25	Closed
Lime Slurry to Downstream Process			
to Screw Press Conveyor	LMS-8403-05-SS10	8403-V-11	Closed
to Fermenter C	LMS-8403-12-SS10	8403-V-13	Closed
to Fermenter B	LMS-8403-11-SS10	8403-V-15	Closed
to Fermenter A	LMS-8403-10-SS10	8403-V-17	Closed
to Propagator 3B	LMS-8403-09-SS10	8403-V-20	Closed
to Propagator 3A	LMS-8403-08-SS10	8403-V-22	Closed
Drain		8403-V-01	Closed
		8403-V-03	Closed
		8403-V-04	Closed

2. Ensure that the air system is operational according to the Air Supply System Operation SOP-9405.
3. Ensure that the potable water system is operational according to the Potable Water System Operation SOP-9705.
4. Ensure that the process water supply is ready according to the Process Water System Operation SOP-9505.
5. Ensure valves 8403-V-01, -03, -04 are closed.
6. Open valve 8403-V-02 to fill the Lime Slurry Tank (TS-8403) with process water.
7. On the HMI, monitor the process water flow rate in FIQ-8403-01.

8. On the HMI, monitor the tank level in LI-8403-03, and once the desired amount of water has been added, close valve 8403-V-02.
9. On the HMI, set the lime slurry agitator speed to 100% in MANUAL using the controller SIC-8403-02.
10. On the HMI, turn on the Lime Slurry Agitator (AG-8403). The agitator can only start when the lime slurry level has exceeded 15%.
11. Slowly add the calculated number of the lime bags to the Lime Slurry Tank from the top hatch to obtain the desired solids percent of slaked lime according to the Experimental Plan. On the HMI, set the pressure to 35 PSI in PIC-8403-05.
12. On the HMI, turn on the Lime Slurry Pump (PC-8403) to start the loop.
13. In order to shut-down the system:
    a. On the HMI, turn off the Lime Slurry Pump (PC-8403) when pH adjustment is completed.
    b. Lime solution can be stored in the Lime Slurry Tank (TS-8403) for no longer than a week.
    c. If the lime solution needs to be drained, slowly open valve 8403-04 to drain the lime solution.
        i. If needed, process water may be added to dilute the lime solution before going to drain.
        ii. Open valves 8403-V-01 and V-03 to allow process water flow to the drain.
    d. Restore all valves to their initial positions according to the initial valve configuration table.