STANDARD OPERATING PROCEDURE
STAN MAYFIELD BIOREFINERY PILOT PLANT

TITLE: Plant pH Probe Calibration

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APPROVALS: Process Change Committee **DATE:**

A. Scope

This SOP describes the procedure to calibrate the pH probes used in the main process area.

B. Safety and Training Requirements

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

CAUTION: Make sure to wear a harness whenever working at heights of more than 15'.

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

C. Related Documents and SOPs

1. Media Preparation SOP-2155
2. Biomass Liquefaction SOP-2325
3. Primary Propagator 2A VS-3202A SOP-3210
4. Primary Propagator 2B VS-3202B SOP-3215
5. Secondary Propagator 3A VS-3203A SOP-3220
6. Secondary Propagator 3B VS-3203B SOP-3225
7. Fermentation Tank A VS-3204A SOP- 3230
8. Fermentation Tank B VS-3204B SOP-3235
9. Fermentation Tank C VS-3204C SOP-3240

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D. Preparation/Materials/Equipment

1. Ladder
2. Harness
3. pH 7.0 and 4.0 buffers
4. Two 50 mL plastic conical tubes
5. D.I. water squeeze bottle
6. 250 mL plastic beaker
7. Kim wipes

E. Detailed Procedure

1. Assure the tank is empty and clean.
2. Assure there are no "fault" warnings flashing at the bottom of the pH meter screen. If so, contact supervisor.
3. Using two 50 mL plastic conical tubes dispense 35 mL of pH 4.0 and 7.0 buffer from the stock containers located in the lab.
4. With a partner, bring the buffers and Kim wipes, and the harness and ladder (if needed) to the tank that has the probes to be calibrated.
5. If a ladder is needed, have one person put on the harness (for probes higher than 15') and climb up to a position close to the pH probe.
6. Latch the harness to a secure, stable object.

   CAUTION: Probes are easily broken and expensive.

7. Carefully remove the first pH probe to be calibrated (there are two per tank).
   a. Once unscrewed, the rubber seal will make it difficult to pull out the probe. Apply tension slowly to prevent the glass probe from hitting the inner wall and shattering.
8. Calibrate the pH probe by:
   a. Rinse the probe with D.I. water, collecting the rinse water in the plastic beaker, and gently wipe the probe with Kim wipes to remove any residue.
   b. Repeat E.8.a. two times.
   c. Place the probe in the pH 7.0 buffer.

d. The person located near the meter should now wait for the pH reading corresponding to the probe that has been placed in the buffer to equilibrate.
e. Once the reading is stable, on the pH control panel;
    i. press menu,
    ii. select calibrate,
    iii. select the corresponding sensor number,
    iv. select pH,
    v. select Buffer Cal,
    vi. select Auto,
    vii. select Start Auto Cal,
    viii. press enter,
f. Once the meter has finished analyzing, select the buffer 7.009 from the list of options.
g. Repeat steps E.8.a – E.8.b.
h. Place the probe in the pH 4.0 buffer.
i. Repeat steps E.8.d. – E. 8.e.
j. Once the meter has finished analyzing, select the buffer 4.01 from the list of options.
k. The slope should be approximately 60.00 mV/pH.
    i. If an error has occurred, contact the shift supervisor.
l. Verify the reading consistency by repeating E.8.a – E.8.c. The pH should read 7.00 ± 0.05. If not then repeat the calibration procedure (E.8.d. – E.8.e.).
m. Repeat step E.8.a.
n. Carefully secure the probe back into the socket from which it came.

9. Repeat step 8 for the second pH probe.