**STANDARD OPERATING PROCEDURE**
**STAN MAYFIELD BIOREFINERY PILOT PLANT**

# TITLE: Aqueous Ammonia

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**APPROVALS: Process Change Committee** **DATE:**

## A. Scope

This SOP describes the procedure to operate the Aqueous Ammonia System during normal operation in order to deliver aqueous ammonia and adjust the pH of the Liquefaction Tank, the Prep Tank, and pH Adjustment Tank.

## 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 aqueous ammonia:

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

## C. Related Documents and SOPs

1. Media Preparation SOP-2155
2. Liquefaction SOP-2300

## D. Preparation/Materials/Equipment

1. Tote bung wrench
2. Aqueous Ammonia Solution (19% w/w)
3. Fork lift

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## E. Detailed Procedure

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

**Table 1.** Start-up initial valve positions settings.

| **Aqueous Ammonia System** | | | | |
|---|---|---|---|---|
| **Line** | **Line Number** | **Valve** | **Position** | **Check** |
| Aqueous Ammonia | AMX-8501-01-SS10 | 8501-V-02 | Close | |
| | AMX-8501-01-SS10 | 8501-V-03 | Open | |
| | AMX-8501-01-SS10 | 8501-V-06 | Open | |
| | AMX-8501-01-SS10 | 8501-V-09 | Open | |
| Liquefaction Tank | AMX-8501-03-SS98 | 8501-V-05 | Open | |
| Prep Tank | AMX-8501-05-SS98 | 8501-V-08 | Open | |
| Hydrolysate pH Adjust Tank | AMX-8501-07-SS98 | 8501-V-11 | Open | |

2. The aqueous ammonia 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 ammonia lines.

3. 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. Preparing the new tote to be placed on top using a fork lift.
        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.

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***E.1 Start-up***

1. Open valve 8501-V-02.
2. Ensure that the pump power switch is ON for each of the following pumps: PT-8501, PT-8502 and PT-8503.
3. At the HMI, set the speed control SIC-8501-01 to MANUAL and OUTPUT to -5.
4. At the HMI, turn on the Aqueous Ammonia pump 1 (PT-8501) to supply aqueous ammonia to the Liquefaction Tank (VS- 2301).
5. At the HMI, set the speed control SIC-8502-01 to MANUAL and OUTPUT to -5.
6. At the HMI, turn on the Aqueous Ammonia pump 2 (PT-8502) to supply aqueous ammonia to the Prep Tank (TS- 2109) and set OUTPUT speed to -5.
7. At the HMI, set the speed control SIC-8503-01 to MANUAL and OUTPUT to -5.
8. At the HMI, turn on the Aqueous Ammonia pump 3 (PT-8503) to supply aqueous ammonia to the Hydrolysate pH Adjustment Tank (VS-2302) and set OUTPUT speed to -5.

***E.2 Shutdown***

1. At the HMI, turn off the Aqueous Ammonia pump 1 (PT-8501).
2. At the HMI, turn off the Aqueous Ammonia pump 2 (PT-8502).
3. At the HMI, turn off the Aqueous Ammonia pump 3 (PT-8503).