1. Procedure summary

This procedure outlines the method to start up and shut down the Polymer Mixing station – HYDRAMAX Model D4000FF-C10-3X

1.1. Related Procedures

Saturation Tank Operations Procedure	CB-02-005-003
DAF operation Procedure	CB-02-004-004

1.2. Procedure impacts and concerns

Safety	Dry polymer that is spilled can create **extremely slippery surfaces**. Do not spill excess material and clean up any material immediately. Face mask and safety goggles need to be worn when handling polymer.	
Quality	Calibration of the polymer feed system and monitoring of polymer usage will prevent excess polymer dosing	<Additional notes>
Delivery	All pumps need to be operated wet to prevent any damage	<Additional notes>
Environmental		<Additional notes>
Cost	Polymer waste can lead to high costs, spillage and overdosing of polymer needs to be recorded to aid in process optimization. Failure to identify total number of batches per day can result in the make down of unwanted batches through the automatic make down system.	
Compliance		

1.3. Responsibilities and owners

Document Owner	Manage content and distribution	Timothy Langer
Process Owner	Responsible for content and process validation	Marcos Delgado
Site Manager	Responsible for implementation and conformance	Rebecca White

2. Process

2.1. Process description

There are 3 parts to this procedure: <Additional notes>

1. Dry Polymer start up and batching
2. Dry Polymer station normal operations
3. Dry Polymer station shutdown

2.2. Process diagram

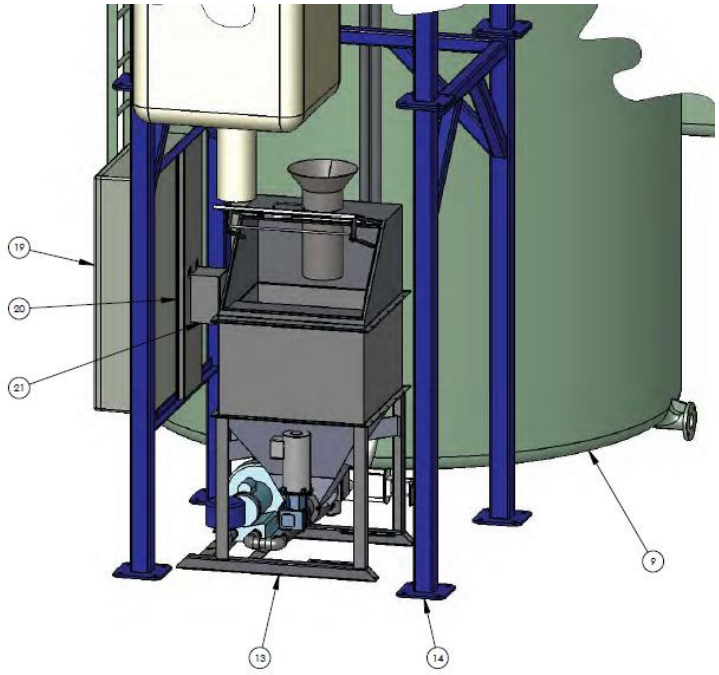

Figure 1 Dry Polymer Hopper and Control Panel

Figure 1: Depicts the Polymer hopper where daily and weekly polymer loads are added to supply the batch polymer make up. Polymer should be stored in this hopper for several days to prevent the continuous loading of polymer each day.

Figure 2 – Polymer mixing station control panel.

Figure 2: Illustrates the Polymer mixing station control panel. This panel will be used when making batches of polymer and shows status of all online systems for the station. This screen will identify if there are any error messages that would prevent the batch process from proceeding. The most important values to identify are the desired make down concentration of polymer, the total volume of the batch being made, and the hopper feed level.

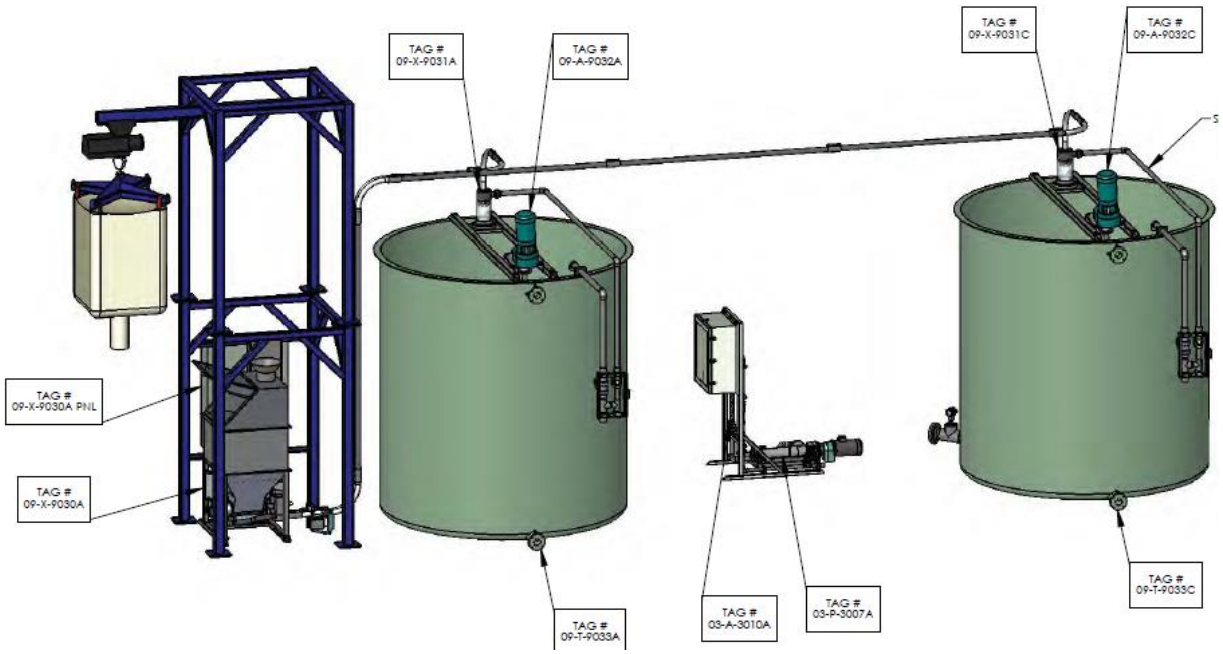

Figure 3 – Polymer Makedown Station

Figure 3: Illustrates the polymer make down system as a whole. There are two batch tanks that should be cycled to ensure constant polymer availability during DAF harvests. At the top of each tank there is a polymer wetting head where polymer is pushed into a water stream using a blower. The blower pulls polymer material from the auger fed hopper system. A polymer solution of between 0.25 -0.5% will be made up and aged for 45 minutes.

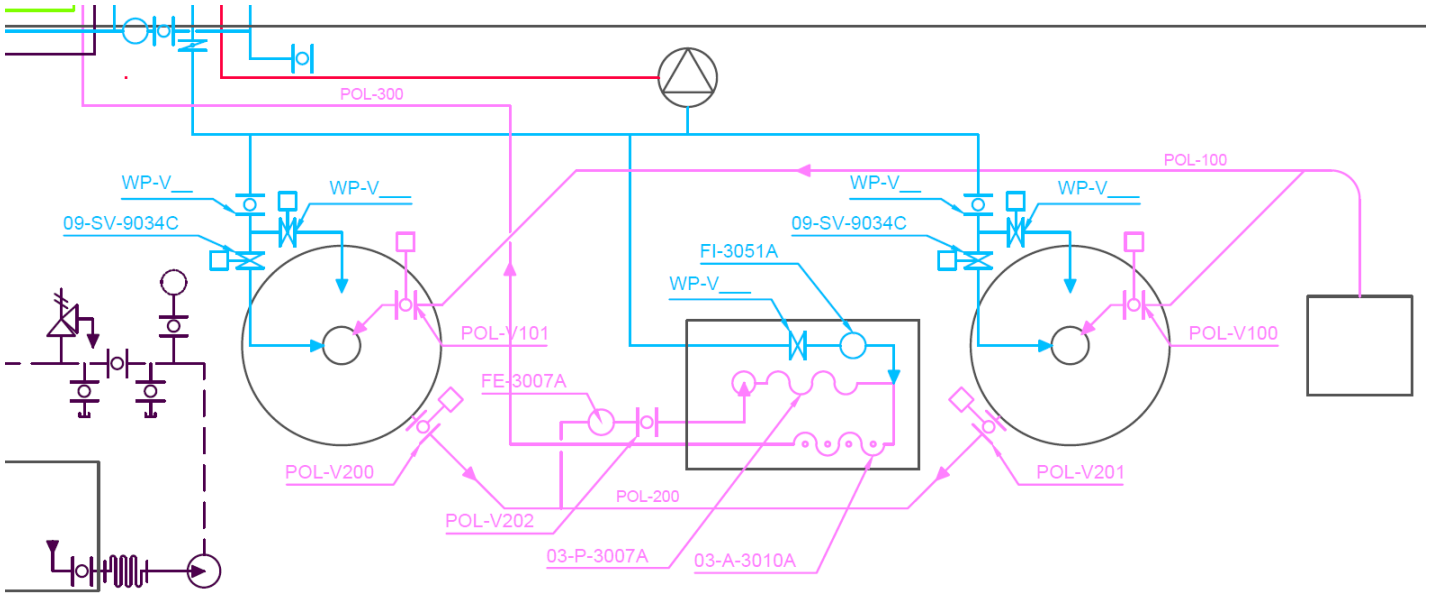

Figure 4 – Polymer Station PID

Figure 4: Outlines the automatic and manual valves for the polymer systems and the water system needed for dilution. The pneumatic addition of polymer is dictated by the automated valves POL-V100 and 200 depending on which batch tank is being made up and are controlled by the Polymer station controls system. After the polymer pump there is the opportunity to dilute the polymer through a water transfer valve.

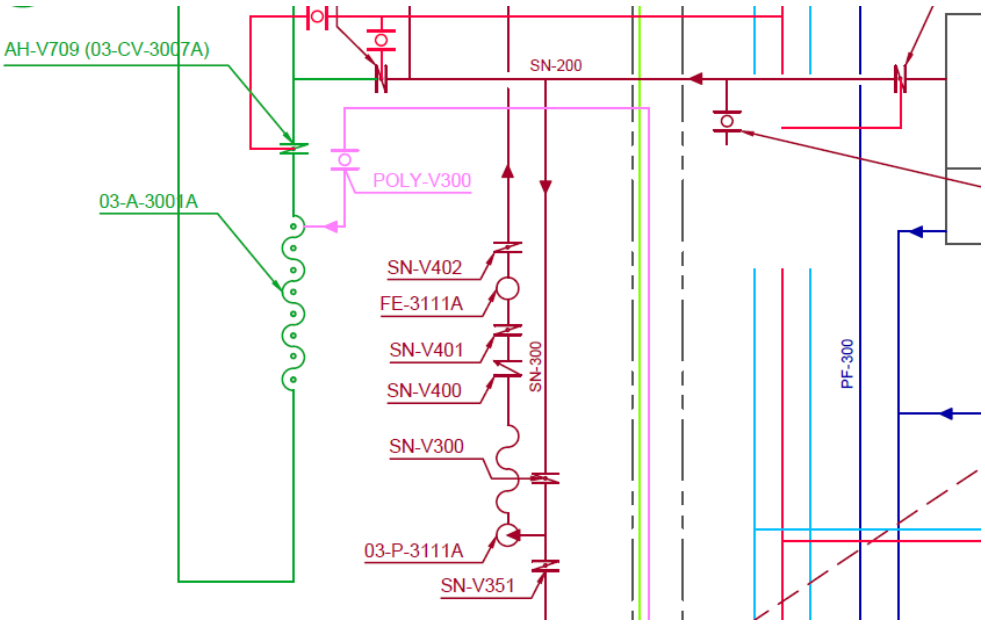

Figure 5– Polymer Injection location

Figure 5: Outlines the inlet ball valve POLY-V300 for the polymer injection system. During normal operations, valve position should be verified.

2.3. Normal Polymer Make Down Station Operations

2.3.1 Polymer Station Start up and batching

This method will outline how to fill polymer tanks with water and mixing in appropriate amounts of polymer.

If the polymer hopper is empty or does not contain enough material for the amount of polymer needed for a batch, add additional dry polymer to the hopper shown in Figure 1. The amount of polymer in the hopper needs to be above the level switch inside of the hopper. This switch needs to remain covered for the system to batch correctly. Dust masks and safety goggles should always be worn when working with polymer.
On the Polymer mixing station control panel confirm the auto batch settings reflect the desired polymer solution percentage (0.5%), the batch size is correct and that there are no alarms on any of the screens.
Select Tank #1 or Tank#2 to start the first batch.
The polymer feed system will start to run. The wet-head water fill valve will open.
Confirm the polymer auger and blower is operational. Confirm desired polymer is metered into the desired tank (Tank #1 or Tank #2).
The mixer will not start until the mixer is submerged.
After the desired amount of polymer is added the auger will stop and the blower will remain on for a few seconds to clear the line to the tank. The blower will stop and the wet head water fill valve will close.
The rapid fill valve will open and continue to fill the polymer tank to the desired batch level.
The tank mixer will run for 30 minutes to mix the polymer.
Once the polymer batch is complete, the tank bottom outlet valve will open to feed polymer to the polymer pump.
Verify that the polymer pump icon on the control panel displays the polymer pump is ready for feed. The polymer pump is controlled by the HMI in the Maintenance Office in the Harvest Area.

2.3.2 Polymer Station Normal Operations

Based on the DAF feed rate, polymer will be injected into the feed stream at a rate determined by jar testing and set by the Harvest Team.
Confirm Valves are in the correct operating position
Verify main water supply (WP-V700) is open
Verify main air supply (AC-V700) is open
Verify water transfer valve (WP-V710) is open
Verify water transfer valve (WP-V712) is open
Verify water transfer valve (WP-V715) is open
Verify main water supply pressure is ≤ 40 psi
Verify polymer transfer valve (POL-V202) is open
Verify water transfer valve (WP-V702) is open
Verify polymer transfer valve (POL-V203) is open
Verify polymer Tank #2 outlet valve (POL-V200) is closed
Verify polymer Tank #1 outlet valve (POL-V201) is closed
Confirm that there is enough polymer solution for daily operations.
Input the dosing rate on the DAF Feed screen at the HMI as determined by jar testing conducted by the Harvest Team.
Verify the polymer pump is set in Program/Automatic Mode.
The DAF feed pump will set the polymer feed pump output and is controlled by the HMI. The polymer pump should be started as soon as the DAF feed pump is started.

2.3.3 Polymer Station Shutdown

These steps will prepare the polymer station for shutdown.

1. Using the shop vacuum remove any excess polymer around the polymer make down station.
2. Ensure that the polymer feed line (POL-300) is flushed with enough water at the end of the run to clear any polymer that remains in the feed line.
3. Verify that there are no alarms on the control panel then shut down the batch controls on the polymer station by placing the system in Manual Mode or cycling power to the control panel.

3. Required documents

3.1. Input documents

Harvest Operations Form	<Input document number>

3.2. Output documents

Harvest Operations Form	<Output document number>

4. Document control

4.1. Revision history

R0 – Initial Release – Timothy Langer	March 7, 2012
R1 – Updated procedure – Marcos Delgado	September 4, 2012

R2- Up-dated procedure –Leo Willis	January 19, 2015

4.2. Document approval

<Name> <Approval date>

4.3. Document reviewers

<Name> <Last reviewed date>

<Name> <Last reviewed date>

5. Risk analysis

<Risk name> <Mitigation plan>