Work Procedure:
A18 Solvent Recovery System

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Author	Name	Job Title	Signature
Reviewer	Name	Job Title	Signature
Approver	Name	Job Title	Signature

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1.0 Overview

This is the initial record of the work procedure for the use of the CleanPlanet A18 Solvent Recovery System, which reclaims MEK and 361 used for backflush cleaning of the coating lines at Wolverine Advanced Materials' Cedar Run and Blacksburg plants. While this is an initial written procedure, over time it will most likely change as operators and engineers become more familiar with the Recovery System's operation. This procedure will refer to MEK (used at Cedar Run) and 361(used at Blacksburg) both with the generic term solvent, since the primary procedures are the same for each.

1.1 Scope

This Work Procedure is applicable only for the A18 Solvent Recovery System at Cedar Run and Blacksburg. The systems are located in the cold storage room at Cedar Run and the rubber storage room at Blacksburg; in this document the location of the systems will be referred to as the distillation area or room.

1.2 Purpose

This procedure is to provide a point of reference for operating, training and maintaining the A18 System. It also provides instructions for the movement of "dirty" drums from the line to the A18 system, and drums containing reclaimed solvent back to the line for use. This work procedure is to be used as an operating and reference manual.

1.3 What to expect

This work procedure will include labeled diagrams of the A18 system, a list of roles and responsibilities, descriptions of the movement of drums between the manufacturing line and the reclamation system location, and a description of operating procedures for the system.

2.0 Process Overview

The CleanPlanet A18 Solvent Recovery System is used to reclaim MEK, 316 and other solvents from a solution containing solvent and rubber, a solution created from backflushing the coating lines at Wolverine Advanced Materials. Taking advantage of the chemicals' vapor temperature

to separate solvents from other materials, the A18 system distills the "dirty" backflushed solution, to produce "clean" solvent that can be used again for backflushing,

The system uses a boiler surrounded by a reservoir containing thermal oil, heated by an electrical heating element. The solvent vapors produced in the boiler move through a condenser and back to their liquid state. The cooled solvent is contained in a stainless steel collection tank, ready to be used again. The process does not chemically alter the characteristics of the distilled solvent. Consequently, the operation can be performed endlessly.

The residues remain inside the boiler and can be removed when the system has cooled to below 130F. The system uses a bag placed inside the boiler that allows for the removal of residues at the end of the distillation cycle.

Use of this system is a two-person operation—one to move drums containing solvent from the line and back, and another to operate the system itself. The Linewalker is responsible for moving dirty drums off of the line to a staging area just outside the distillation room. The Mixing Room Attendant: brings the dirty drums into the distillation area where they are placed in an incoming queue; operates the A18 recycler; then moves clean drums into an outgoing queue; and eventually moves the drums out of the distillation area to provide reclaimed solvent to the line, as requested by the Linewalker. This process is shown in Figure 1.

2.1 Areas in use

As stated above and seen in Figure 1 there is a process for moving dirty solution to the A18 reclamation unit, and then supplying reclaimed solvent back out to the line. A drum of dirty material is disconnected from backflush staging areas at Coater 1 (lower) and Coater 2 (lower), and initially moved to a staging area outside the distillation area and then into a queue inside the distillation room. Once reclaimed, the solvent drum is moved into an outgoing queue and eventually back onto the line as needed. If additional storage is needed for drums of dirty or clean solution, they will be stored in the outside chemical storage facility. At all times during movement the drums must have a lid held on by a locking ring.

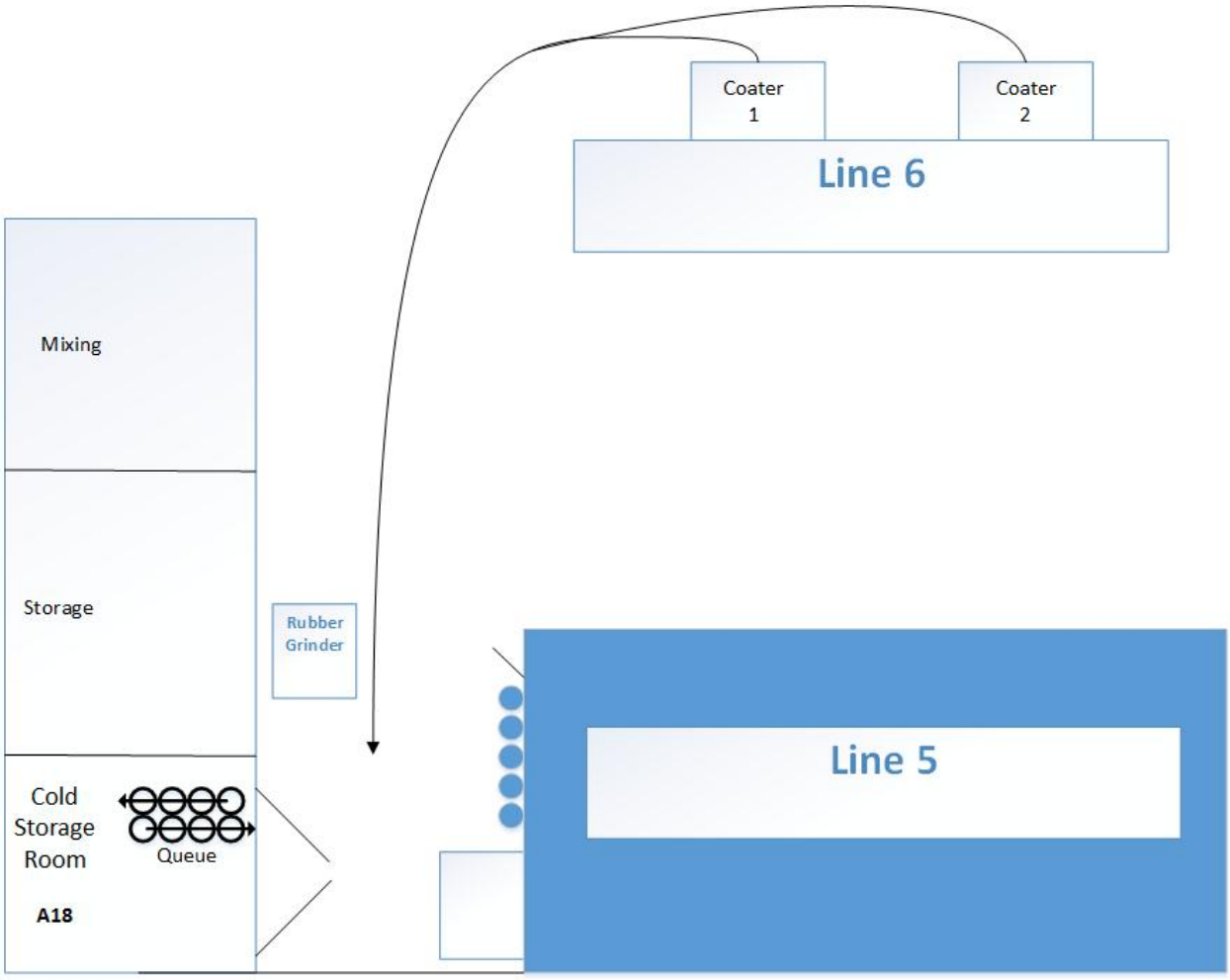

Figure 1—Diagram of movement of solvent barrels to and from the reclamation unit at Cedar Run

Blacksburg Area description and diagram to come

2.2 Roles and Responsibilities

As mentioned in Section 2.0 the solvent reclamation process consists of two members: the Linewalker and the Mixing Room Attendant.

2.2.1 Linewalker

The Linewalker is responsible for determining when the drums have reached a point to be taken for solvent reclamation. The secondary backflush drum will be taken off the line when it has become dirty and the Linewalker will take it to a position immediately outside the distillation room. When a secondary drum has been moved out of the coating staging area, the primary drum will be moved into the secondary drum position and a new drum with reclaimed backflush will be stationed as the new primary drum.

2.2.2 Mixing Room Attendant

The Mixing Room Attendant is responsible for connecting and running the reclamation process. The Mixing Room Attendant takes the dirty drums from the area outside the distillation room and moves them inside to the incoming queue. Once the reclamation process has filled a drum with clean solvent the Mixing Room Attendant delivers it back to the coating staging area upon request.

2.3 Documentation

The mixing room attendant documents the time that the A18 begins a reclamation cycle. The attendant also records the counter number on the collection drum pump (refer to Figure 2), both before and after reclaimed solvent has been pumped out of the A18 collection vessel and into a 55 gallon drum.

3.0 Operation

The solvent reclamation process can be broken down into several steps. The preparation and operation steps are done together, while the handling of drums can be thought of as a separate step.

3.1 Handling of drums

Drums being brought from the line must have a steel lid and locking ring in place, and should be taken from the backflush area to the queue of drums awaiting reclamation in the designated area outside the distillation area. It is the Mixing Room Attendant's responsibility to move the dirty drums into the distillation room queue. The Attendant is also responsible for taking reclaimed solvent drums back out to the line when requested.

Note: If at any time the distillation area's incoming and outgoing queues are full, the outside storage facility will be used for drum storage.

3.2 Preparation

The collection or receptacle bags used in the unit to hold materials are on a shelf in the distillation area. There is a hazmat drum for disposal of the bags containing refuse material from each reclamation cycle. The bags are to be used for only one reclamation cycle.

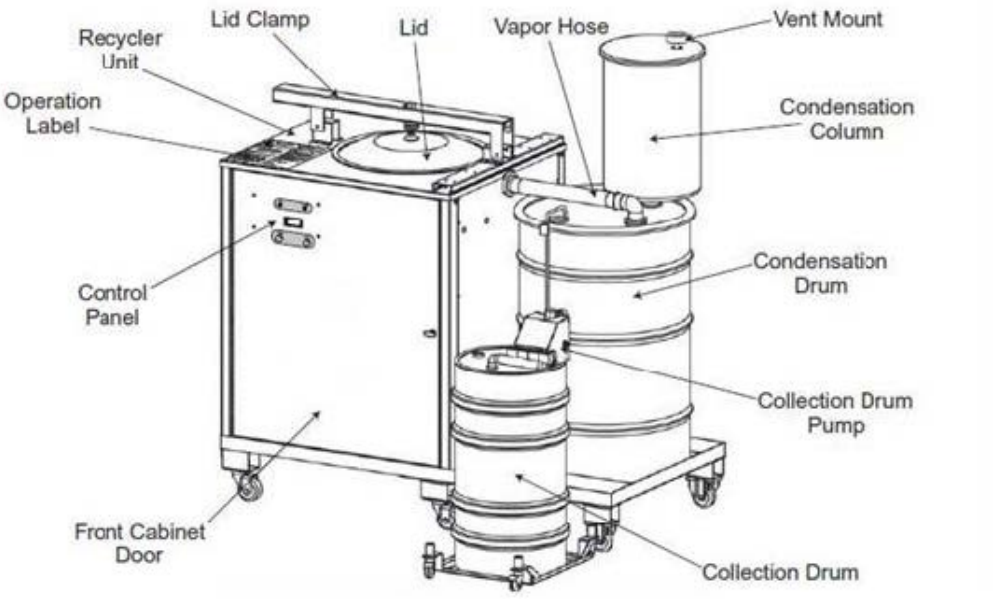

Figure 2--The A18

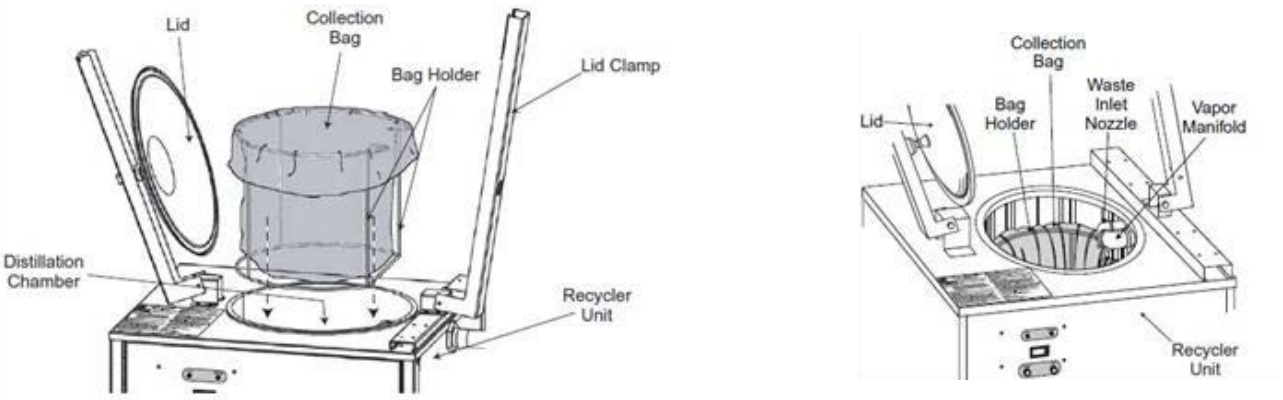

Figure 3—A18 Bag System

3.2.1 Bag Removal and Insertion

(Refer to Figure 3)

1. When the green light is on, it is safe to open the unit to prepare for reclamation.
2. Open lid of unit. For safety, the lid should never be opened when temperature inside the system is above 130 F.
3. If a reclamation cycle has completed, remove the bag containing refuse from the unit, and dispose in hazmat drum.
4. Following removal of the old bag, remove bag holder (basket ring).
5. Open new bag and place inside bag holder.
6. Fold top of the bag over the top ring of bag holder.
7. While squeezing the top ring, fit the bag holder and bag into the unit, making sure the bag is held open once installed and that the bag is securely over the bag holder ring.
8. Make sure the bag is **under** the vapor manifold and the waste intake valve. The vapor manifold and the waste intake valve are not to be blocked or covered .

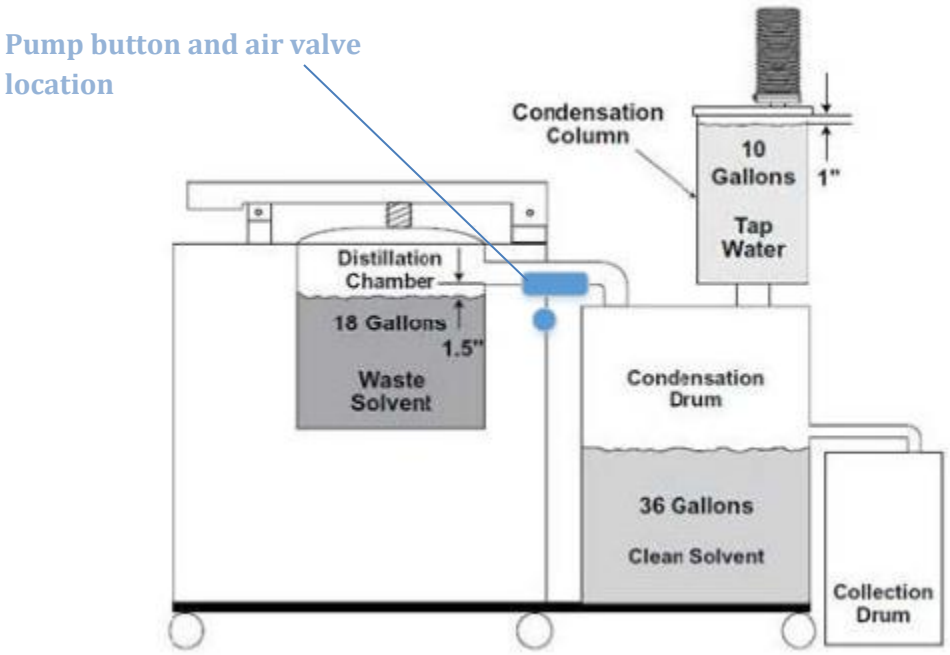

Figure 4—A18 Cutaway

3.3 Operation

3.3.1 Collection Drum/Vessel

As seen in Figure 4, the collection vessel provided with the unit is the only vessel to be used for the collection of distilled solvent. This vessel holds a maximum of 18 US Gallons (68 liters). It is fully mobile and has its own pump to pump fluid into drums when the cycle is completed. The pump is pneumatically powered and is operated with a push button near the pump button, as shown in Figure 4. The collection drum comes equipped with a grounding clamp to connect the unit to a suitable ground.

The collection drum must be empty and connected to the condensation drum via the solvent line quick connect for the duration of a distillation cycle. The collection drum must be attached to a suitable ground during a cycle. There is a grounding bar on the wall of the distillation area; connect a grounding cable to the drum and to the grounding bar.

3.3.2 Auto-Fill Procedure:

1. Place Waste Pick-up Wand located on back of the unit into dirty waste drum solution.
2. Turn Air Valve to the on position (valve located near the pump button as seen in Figure 4).
3. Press and hold "Pump" button, located on side of unit, to begin pumping waste into chamber.
4. Pump waste into receptacle bag. Maximum level is 3.1" (8cm) below the bottom of the vapor manifold. This unit is designed for a maximum volume of 18 US Gallons (68.14 liters).

Note: Overfilling

Overfilling will result in an overflow into the vapor manifold, resulting in dirty reclaimed solvent. Overfilling will also cause backflush to go behind the bag; this will make it difficult to remove the bag as the backflush will act as glue making the bag stick to the bottom. If such sticking happens, press "START" and let the unit warm up for 5 minutes. Press "STOP," open the lid, and gently pull the bag out.

3.3.3 Operation of the Unit

1. Close lid and secure.
2. Re-insert lock into handle and close lock.
3. Open tap, making sure the collection drum is empty to the level of the tap.
4. Press "START", yellow light and digital display will come on. These displays show the temperature of the thermic oil.
5. The green light will stay on until the temperature of the thermic oil reaches 140°F (60°C). At this point the green light will turn off. The unit will automatically set temperature and time in accordance with the solvent or solvents to be recycled. This has been set by CleanPlanet.
6. Once distillation is complete, the unit will automatically shut off and the yellow light will begin flashing, indicating the unit is "OFF" and cooling down. The yellow light will flash until the unit has cooled to 134.6°F (57°C). At this point the yellow light and the digital display will turn "OFF". The

green light will come on indicating the unit is safe to open and is ready to do the next cycle.

7. Open cover and remove bag. Place residue bag into designated Hazmat drum. Pump reclaimed solvent from collection vessel into a 55 gallon drum, recording the number of gallons pumped into drum.

Note: A drum should only be used to contain three cycles of reclaimed solvent.

3.3.4 Safety/Other Considerations

1. Operator must wear breathing mask and solvent-proof rubber gloves, provided in the distillation area.
2. All containers must be grounded when in use.
3. Never open the unit unless the green light is on.
4. Drums containing reclaimed solvent will be marked with a label stating it is reclaimed, and the date that the final addition of reclaimed solvent was put into the drum.
5. All drums, while being moved or in the distillation area and containing either dirty solution or reclaimed solvent, should have a hard lid and locking ring.
6. If the distillation area does not have room for dirty or reclaimed backflush drums they should be stored in the Outside Storage Facility.

4.0 Appendix A

5.0 Reference

CleanPlanet Chemical A18 Operator manual