

A close-up photograph of birch bark, showing its characteristic white, papery texture and horizontal lenticels. The bark is slightly weathered and has some small holes and cracks. A white rectangular text box with a black border is centered on the image.

The How to Guide 2018

Birch Syrup Sugar Shack Operation

Non-Timber Forest Product Project



Wahkohtowin
Development GP Inc.

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Pre-Season Preparations

1. *FOUR-WHEELER:*

Wahkohtowin does not own a four-wheeler yet. In 2018, we rented a four-wheeler at a cost of \$50.00 a day for 10 days. This will have to be arranged as it's a necessary component in effectively moving the birch water from the trail to inside the trailer.

2. *WOOD:*

The wood evaporator needs to run approximately 8 hours, per batch of sap, full blast. In 2018, we used three face cords to cook four batches of product resulting in 145 flasks at 200ml each.

3. *WEATHER WATCHING-TAPPING:*

Birch sap flows for a brief 2-4-week period each spring. This can occur anytime between mid-March to mid-May. As warmer days thaw up the sap in the tree, the trees will start to flow more heavily. When the nights are still below freezing (-0 degrees) but the daytime temperatures are above freezing (5-10 degrees) it is prime time to start collecting. Just prior to bud break, the season is over and we pull the spiles (See Appendix) therefor allowing the sap and nutrients to reach the leaves.

4. *TRAIL MAINTENANCE:*

It would be worth it to take a walk down the trail before the season begins to assess the condition of the trail and decide if we need to put down more wood chips before we get started. See Appendix for Map.

5. *GASOLINE:*

The generator requires straight gasoline, one tank runs approximately 10-12 hours, depending on how much power is being emitted. The four-wheeler will also requires straight gas, so always be sure to have gasoline handy on-site.

6. *PROPANE:*

A 30-pound propane tank is part of the inventory and is needed to finish the cooking process prior to bottling. The one tank cooked for approximately 20 hours.

7. *CHECK FLASK/JAR INVENTORY:*

Make sure you have enough jars and flasks to store the product in before the season begins. Check the inventory and order more as necessary. In 2018, we used approximately 100 flasks (200ml) as well as 72 jars (125ml). Filled about 150 flasks per one week of collection.

**CDL is equipped year-round with inventory, however there is a significant increase in demand starting in February through to May. So, the earlier you order the quicker it will come in.

8. *EQUIPMENT CLEANING:*

Although the equipment was cleaned last season, the equipment will need a good rinse before starting back up this season. This includes filling both the large and small stainless-steel round bottom tanks with clean water and a small amount of Javex, then wiping down the tanks inside and out. Rinse one more time after the Javex has been rinsed. Rinse the wood evaporator with

water ONLY. One rinse is enough, unless you think it needs more. Check the sugar pans at this time as well to make sure they don't need a good rinse as well.

Tip: Bring 300-gallon tank (large white cube shape) to town and fill with water from hose. Return to sugar shack and use water pump (see appendix) to transfer water into steel tanks and wood evaporator.

9. **SAFETY PROTECTIVE WEAR:**

Before the season begins and workers are on site, ensure to always have on site the following: First Aid Kit, Fire Extinguisher, Safety Goggles, Long Disposable Gloves, Rubber Work Gloves, work gloves and Fireplace Gloves. Keep extras of gloves with a variety of sizes for volunteer workers as well.

**A camera may be worth installing in the area for monitoring purposes during days when no one is able to be on site. (Not part of current inventory)

Site Set-up

Trailer Set-up

You will have to contact a contractor or supply your own truck and manpower to haul the shack up to the site, which is located at the 4-kilometer mark down Martel Road. For safety reasons, the trailer needs to be properly levelled before operations can begin. (See Figure 1)



Figure 1: Trailer must be safely levelled

Place one of the 300 gallon tanks at the trailhead, this makes for a shorter distance to travel when moving the birch water out of the trail. As you can see in Figure 1.1, the tank is at the head of the trail and a water pump is used to transfer its contents to the holding tank inside the shack and/or the Reverse Osmosis holding tank.



Figure 1.1: Large tank is easy to access

Tapping the Trees

Once a safety and access check has been done on the trail and the trailer is set up, it's time to tap the trees and hang the buckets!

In 2018, a crew of three installed 180 buckets in half a day. This crew had 2-3 members collecting 180 buckets on a daily basis. This was ideal because they managed to nearly fill the 300-gallon tank daily, which was plenty for a crew of this size to handle all of the production process beyond just collection. Listed below are the average times it takes to collect the sap based on summer 2018.

(Hours to complete collection will vary from person to person)

180 buckets/ 1 person = 7 hours

180 buckets/ 2 persons = 4 hours

180 buckets/ 3 persons = 2 hours

Tools to get started:

- 1 Cordless drill per person (drill bit must be sharp, clean and correspond to size of spiles being used, we used 5/16th)
- 1 Hammer per person (for spiles)
- 3-Gallon blue pails to be hung (Number may vary each year)
- Spare pails to help with collection
- Blue lids (requires same number as blue pails)
- Spiles (requires same number as blue pails)

How to set up the buckets:

1. Pick a birch tree that is 8-inches in diameter or larger and find a smooth surface to drill in to.
TIP: Look up and make sure the tree is not dead!
2. When choosing where to drill, inspect tree for previous seasons hole. Ideally you want to move up 3 inches and over to the right 6 inches.
TIP: Pick a spot on the trunk that's shaded if possible
3. Next, drill at a slightly upward angle (15-30 degrees) to facilitate downward flow of the sap.
TIP: Drill in about 2-2.5 inches, no need to go deeper. (See figure 2)
4. Then insert the spile and lightly tap it further into the tree with a hammer so that it sits flush with the knuckle.
TIP: Only light tap necessary, try not to damage the spile. (See figure 2.1)
5. Lastly, attach the lid using the metal rod to connect the lid to the top of the spile, then hang the bucket from the hook located below the spile. (See figure 2.2)



Figure 2: Slightly upward angle



Figure 2.1: Spile sitting flush with knuckle



Figure 2.2: Everything attached

Birch Water Collection

You will need:

- 4-wheeler with milk crate rack attached to both front and back of 4-wheeler
- 5-gallon pails with lids/ one per crate
- Extra blue buckets to help with bucket retrieval



Figure 3: Back of quad



Figure 3.1: Front rack



Figure 3.2: Best lids to use

TIP: Use pails with lids that are easy to remove. It's really hard on the hands after a while of continuously sealing and removing the lids. The ones in *Figure 3.2* were a great.

Collection Strategy

The buckets need to be collected on a daily basis. If you are ambitious or have a lot of help, you can probably collect twice a day depending on sap flow. In 2018, a 4-wheeler was used to haul the water out of the trail as shown in picture. We placed one white 5-gallon pail into each milk crate, which was later filled with birch water from the blue collection pails. Once full the four-wheeler transported the Birch water out to the 300-gallon trailhead tank.

As a team of 2-3, you will require one person as a runner, one person as the quad operator and extras can be of assistance to the other two.

The **runner**'s job is to carry empty blue collection pails into the bush and exchange them with the birch water pails hanging on the trees. The runner will shuttle the full pails of birch water to the side of the trail close to where the quad operator is working.

TIP: It speeds up the process when the runner leaves the pails in clusters as shown in the diagram provided.

The **quad operator**'s job is to pour the contents of the blue pails into the white pails on the quad. When all white pails are full, seal lids tightly and then shuttle the birch water to the 300-gallon tank located at the trailhead. Empty pails into tank through filter sock and repeat.

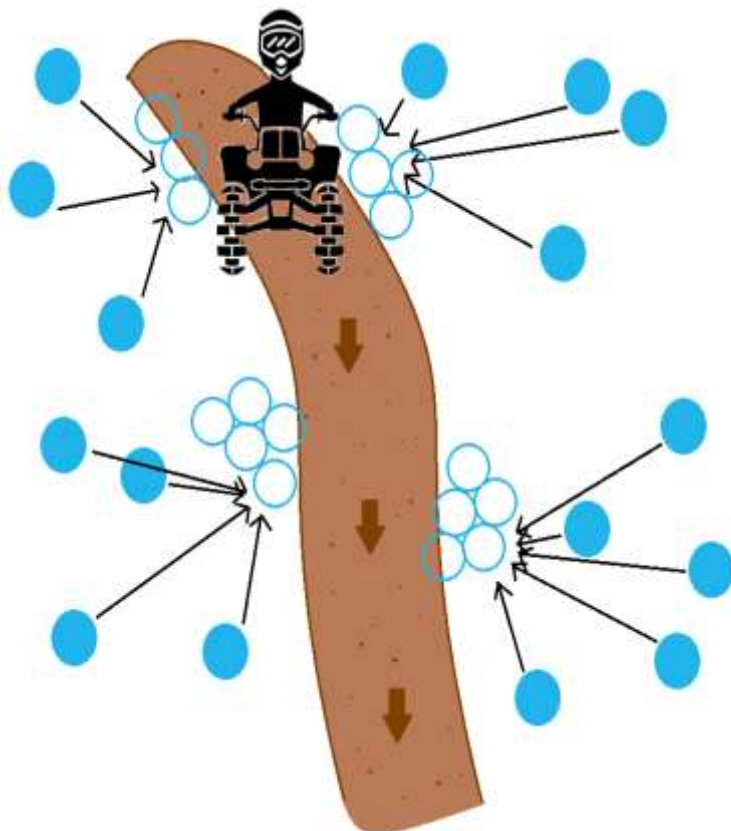


Figure 4: Runner brings full pails out of trail for quad operator

Advancing the empty blue pails

Once the quad operator has emptied a cluster of blue pails, advance those empty pails forward so that the runner can reuse them when shuttling the birch water out of the trail.

Any other help can assist the runner with moving the birch water to the trail edge as well as helping the quad operator pour the blue pails into the white pails and then resume helping the runner.

Note: Team members should rotate jobs to avoid repetitive stress injuries.

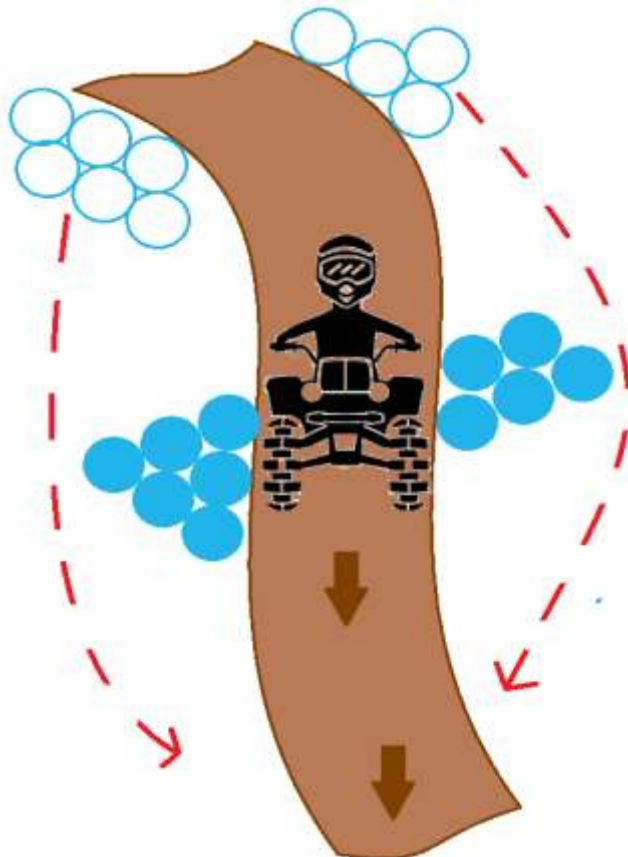


Figure 4.1: Quad operator advances pails for runner



Figure 4: Filter sock

TIP: Don't forget to insert the felt filter sock into the big tank prior to dumping the birch water into it. Ensure to clean this sock daily.

Birch Water Shelf Life

It is important *not* to leave the birch water sitting outside because if left out in the sun, it could spoil within 2-3 days. The shelf life in cool temperatures out of the sun is approximately 3-5 days. It's best to pump the water into one of the tanks located inside the shack as early as possible using a pump and extension cord. (See Figures 6 and 6.1) Start with filling the large stainless-steel round bottom tank located below the Reverse Osmosis machine so that the Osmosis process can begin. It is not recommended to fire up the wood evaporator until you have run at least two 300-gallon tanks of birch water through the Reverse Osmosis machine so that there's enough concentrate in the evaporator as well as extra in the elevated concentrate tank.



Figure 6: Water pump in tank



Figure 6.1: Pumping into shack

Reverse Osmosis Machine

The Reverse Osmosis (R/O) machine separates the water and sugar into concentrate (concentrated sugar water) and permeate (purified water). Once the large stainless-steel tank below the R/O is full of birch water, follow the steps below to get started.

Step 1: LOCATE your membrane as it cannot be stored below 0.

Your membrane will have been stored in a solution through a REQUIRED storage preparation (See page 18) process. Drain storage fluid from membrane cylinder and replace with DISTILLED water (not tap) fully covering the membrane. Let sit for 24 hours before proceeding to step 2.

Step 2: Inserting the membrane in the membrane housing:

TIP: Due to the design of the trailer, the membrane cannot be inserted without physically repositioning the Hobby as shown in Figures 8 & 8.1. Once the membrane has been inserted, slide Hobby back into its original position.



Figure 7: Membrane Storage Cylinder



Figure 8: Hobby before repositioning it



Figure 8.1: Hobby after repositioning it

Using the socket-wrench tool kit (Figure 9), remove couplings (Figure 9.1) and pull sealed white end off membrane housing (Figure 9.2).



Figure 9: Socket Wrench Kit



Figure 9.1: Couplings



Figure 9.2: Membrane seal

Insert the membrane into the housing following the arrows indicated on membrane as shown in Figure 9.3. Before sealing the membrane in, check the inside of the white seal and you will notice some holes as shown in Figure 9.4. The top hole in the picture reveals two black 'O-rings' that must not be pulled out of the tracks they are meant to be in. In other words, when you stick your finger inside, it should feel smooth indicating an effective seal. Apply a generous amount of food-grade grease also known as 'Molykote' (Figure 9.5) to help increase seal.

TIP: When tightening the clamps, it is important to tighten them as tight as possible, or else the clamps have been known to blow off shortly after starting up the machine due to amount of pressure required to run the machine. **ALSO**, be careful not to drop the screws into the large tank below because they are difficult to retrieve, especially when it's full of birch water.



Figure 9.3: Arrow indicating flow on membrane housing



Figure 9.4: O'Rings inside membrane seal



Figure 9.5: Grease for O'rings

Step 3: Hose

Blue SAP INTAKE HOSE always remains in large stainless-steel tank below.

Insert the hose labelled “Permeate” which is clean filtrated water into the white tank located under the smaller stainless-steel round bottom tank (*Figure 10.1*). This tank holds pure birch water that will read 0% when conducting a brix test as long as the R/O is functioning properly.

The hose labelled “Concentrate” will remain in the large stainless-steel tank located under the Hobby machine. This way the sap will recirculate and the sugar content will become more concentrated.

After several hours, the birch water will read 3-4% on a Brix test which means you must transfer the concentrate hose up to the small stainless-steel tank (*Figure 10.1*) located above the permeate tank which will therefor feed into the evaporator.

Note: The permeate water can be used for drinking, cleaning and rinsing the evaporator throughout the cleaning process.

TIP: Occasionally, test the Brix level (*Ref page 13*) of concentrate returning into raw sap tank, do not go higher than 8 brix or you risk plugging your membrane and your efficiency will suffer. A plugged membrane is NOT covered under warranty. It is also recommended to test the permeate tank to ensure it reads 0%. If the R/O is not functioning properly and sugar is getting into the permeate tank, you will lose it later when this tank is drained.



Figure 10: Labelled hose



Figure 10.1: Concentrate goes on top, permeate goes in tank below

Step 3: Install a Pre-filter

Unscrew the SS-ring using the tool located in the R/O box (Box with start/stop button). Pull down the SS-housing as shown in *Figure 11* and insert a clean filter as shown in *Figure 11.1*. Make sure when reattaching SS-housing that the SS-ring is properly installed or you risk blowing that seal.



Figure 11: installing a pre-filter



Figure 11.1: New filter

Sap pressure P2 Sap pressure P1



Figure 12: Sap pressure gauges

Make sure the prefilter is new or clean of any soap and that the prefilter housing is tight and the bottom plug is in place.

Replacing the Pre-filter: when the pressure difference between the gauges on the sap pressures is more than 50 psi, it's time to replace the prefilter. It also needs to be replaced if it's clogging, otherwise once or twice a week is not uncommon. See pressure gauges in *Figure 12*.

Step 4: Turning the machine ON

Note: Ensure proper maintenance has been done to the generator. See owner's manual in trailer.

Plug the machine into the generator ensuring the exhaust is facing outside of the shack. Push the start button until the green light stays on (5-20 seconds). Next, turn concentration valve clockwise (left knob) until flow rate on both flowmeters are equal. Permeate flow must be equal or higher than concentrate flow. See *Figure 24*.

Tip: Once the R/O has been running smoothly for about 5 minutes, turn on the ECO THROTTLE switch located on the generator to save energy.



Figure 13: Valves to adjust



Figure 13.1: Sap pressure

Verify the sap pressure occasionally, which should be somewhere between 125 and 250 psi. This machine seemed to operate around 175-200 psi. (*Figure 13.1*) Try to target 3-4 Brix (*See page 13*) before transferring the concentrate up to the small tank. When you are done concentrating, press the red button to stop the machine.

TIP: The machine is manufactured to shut off when it reaches 8 Brix. It is not recommended to let it run that long.

Cooking

Operating the Evaporator

Before ignition of the evaporator:

1. Install a thermometer at the exit of the last syrup pan (at the front), ensure you calibrate prior to installing, (See page 15).
2. Open the hinge of the smoke chimney using pull cord so that's half open.
3. Open the valve of the water basin leading to the water pan located under small stainless-steel tank and is attached to hose that connects to evaporator. Fill the pan until the level reaches 2" above the grooves. After starting the evaporator, stabilize the water level around 1" above the grooves. (Adjust the rear fleet to maintain the water level)
4. Open the valve of the front fleet box and bring the water level up in the syrup pans at least 1 1/2" above the exit spout. (The fleets maintain the water level, once adjusted, they should no longer need much correction)
5. Completely fill the fire box up to 4" from the syrup pans. Be sure to keep a distance of at least 6" between the doors and the wood-try to maximize the cooking heat.
6. Light the fire and bring the evaporator up to cooking temperature.
7. Open up roof baffles as necessary to allow venting of steam from evaporator.
8. The use of an anti-foaming agent is needed for proper operation of the evaporator. The anti-foaming agent avoids unpleasant syrup overflows. (See Figures 14 & 14.1)
9. Pay special attention to front and rear water levels and adjust as needed using the crank on each fleet.
10. The syrup is ready when it reaches 7 degrees above the boiling point of water indicated by the thermometer installed in step one. Open the valve when the syrup temperature reaches this level and close the valve as soon as the temperature drops. (See Figure 14.2)
11. Repeat the movement whenever the temperature reaches 7 degrees above the boiling point of water.



Figure 14: Kascher Antifoam



Figure 14.1: Liquid defoamer



Figure 14.2: Syrup has reached 7 degrees

12. As you become more experienced, you can reduce the water levels in the pans. The ideal level in the water pan is 1" above the grooves and 1 ½ " to 2" in the syrup pans. The lower the level, the quicker the boiling. Do not go too low as you risk burning the syrup and the pans spoiling the whole batch.

Brix Test

Definitions:

Brix: A unit of measurement used in the refractometer. When the Brix reading is divided by 2, it will be equal to the percent of crude sucrose in the plant tissue. (also known as birch water)

Refractometer: A device used to measure the refractive index of plant juices in order to determine the mineral/sugar ratio of the plant cell protoplasm.

The sugar shack is equipped with two Brix Refractometers. (See Figure 30) You will need to conduct this test several times throughout the procedure to check what the sugar content is at. Use the Refractometer that measures from 0%-32% when measuring sugar content in the earlier stages such as R/O outputs and during the evaporator stage. The sap was often transferred from the evaporator heat to the propane heat around 30 Brix.

How to Do a Brix Test

1. Using the metal scoop, take a small sample of the syrup and let it cool for a few minutes.
2. Next, flip back the clear plastic cover and using the plastic dropper, transfer a small amount of syrup onto the blue screen.
3. Flip the plastic cover back into its original position (on top of the sample) and look into the lens. *Figure 32* shows what you will see when looking into the eyepiece, only it will identify on this scale how much sugar content the sample contains.

TIP: Keep cleaning supplies handy such as paper towels and clean water to keep dropper clean, rag for screen.
DO NOT USE paper towel on screen

The first refractometer only measures to 32% and the second one only starts at 45%. There will be a discrepant time period where neither test will be able to read the sugar content, however the syrup is not ready to be bottled until it reaches 58-62%, so you have plenty of time to wait.



Figure 15: Brix Tests



Figure 15.1: Refractometer



Figure 15.2: Brix scale

When to do a Brix test

Stage	Why Test?	Required Percentage
Reverse Osmosis Stage	To make sure the concentrate is becoming more concentrated.	Never exceed 8 Brix in the R/O. We transferred it to the small stainless-steel tank around 3-4 Brix.
Permeate Tank	To make sure the output here is pure water.	Permeate tank should always read 0%
Evaporator Stage	To see what the sugar content is at.	We often transferred the syrup around 25-35% Brix. However, as mentioned above, the syrup is ready to be transferred when it reaches 7 degrees passed boiling point.
Propane Stage "Finishing"	To make sure it doesn't burn.	Test as often as you wish. As time passes, the Brix will start to increase at a faster rate. See chart below. The syrup is ready at 58% Brix.

Time	Brix
12:00	28%
13:00	35%
16:00	40%
18:00	47%
18:30	53%
19:00	62%

This chart is an example of what the timeline looks like to cook a batch once removed from the evaporator. You will notice how much more quickly the percentage rises near the end of cook.

Calibrate Thermometers

The thermometer is important for making precise measurements and can lose their calibration, so it's important to reset them frequently. This manual will describe the *boiling water method*.

1. Boil a pot of distilled water using propane burner.
2. Once the water has reached a rolling boil, (using gloves) insert thermometer, making sure not to touch sides or bottom of pot.
3. Wait a minimum of 30 seconds before adjusting.
4. Without removing the stem from the water, use the adjusting tab on the back to set the arrow at 0.



Figure 16: thermometer tab to calibrate

CAUTION: BOILING WATER AND OPEN FLAMES – WEAR GLOVES AT ALL TIMES

"7 degrees above the boiling point of water" means the arrow will travel fully around the gauge before it reaches the boiling temperature of water. 7 degrees later means the desired temperature to finish cooking the syrup at. Final Brix target is 58 Brix.

Propane

As previously mentioned, once the syrup in the evaporator has reached 7 degrees, it's time to draw off the syrup from the front pan to another cooking pan, see *Figures 17 & 17.1*. Next, set-up the propane. *Figure 17.2* shows the properly assembly; although not pictured below, for safety the propane tank will fit perfectly inside the stand under the red burner.



Figure 17: Set-up to transfer contents



Figure 17.1: Open valve



Figure 17.2: Propane set-up

Cooking on Propane Burner

1. Before you begin, make sure the hose from the burner is properly connected to the propane tank.
2. Make sure the main valve on the tank is fully open whereas the red dial should start closed and opened slightly while igniting the element.
3. Place cooking pan directly on top of the burner. Turn up heat to point where maximum heat is maintained on the element without extinguishing the flame.

Tip: If flame goes out, restart process of igniting burner once propane smell has fully dissipated.

4. Wait for pan to approach 7 degrees above boiling point. (This takes some time- see tip below)
5. The goal is to frequently monitor (20-30 minutes) the Brix and temperature of the syrup to continuously cook at 7 degrees until it reaches 58 Brix.

DO NOT BURN THE STYRUP!

TIP: Be patient and monitor as you will need to reduce the heat to stabilize at 7 degrees and cook for the next 4-5 hours.

NOTE: In between monitoring, set an alarm for yourself so that you can continue to do other tasks or maintenance without losing track of time. Stoke stove, split wood, clean buckets, check R/O, Brix testing etc.

Syrup Filtration

1. Line the stainless-steel filtration piece with a single piece of thick filter on bottom. (See figure 18)
2. Next, place 4-5 of the thin filters on top of that.
3. Place stain-less steel filtration piece (See figure 18) on top of the bottling pan. (See figure 18.1)
4. Once ready, place filtration pan under valve of pan containing syrup to transfer contents. (See Figure 18.2)



Figure 18: Filtration piece



Figure 18.1: Bottling pan (has a spout)



Figure 18.2: Syrup being filtered

Bottling the Syrup

1. Fill short stainless-steel pan with water. (See figure 19)
2. Place bottling pan on top.

Note: Only 1 pan fits on top, it has a different thermometer than the rest and has a spout. (See figure 19.1)

3. Ignite propane burner on high heat.
4. Syrup is ready to be bottled when temperature reaches 180 degrees. Make sure thermometer is calibrated. (Refer to page 14)
5. Remove heat and begin to pour contents into flask up to neck. Tightly seal with cap. (See figure 19.2)
6. Lay flask down on side and allow to cool. This helps create a stronger seal. (See Figure 19.3)
7. Store final product in cool, dry space.



Figure 19: Short stainless-steel pan

CONGRATULATIONS ON YOUR FINISHED PRODUCT! – High Fives



Figure 19.1: Bottling pan



Figure 19.2: Filling a flask



Figure 19.3: Strong seal

End of Season Equipment Maintenance

Reverse Osmosis Rinse and Wash

1. Insert designated prefilter that will only be used for the wash cycle for that season.
2. Pump clean permeate water into the large stainless-steel tank. Approximately half. This allows for clean water to wash R/O hose.
3. Put the concentrate and permeate lines into the large ribbed blue hose and place the end of that hose outside the double door.
(See figures 20 & 20.1)
4. Press the start button and hold until machine starts and stays on.
5. Turn the concentrate valve until P2 reaches 50 psi. (See figure 12)
6. Run for about 15 minutes, the objective is to reduce the remaining sugar in the R/O and membrane.
7. After 15 minutes, STOP the R/O.
8. Fill a 5-gallon pail with permeate at room temperature or slightly warmer or else R/O machine will stall.
9. Put ½ tablespoon of CDL soap in the pail, then test PH. Add more soap or water until target PH is reached. Use tabs shown in Figure 20.2.
(Max PH 11 OR 12 for end of season, if you go over, membrane will be ruined)
10. Put the blue hose and the concentrate and permeate hoses in the pail.
11. Start the R/O and adjust the concentrate valve to get 40 psi on gauge P2.
(See Figure12)
12. Let the R/O run until it shuts down by itself. It will stop when the wash water reaches the set temperature. (80' F or 30'C).



Figure 20: Cleaning the hose



Figure 20.1: Hose leading outside

13. After the wash, return the blue intake hose from the 5-gallon bucket into the large stain-less steel tank (ensure enough clean permeate water remains in tank for this step, about ½ full), leaving the 2 other hoses in the drain out the double door.
14. Start the R/O and rinse the membrane with about 100 gallons of permeate. (Adjust pressure P2 to 50 psi)
15. Stop the R/O or let it stop by itself when it runs out of permeate. Not recommended to run the R/O dry.
16. You are ready to start concentrating again.



Figure 20.2: PH tabs

** This process needs to be done if pre-filter is clogging or if the machine goes unused for a period of time. (couple days)

End of Season Storage

1. Prepare the machine the same way you do to drain the R/O.
2. Remove the membrane from the machine, store in your storage cylinder. (See page 8, Figure 7)
3. In a separate pail, mix half and half: Distilled water and Propylene Glycol. (See Figure 21)
4. Pour in the cylinder enough storage solution to cover the membrane.
Tip: Pour in mix after membrane has been inserted.
5. Close the cylinder and store in a location where it won't freeze.



Figure 21: Propylene Glycol

Wood Evaporator End of Season Clean

1. Fill the pans with permeate or clean water to about 2 inches from top of the evaporator.
2. Add CDL recommended cleaner (See Figure 22).
3. CDL recommends 1 litre in big pan and ½ litre in front pan.
4. Heat water to 90°C, turn off heat and let stand overnight.
5. Using PVC black piping, drain stove.
6. Fill pans again with water, boil and drain. Repeat 1 more time.
7. Never use abrasive products, wire brushes, steel wool or products containing chlorine or muriatic acid.
8. If there are blockages or clogging the evaporator should be drained, rinsed and boiled with water. If you're not experiencing any issues it's perfectly fine to clean it at the end of the season.
(Keep in mind valves that aren't used often and consider opening them from time to time.)
9. The best way to return the pans to their original state is to take the evaporator apart and scrub all parts individually with non-abrasive scrubbies, warm water and soap. (See Figures 22.1 & 22.2)



Figure 22: Pan Acid

IMPORTANT: Between seasons, if there is the slightest trace of acid left in the pans, they will be full of holes at the beginning of the following season.



Figure 22.1: Cleaning Supplies



Figure 22.2: Evaporator parts being cleaned individually

Buckets and Spiles

Buckets:

1. The blue buckets all need to be properly cleaned with a good scrub, using warm water and soap before being put into storage for the winter.
Note: If this step is not done properly, a strong odour and mould will develop in the buckets, so do a good job.
2. Each bucket needs to be properly dried so that there is no water residue. The best way to do this is outside on a trailer with access to a hose.
3. Next, the buckets need to be stacked and wrapped in plastic wrapping to preserve their cleanliness. In 2018, they were stacked in piles of 20, wrapped using industrial sized plastic wrapping and stored in the sugar shack. (See figure 23)



Figure 23: Wrapped and ready for spring

Spiles:

1. Each spile needs to be individually inspected and scrubbed to remove debris and leftover sap.
2. Next, add warm water and a cap full of Javex to a bucket. Then add spiles to bucket.
3. Let sit for several hours, stirring occasionally.
4. Rinse 2-3 times with water ensuring Javex has been fully rinsed and allow to air dry.
5. Store in clean dry area for winter.



Figure 23.1: Clean spiles

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