Best Management Practices for Maple Syrup Producers in Nova Scotia
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INTRODUCTION

About MPANS

The Maple Producers’ Association of Nova Scotia (MPANS) is a Provincial Association whose members consist of any maple producer or potential producer in Nova Scotia or any associated representatives approved by the Board of Directors and who has paid their annual membership fee.

The objectives of MPANS are to encourage the development, expansion and improvement of the maple industry in Nova Scotia by:

- promoting the production of high quality maple products produced with ‘Best Management Practices’;
- promoting production practices that stress food safety and good hygiene;
- developing a greater interest in scientific and labor saving methods of production;
- promoting sound woodlot management practices;
- promoting marketing methods leading to increased revenue for producers;
- encouraging research and development projects related to production and marketing of pure maple products;
- working with governmental, agricultural and other organizations to promote the interests of both producers and consumers of Pure Nova Scotia Maple Syrup;
- informing consumers about the quality and safety of maple products made in Nova Scotia and about the uses for pure maple products;

Nova Scotia’s maple producers are concerned with the long term sustainability of the maple industry, sugar bushes and maple operations in this province. They are also concerned with producing quality and safe maple products for sale to consumers. These concerns will be addressed in these ‘Best Management Practices’ for Maple Producers in Nova Scotia. Another good resource for Maple Producers is the North American Maple Syrup Producers Manual produced by Ohio State University Extension in cooperation with The North American Maple Syrup Council.

Continuous Improvement: Best Management Practices

To ensure that the MPANS Best Management Practices document maintains currency, the Best Management Practices will be reviewed by the MPANS Board of Directors annually. The membership is encouraged to bring up items that they believe should be included or for which they have supporting documentation showing that aspects of the document need to be updated. The MPANS Board of Directors will take this member feedback into consideration during the annual review.
This document adheres to a methodology of continuous improvement. It is meant to represent the best known practices to date with continuous incremental improvements being made over time. Please see the footer section of each page for the current version number and release date. It is not intended to be a final draft or a complete works.

It is meant to be a credible guidance document to outline the most current acceptable standards and practices for the production of maple syrup. Please do not try to implement all of these things at once. Instead, identify where your operation requires improvement and start working on those items slowly and steadily to incrementally improve your operations, efficiencies and ultimately your finished product. This document is also not intended to outline the only or the perfect way to do things in your sugar woods and operation.

PRODUCTION

Site Selection - Before you start

Woodlot management is likely the most important first step in preparing to tap trees. You also need to decide how you will be collecting the sap. Will you be using the traditional sap bucket for collecting sap or select the more popular modern day tubing installation? Will you be using a gravity system or vacuum system? Making this choice for a tubing installation may take some time and involve getting advice from a forester or another qualified person.

Probably the third most important thing is gathering information on current tubing installs and deciding what set up fits your woodlot best, this might involve visiting several modern installs or having an expert(s) visit and show you some options for your layout. One thing that needs to be stressed at this point is that there may be several opinions on the ‘Right way to install tubing’. The goal of modern tubing installations in most cases is to get the same level of vacuum that is at the vacuum pump to the last tree on your system. There are several set ups that do this very well. The key to all of them is proper amount of available vacuum created by the pump to handle the number of taps and the equipment to be operated by vacuum. Other critical points to consider are proper sizing of the mainlines, proper number of taps on each size of mainline and most important of all the maintenance on the system once installed. A general guideline/best practice to follow is that after initial tapping and repairs are done each of the 7000-10000 taps requires a full time person every day during the season to check for leaks and maintain the system’s ability to hold high vacuum.

Consider the best location for sap collection points. The lowest elevation in your woodlot should be considered, even if it means you have to transfer sap by pump or hauling to the processing facility. Under no circumstance is it acceptable to run the mainlines uphill - even the last few feet before they enter the vacuum extractor at the sap tank.

Spend time to mark the location of mainlines using ribbons on trees as a guide and rechecking the location several times until the best possible location and grade achievable is found. Much of the same procedure can be used if you are utilizing a gravity system. It’s even more important in that case to ensure you have the proper location, grade and sizing of your system.
Sugar Woods Management

Maple producers should manage their sugar bushes to keep them healthy so that the trees will produce a good yield of maple sap on a continual basis over many years. Maple producers promote healthy trees, a healthy woods and a healthy environment. This is accomplished by:

- Writing a management plan to include:
  - A historical summary of the sugar woods.
  - Maps (survey & topographical) and aerial photographs.
  - An inventory in the various sections of the sugar woods that will include species of trees, diameter of trees, general health of trees, potential problems, a rating of the regeneration of trees, and the number of tappable trees.
  - A report of any trash or garbage piles in the sugar bush. Steps will be written showing how clean-up will be accomplished.
  - Statement of objectives for the sugar bush both over the short-term and the long-term.
  - A plan of activities over the next three to five years.
- Detecting potential woodlot management problems before they become serious.
- Thinning the sugar woods to promote increased growth rates, increased crown development and improved health, being careful not to thin too heavily. Thin trees that are sick, dying or crowding good trees up to 10% of the maple stand. If pine, fir or spruce is intermixed, clear no more than 30% of those trees. Break large woodlots into sections and complete the work on one section per year. If you are unable to do this on your own then hire a qualified silviculturist. Proper woodlot management will improve sap yield and ensure healthy maple trees in the years to come.
- Being careful not to damage crop trees, potential crop trees, or the soil when doing any activities in the woods.
- Being careful not to alter the drainage in the sugar woods when building roads.
- Encouraging an uneven aged stand over time so that younger trees will be available to replace over-mature trees.

Tubing Installation

Using only a high carbon #9 or equivalent wire at a minimum is critical to suspend mainline properly and maintain the tension required to support the mainline once installed. During installation using a come-along to add tension is highly recommended. Non high-carbon wire will not stop stretching and will be impossible to maintain the tension required.

The high carbon support wire should NEVER be installed so that when tightened it pulls back against a tree at any point along its path. Failure to install the carbon support wire correctly can lead to the tree becoming girdled by the wire and the wire becoming impossible to raise or lower as required (see photo at right). It should always be a few inches away from any tree; doing so will make maintenance and any adjustments to height later very easy.
The high carbon wire will need to be tied to trees at several points to add tension and to support it. The most common method today is to use a lighter gauge wire and old pieces of tubing to protect the tie-back trees from being girdled.

Use a food grade mainline designed specifically for maple sap collection. Generally this type of mainline is referred to as linear low-density polyethylene pipe. This type of pipe is much smoother inside so it's easier to clean and stays clean. It also has thicker walls that will withstand the high vacuum levels that are achievable when using a vacuum installation (it is not uncommon to have pumps designed for the maple industry that will deliver over 28”/HG). It is preferred over standard potable water line which is referred to as high-density polyethylene pipe.

Mainlines should be tied to the support wire at approximately 12-inch intervals, the most common method used today is to use wire ties for this job. Wire ties are available in sizes that match the various sizes of mainline.

Adding strain to the mainline with a come-along will make the tying process much easier. When tying the mainline, and while the tension from the come-along is on it, adding a hose clamp at approximately 100-foot intervals to attach the wire and mainline together is a very good idea. This helps prevent the mainline from forming snake-like loops due to temperature changes which cause expanding and contracting. These snake-like loops and sags are extreme vacuum killers. Unless on a steep slope, mainlines should be attached to posts at approximately 20 foot intervals using cedar posts, fence posts, steel pipes, etc. to eliminate sags.

There are various recommendations for the number of taps for 5/16 tubing. General guidelines are to adopt a layout with an aim to maintain approximately 10 taps per lateral. It is common to end up with as few as five or as many as 15 taps per lateral. The 5/16 tubing should be set up to work with the slope and run in an easy to follow pattern and make the all-important leak detection process as easy as possible. The 5/16 tubing should never be connected to the manifold in a way that allows for direct strain on the manifold; in all cases a fitting that hooks directly to the mainline support wire should be used so all strain is on that fitting. This will leave a loose loop of 5/16 tubing that is then connected to the fixed head manifold.

Manifolds should be carefully considered and there is no doubt that for the best results extreme care must be taken when installing them. A single model with a fixed head has been shown to be favorable. Maintenance of the tool used for the hole-boring into the mainline is important; it should be kept very sharp so a perfectly round clean hole is made every time.

Drop line installation is very important and the goal should be to try to have them installed at the center point where the pipe is passing the tree, some tension should be added as required while installing the drop line. Historically, drop lines should be a minimum of 28 inches long however some producers find that this is actually too short to allow for a good tapping pattern, some
producers are now ordering 36-inch units and feel that they are getting a very good result. You want to make sure it’s long enough. One drop line per tree is the best rule to follow no matter the size of the tree.

3/16 tubing systems are also an option. There is a publication on this topic on the University of Vermont, Proctor Maple Research Center’s website. See the Member Resources section for the web address.

Incorrect Tubing Installation – What not to do!
Correct Tubing Installation
Vacuum: Basic Requirements to Consider Before Starting a Tubing Installation

- Every 1000 taps require 10 CFM (cubic feet per minute) of vacuum pump capacity
- Each extractor requires 10 CFM of vacuum pump capacity; this includes reverse slope extractors or other vacuum operated equipment such as vacuum powered pumps
- Mainlines need to be sized according to the distance they will run, the amount of CFM required for the number of trees and pieces of equipment; as well as the amount of CFM your vacuum pump(s) create. Increasing the size of the vacuum pump (increasing the CFM put into the system) will not mean more vacuum to the woods - higher CFM in mainlines that are too small will not help due to the restrictions created
- Mainline diameter and length determine the amount of CFM that gets to the tree
- Mainline smaller than 1-inch should NEVER be used
- Use mainline connections that do not restrict the inside diameter of the tubing, such as stainless steel fittings designed for maple installations; almost all plastic insert fittings will reduce the mainline inside diameter by one pipe size
- In order to get good vacuum through properly sized mainlines they must be graded to achieve the best possible slope, must be tight, and have no sag where sap will lay and cause restrictions
- Always use friction loss charts for calculating CFM losses in mainlines. These charts are very easy to use and a copy is included in this document.
- Using friction loss calculators for mainlines for pumping sap over long distances is also a must. There is also a chart in this package that will help with this. The Hazen-Williams equation online calculator is highly recommended, it is very easy to enter the different parameters such as flow rates in GPM, pipe size, pipe length etc. to determine the pressure required
- Once installation is complete, the trees are tapped and vacuums are turned on the work of leak detection can begin. Walk mainlines and stop briefly at each manifold and WATCH for movement through the loose loop where it enters the manifold. Very slow to stopped sap movement means move on to the next one as there are no leaks. Tubing which allows a view of the sap movement inside is very important; most tubing today is designed especially for this purpose
- It’s okay to have a vacuum gauge at the pump and on the extractor located at the tank, but there should be very little info collected from these as they have little to no relevance to the amount of vacuum you are getting at the tree
- Vacuum installations do not hurt the tree, vacuum installs take the air out of the lines, and they do not pump the sap from the tree.
• A vacuum gauge located at the ends of the mainlines should be checked initially. Once the vacuum level at these locations is the same as the pump, it’s time to work on keeping these vacuum levels. During the season each freeze/thaw cycle can loosen taps, fittings, etc. Each time there is high wind there could be a limb break or a fitting loosened, and of course there are many other factors that make it paramount to continue the leak detection process from the beginning of the season until the last run.

• A good indicator of leaks is to watch inside the extractor and watch the flow as it comes in. A leak-free flow is steady and does not surge or show signs of air entering and splashing against the opposite side of the pipe entrances.

• Another telltale sign at the extractor is as the temperature drops ice will form inside the extractor manifold. In a situation where there are many leaks, ice will form well above 0 degrees Celsius under the right conditions. Once this happens sap stops flowing.

• Producers have reported that when the system is tight and no ice forms inside the extractor at freeze-up something very interesting happens— they are continuing to collect sap well below 0 degrees Celsius. Some producers have reported being able to collect many nights until the temperature gets below minus 2. When the temperature gets lower and the sap stops they are finding that there is no ice formed inside the extractor manifold. This keeps the sap in the lines and allows sap to start flowing earlier the next day.

• Vacuum pumps should be started before temperatures rise in the mornings (0°C or warmer) and left running until well after freeze-up (at least until the temperature reaches -4°C) by doing this you prevent back flow. There have been several occasions in recent years where by keeping the leaks under control under high vacuum the pumps have run 24 hours a day for several days.

• To check the vacuum reading at the tree during the season, place a set of vice grips (with the jaws covered with a scrap piece of 5/16 tubing to protect your tubing) on the drop line at the furthest tap before pulling the spile from the tree. Install a vacuum gauge adapter at the spout then take the vice grips off the drop line, you will see the correct reading. If you do not use vice grips you will be adding air to the line and it will not be an accurate measurement.

• Producers who have achieved high vacuum at the tree have noticed that during periods with little or no frost during the season that sap will still flow very well. It becomes the norm to collect sap with vacuum when others with little vacuum at the tree or no vacuum are getting no runs at all.

These are just a few notes that should help with understanding some of the important things to think about when considering installation of vacuum tubing; there are many other factors that should be considered and there are always new things to learn.
VACUUM REQUIREMENTS IN CFM - CALCULATING LOSS IN PIPES

*Number of taps _____ X 0.01 = ______ CFM Necessary

**Add number of pieces of Vacuum equipment - (releasers, vacuum piston transfer pumps etc.), allow 10 CFM extra requirement for each

*Total length of Mainlines in feet ___ /100 = ______ = the multiplication factor
Multiplication factor _________ x _______ Loss in pipe = _________ Friction loss in PSI

*The number of PSI _________ X 2.03 = ______ the loss in HG
Total air required in CFM –

Example:

2000 taps (Requires 20CFM), 1 releaser (requires 10 CFM), 1 vacuum piston transfer pump (requires 0 CFM) total CFM required = 40 CFM

25 (2500 feet of pipe /100) X .044 (Friction loss from chart -- 40CFM under the 1 1/2 heading) = 1.1 (Friction loss in PSI) X 2.03 = 2.23 Loss

In this example the loss is good and the pipe sizing is correct, if we try this with a smaller pipe, let’s use ¾ “ it seems to be a common pipe requested see the results below.

25 (2500 Feet of pipe /100) X 1.300 (Friction loss from chart -- 40CFM under the ¾ heading) = 32.5 (Friction loss in PSI) X 2.03 = 65.97 Loss

It becomes very obvious very quickly that the proper size of tubing be used, it is a very important aspect of getting vacuum to your trees and a critical requirement to achieve high sap production levels

Tapping Trees

Holes are drilled in maple crop trees in late-winter in preparation for the maple season. Recommended tools to have on hand when tapping are a hammer, drill and drill bits, spray bottle filled with 70% alcohol, ribbon, and a small brush to clear snow off the tree, colored wax stick or paint to mark the hole.

How early tapping begins depends on the cleanliness of the equipment, the number of trees, number of people available to help, weather forecasts, and type of taps used (disposable taps take a little longer to use). The first run is better value than end of season runs. There are still some good daily flows toward the end of the season; however yields can decrease if good tap sanitation is not practiced. Starting with clean drill bits and taps will prevent the trees from trying to heal the tap hole over and sap will flow longer. For example:
You Can Begin to Tap In:  If You Begin With:

| January       | • New spout, new drop line or  
|              |   • Check valve spout (backflow preventer) & an old  
|              |   • Drop line with 70% isopropyl alcohol (food grade) & a  
|              |   • old drop line  
|              | • Dirty drop line and a new spout or  
|              | • Dirty drop line and a clean spout  
| March         | • Dirty drop line & dirty spout  

If the drop lines were not injected with 70% isopropyl alcohol and the taps fully capped between May and October; then wipe the taps by hand with 70% isopropyl alcohol, spray or use a container filled with 70% isopropyl alcohol to dip the tap before installing it into the tree.

Disposable taps are meant to be single use only, they do not have UV protection and are easily marked and scratched which makes them hard to clean and cause leakage around the spile. When installing disposable make sure to have long drop lines as ¼ inch of tubing will need to be cut off each year to install a new disposable tap.

Failure to replace spouts and drop lines or to properly clean the tap and drop lines will lead to a steady drop in yield year after year.

When buckets are used to collect sap make sure they are clean. Aluminum spouts must be boiled for one hour and handled carefully so that the spouts stay clean. Textured spouts or old spouts that are scratched are hard to clean. Instead use smooth spouts, they are easier to keep and stay clean.

Producer/members should ensure that drill bits are sharp. Failure to do so may lead to poorly-drilled holes, with uncut wood blocking the holes thus decreasing sap flow. Drill bits at the end of each day should be cleaned well with soap and water, sanitized properly and allowed to dry after each use to prevent contamination. Different drill bits should be considered for hard wood (sugar maple) and soft (red maple), frozen versus unfrozen wood. One type of drill bit that works for any kind of wood in any weather are drill bits that are sharpened to the Bolduc standard. Bolduc drill bits can be purchased from any of the maple equipment suppliers or ordinary drill bits can be sent to the address in the Member Resources section and be sharpened to the Bolduc standard for a low cost. Ask them to sharpen only the good drill bits; if you request this they will examine the bits and be sure and send you back those sharpened to the Bolduc standard that would produce a good tap hole.

A good drill bit should be able to drill 1000 taps before it needs to be re-sharpened. After 2000 taps a drill bit will likely need to be replaced.

Be certain of the size of the spout you are using as some spouts manufactured by different suppliers might require either a 5/16 or 19/64 bit to make the proper hole.

It is a worthwhile investment to purchase a good quality cordless drill that is lightweight and does not have a weak chuck and has a strong, long lasting battery. Regardless of drill type - when drilling through the bark, the drill should be on a slower speed. Use full speed when drilling in the wood. Make sure that the drill bit is slightly off level (approximately 1° off level). The tap hole should be drilled slightly upward. If you are collecting in a bucket it’s not as critical,
but if using tubing there will be leaks if a level hole is not drilled. Use two hands to keep the drill steady and face the tree. Put one leg in front of the other when you tap, it’s easier on the back than with the feet side by side. Resting an elbow on the tree will help stabilize you. Keep the drill moving as you drill in and out of the tree to avoid leaving pieces of wood inside the tap hole. Care should be taken not to drill into decaying, discolored (brown wood), diseased or damaged wood.

Trees react to tapping by producing compartmentalization that causes wood to darken at the drill site. Sap will not flow through dark wood. If tap holes are too close together it will cause the tree to react and the area of dark wood will increase. Typically a tree grows an inch of new wood every 10 years. It can take 30 to 50 years for the tree to heal enough to be tapped again in the same spot. Proper wood lot management as mentioned previously can cut the healing time in half.

Never put chemicals in the tree, it is not permitted in Canada and it increases the size of the injury site.

Spiles should be seated firmly into the tap hole being careful not to split or damage the tree around the tap hole. If the spile is too hard it may pop out of the tree a bit; a softer spile will hold in place in a cold tree. 7/16 inch spiles should be used if you have a gravity system or are collecting in buckets because they will give a better yield without the assistance of a vacuum system. Producers using a vacuum system should consider using the smaller 5/16 or 1/4 inch spiles. These smaller spiles seem to yield nearly the same amount of sap, are easier to get a good vacuum with, and are easier, less damaging, on the trees than the 7/16 inch spiles. Very few producers in the industry are still using 7/16 spiles. Do not go lower than ¼ inch.

The tapping depth should be 2.5-5 centimeters (1-2 inches) into healthy sapwood (white wood) of the tree. Do not tap too deep as this increases the injury to the tree. Reduce the depth of the tap hole and compensate with increasing vacuum to minimum of 25” mercury measured at last drop line.

If it’s -5°C outside there shouldn’t be issues with the wood cracking when you tap the spout in; when its -10°C outside be careful when tapping the spout in, tap gently so that the wood doesn’t split. When it’s -20°C give it one gentle tap and come back later when it’s warmer to secure or you risk cracking the wood.

Sap flows through the healthy white wood of the tree. New tap holes should not be located within 15 cm (6 inches) of an old tap hole, alternate sides of the tree as well. It’s best to tap in a clockwise or counterclockwise rotation around the tree, varying your holes up and down the tree; this will ensure you don’t cause large bands of dark wood to form. Mark the holes tapped with a brightly colored wax marker, or spray paint a small mark under the hole. You can do this as you tap or as you remove the taps from the trees at the end of the maple season. Trees should not be tapped if they are too small and should not be over-tapped. Tapping a tree that is too small or putting too many taps in a tree will put unnecessary stress on the tree.

A suggested number of taps based on tree diameter:
- Less than 20.5 cm (8 inches) – 0
- From 20.5 to 40 cm (8 to 15 inches)– 1
- From 41 cm or larger (16 inches or larger)– 2
If you have a large tree and choose to place 2 or more taps in it then make sure they are positioned up and down the tree and on opposite sides to each other. Sap flows better vertically than horizontally. It is not recommended to tap more than 2 holes per tree measuring 15 inches or larger. It doesn’t give you more sap, but it does give the tree more injury.

The height of the tap hole is dependent on the slope of the wood lot, snow conditions and how the sap is collected. For best results don’t tap higher than 6 feet above the base of the tree. Drop lines should be installed at a $45^\circ$ to $90^\circ$ angle above the 5/16” tubing, if you tap below this line then there could be back flow into the tap hole. You should tap a minimum 6 inches above previous holes and minimum of 2 inches to the right or left. If you drill really high one year, you can lower the 5/16 inch line and drill the same side a minimum 6 inches down and minimum of 2 inches to the right or left the next year. If trees are located in a wet area drill 1¼ to 1½ inches shallower. To determine if the area your trees are located is wet look at the bark and the size of the tree; trees located in wet areas tend to be short and have poor quality bark. While drilling if you see all white shavings you’re in a good spot, some brown shavings are ok. If all the shavings are all brown you may want to consider drilling a new hole.

Pest Monitoring and Control

Maple trees can become damaged from insects and disease. It’s important to be vigilant and monitor for pest and disease damage and report any observations of unusual insect activity, defoliation etc. These occurrences can be reported and advice sought from Dale McIsaac extension specialist contracted with Perennia Food and Agriculture or any of the MPANS directors. Information posted on the MPANS website details the current pests affecting the local industry.

Members should be familiar with the factsheet titled “Characteristics of a Good Sugar Maple Stand", written by extension specialist Dale McIsaac for Perennia and MPANS. It is posted on the Perennia Food and Agriculture website www.perennia.ca there is also a link to it on the MPANS website.

Sap Collection and Storage

When installing permanent tubing systems for collecting maple sap, producer/members should use only CFIA approved food grade polyethylene tubing that is manufactured for the maple industry. Collection lines should be kept as tight and straight as possible and should be installed at a slight downhill gradient.

Tanks used to store sap should be made of stainless steel or food grade plastic. Tanks that are showing rust or were once used in a non-food application should not be used for storage of maple sap. Sap should be kept cool until it is evaporated. Each time a tank is emptied of sap, it should be cleaned with potable water.
Tap and Tubing Sanitation

Tubing systems can develop decreased sap yields over time due to the age of the lines and bacteria growth over time. The University of Vermont, Proctor Maple Research Center as well as other research centers have informative publications available on this topic. See the Member Resource section for links to these websites.

Mainlines and tubing needs to be drained and flushed with clean water at minimum at the end of the season. Keep the vacuum on, attach a vice grip on the line above the drop line. Vice grip should have 5/16 tubing piece inserted on the jaws to protect the line. Then using a spile remover tap the spile two times on both sides and pull it out of the tree gently - removing the bark could take 8 years for the tree to repair itself. Start at the end of the line and go in the direction of the main line.

Drop lines and taps can be hard to clean. Some operations choose to replace the hard to clean drop lines, valves and taps annually to help prevent this. Some stack the lines with water and or bleach and flush the lines at the end of the season. Others opt to use 70% alcohol injected into the drop lines which are then capped and left to evaporate when the season is over. NOTE: At the time of this document’s publishing 70% isopropyl alcohol is not approved for use for products being shipped to the United States. Approval is pending. Isopropyl alcohol is ok to use if you are organic.

When injected into the tap and drop line any time between May and October, 70% isopropyl alcohol (food grade) produces a gas over time. When the spout is capped fully the alcohol in the line will keep the dropline and tap clean until next season. To cap the spile, purchase caps for this purpose or use a long T to place the spile in. If you do uncap - you have 24 hours to place that spile in the tree or you will need to add more 70% isopropyl. The alcohol must be 70% not 95 or 50%. To clean the drop line, do not start the vacuum, empty the drop line of any sap (if you leave sap in the line it will dilute the solution), inject the spile and drop line with 15ml of 70% isopropyl alcohol, cap and let sit until tapping next season. The line and tap will look as clean and new as when you installed it. Bleach and peroxide do not produce a gas and over time lose their effectiveness, so you will see that lines and spouts will become dirty. Use of the check valve spouts or disposable taps is a good alternative to the alcohol.

SUGAR HOUSE

Sugar House Design and Construction

It is important to remember that as a sugar maker, you are making food products for human consumption. It is imperative that you take every step possible to ensure that the food you produce is safe, and is top quality.
Interior

- The sugar house interior including ceilings, wall and floors should be constructed of materials that allow easy, thorough cleaning and washing.
- Floors should have slope that is sufficient to allow flow to a trapped drain.
- Work surfaces should be smooth, free from cracks or rust and should be able to stand up to repeated cleaning and sanitizing. Stainless steel or food grade plastic surfaces are preferred. Work surfaces should not be made of wood.
- Care should be taken when handling wood and fuel oil to prevent cross-contamination with maple products.
- To prevent cross-contamination from other agricultural activities, clothes and especially work boots used in other farming activities should not be worn or even allowed in the sugar house.
- Maple evaporator pans and other equipment used should be made of stainless steel manufactured after 1994, and should contain no lead solder.
- Only preheaters that were manufactured using lead-free solder, and preferably made of stainless steel, should be used to preheat sap before it enters evaporator pans. Brass or bronze fittings should not be used.

Lighting

Lighting should provide sufficient illumination for working, and lights/fixtures should be constructed of shatterproof material and/or protected so that food does not become contaminated with broken glass if a bulb or fixture should break. Lighting should be checked with a calibrated light meter. If no calibrated light meter is available there are many free apps available on Android and IPhone that can be used to give an approximate reading of the light quality in the sugarhouse.

<table>
<thead>
<tr>
<th>General Lighting Guidelines</th>
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<tbody>
<tr>
<td>110 lux (at a distance of 3 feet from the floor) in storage areas and other areas when cleaning</td>
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<tr>
<td>220 lux (at a distance of 3 feet from the floor) in general production areas, washrooms, handwashing areas, equipment/utensil storage, sales areas.</td>
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<tr>
<td>540 lux at the location where personnel are handling product (packaging, grading, inspecting etc.)</td>
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Waste

All garbage, debris and clutter should be removed regularly both from the interior and exterior of the sugarhouse. These items give pests good places to inhabit and a sustainable food source.
Sugar House Preparation

Pre-Season and Post-Season
Take stock and inventory of packaging, replacement parts and tools. Clean and inspect the sugar house to ensure the evaporator and tanks are ready to go before the season starts and are cleaned at the end of season. Storing equipment clean will help with the pre-season preparation as well as discourage pest infestations and yeast and molds from forming. Ensure that all equipment, tools and supplies are organized and ready for the upcoming season. Stock up on firewood, oil, gas and/or propane. Remove any waste or areas where pests could nest and/or feed. Continue to keep the area clean during the pre-season. Ensure that there is a stocked first aid kit and fire extinguishers are charged.

Processing Sap to Syrup

Density
Maple producers in Nova Scotia produce and market maple syrup that is between 66° Brix and 67.5° Brix. The proper devices (hydrometers, hydrotherms and refractometers) for measuring density should be used to ensure proper density of syrup. These measuring devices should be calibrated regularly.

Defoamers
Defoaming agents are used to keep sap/syrup in evaporator pans from foaming or boiling over. Producer/members should only use defoamers made for the maple industry and available from maple equipment dealers. Animal products, vegetable shortening, peanut oil or soy oil should never be used. These products can cause allergic reactions and can impart off-flavors to the syrup.

Filtering
When sap is evaporated to syrup, some solids are precipitated out. These solids need to be filtered from the syrup. Producers should use proper pre-filters, filters and filter presses to filter the syrup before it is packaged for sale. Synthetic filters should be soaked and agitated in potable water, air dried and placed in a clean cloth bag kept in a clean, dry and well ventilated area. Filters and filter presses should be kept clean and in good working order. Detergent and/or scented cleaners or sanitizers should never be used to wash sap or syrup filters.

Grades
CFIA has adopted the grading system for maple syrup recommended by the International Maple Syrup Institute (IMSI) announced in January 2015. There are two new grades for maple syrup which have been assigned new color classes with taste descriptors. There is a two-year transition period which allows for both the old system and new system to be used until December 12, 2016. On and after December 13, 2016 only the new grading system will be permitted to be used.

Until December 12, 2016 syrup that meets all the new descriptors with the exception of “Canada Processing Grade” may be graded as "Canada Grade A" in the former system, providing it meets the requirements of the "Canada Grade A" grade.

Requirements are as follows:
- It is free from fermentation;
It's uniform in color and free from sediment, cloudiness or turbidity;
It meets one of the four color classes listed in the table below
It has a maple flavor characteristic of its color class and is free from any objectionable odors or tastes.

Maple syrup that does not meet the "Canada Grade A" requirements may be graded as, "Canada Processing Grade". There are no color classes for this grade.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Color Class</th>
<th>Light Transmittance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada Grade A</td>
<td>Golden, Delicate Taste</td>
<td>not less than 75.0</td>
</tr>
<tr>
<td></td>
<td>Amber, Rich Taste</td>
<td>less than 75.0 but not less than 50.0</td>
</tr>
<tr>
<td></td>
<td>Dark, Robust Taste</td>
<td>less than 50.0 but not less than 25.0</td>
</tr>
<tr>
<td></td>
<td>Very Dark, Strong Taste</td>
<td>less than 25.0</td>
</tr>
<tr>
<td>Canada Processing Grade</td>
<td>has small quality defects but it still meets all food safety and quality regulatory requirements for human consumption</td>
<td></td>
</tr>
</tbody>
</table>

In Canada all maple syrup produced in federally registered establishments is subject to the Maple Productions Regulations (MPR) which are enforced and administered by the CFIA (Canadian Food Inspection Agency). The Maple Products Regulations published by the Minister of Justice are at the following address: http://laws-lois.justice.gc.ca. They apply to all maple products including maple syrup, maple sugar, soft maple sugar, maple butter and maple taffy.

Currently the only provinces that regulate intra-provincial marketing of maple syrup are Quebec and Ontario. Nova Scotia, New Brunswick, and Prince Edward Island do not currently regulate the maple industry so at this time such maple products produced in these provinces are only subject to the Food and Drugs Act and its regulations.

Attend the International Maple Syrup Institute Maple Grading School if possible offered through the University of Maine (see member resources section). This course provides a wealth of information, and problem solving tips that assists in the production of high quality maple products.

**General Equipment Use Guidelines**

Equipment, such as but not limited to, sap storage tanks, dumper/sap extraction, reverse osmosis, evaporator, finishing pan, generators, hydrometer and hydrotherms will need to be maintained as per the manufacturers requirements. The North American Maple Syrup Producers Manual has additional information on these pieces of equipment. See Member Resources.

**Refractometers**: Used for measuring syrup density, they are handheld, delicate pieces of equipment and may be inadvertently bumped or dropped so they will need frequent calibration checks. Syrup must be cooled to at least 65°C (150°F) in order to get an accurate reading. Simply place a drop of syrup on the clean glass prism and close the lid (unless a digital model is
being used). Hold the refractometer up to the light and look through the eye piece. A good light source is required in order to see the 'shadow line' on the scale. A solid shadow line should be visible and will indicate on the scale the Brix measurement of your syrup. Distilled water and a soft tissue are used to clean the prism.

**Thermometers:** Thermometers and temperature probes are typically in place at various points of the boiling process. Avoid mercury type thermometers and opt for plastic instead of glass thermometers where possible. Metal probes are typically in place on most evaporators; opt for plastic dials to avoid glass breakage. Temperature guns can also be used and should be calibrated much like the thermometers and probes.

**Personal Hygiene and Cleanliness**

Producers need to keep in mind that they are making and selling a food product and should maintain a high level of personal cleanliness and hygiene. People working in a sugar camp should not smoke or eat near where maple is being produced or stored. Clothing worn by those working in the sugar camp should be clean and free from hair, wood splinters and dirt. Hands must be washed before engaging in any maple processing, manufacturing or packaging activity. If visitors are allowed in the sugar camp, they must follow similar hygiene rules. The following list is the recommended personnel hygiene & employee conduct standards that should be followed in the sugar house or wherever maple products are produced and packaged.

**Personnel Hygiene & Employee Conduct Standards for the Sugar House**

**Hairnets must be worn in the sugarhouse.** Hairnets are not only to keep hair out of food but more importantly to keep what is in or on your hair out of the food you are producing. Baseball caps or other hats are not a substitute and will not provide the same level of protection as a new, clean hairnet. It is important to keep the naturally occurring yeast and molds that are in your hair and on your hats out of the food you are producing. Hairnets should be worn by anyone who enters the sugarhouse, even guests. Hairnets are disposable and should never be re-used.

**Foot wear and clothing** used in other agricultural activities should never be worn in the sugar house. Long sleeve shirts, long pants and only footwear designated for the prescribed task are recommended. Syrup is hot and can cause burns if workers are not fully protected. Clothing should be in good repair and not have loose buttons, frays etc. as these foreign materials could fall into open evaporators, tanks and into product. Whenever workers leave the sugarhouse or use the washroom remove any apron, overcoat or gloves which are being used while handling food or packaging and place on designated hooks or racks.

**Handwashing and Sanitizing is required.** Proper and frequent hand washing is by far the easiest way to keep the food safe. Hands must be washed and sanitized:

- Upon entering the sugar house
- After using the bathroom.
- After eating or drinking.
- After touching any part of the body including the hair.
- Anytime hands get dirty or soiled (i.e. handling gas cans, wood etc.)
- Whenever floor contact items such as garbage, brooms etc. are handled.
Disposable gloves, if used, are to be washed and sanitized as you would your hands. Hands need to be washed and sanitized before putting on gloves. Gloves must be replaced if workers leave and return to what they were doing or if they become ripped. Gloves are not a substitute for clean hands; rather they are added protection. Nitrile gloves are strongly recommended since latex is a known allergen to many consumers.

Jewelry must not be worn in the sugar house. This includes rings, watches, piercings, bobby pins, necklaces and bracelets. If jewelry cannot be removed it should be covered with a brightly colored band aid, (if the jewelry is on hands, a glove should be worn over it). Plain wedding bands can be permitted. The exception is medical alert necklaces and bracelets, please ensure that these are tucked in the shirt so they do not get caught on moving equipment. Jewelry can not only break or end up in food causing a hazard; it has also been linked to personnel injury and therefore further supports the need for removal.

False fingernails and fingernail polish must not be worn in the sugarhouse.

Eating and smoking are not permitted in areas of the sugarhouse where processing, storage or packaging of food is taking place. There should be a designated area in the sugarhouse, away from all processing and storage, where everyone can eat. These lunch areas must be kept neat and tidy and have garbage removed regularly. Only drinks in covered containers should be allowed near a processing or storage operation.

Illness: sugar house workers that are sick with the flu or coughing and sneezing uncontrollably need to stay home. Everyone in the sugarhouse is expected to sneeze or cough into their elbow or turn their head into their shoulder. If anyone working in the operation believes they are suffering from an illness which could be transmitted through food, cause a possible microbiological contamination of food, food packaging materials and food contact surfaces they should immediately report to the producer or supervisor. The producer or supervisor can then make a case-by-case decision about the potential of food contamination. Any worker in the sugar camp, who represents a risk should be moved to a job where there is no possibility of contamination or if need be, sent home. Some symptoms that indicate a potential risk of contamination are bad coughing, diarrhea or vomiting. If you are not sure if the reported illness or symptoms are a risk for your operation, consult with a local health authority or Health Canada.

Injury: in the case of open wounds, cuts or scrapes, do not handle product, packaging or food contact surfaces unless the injury is completely covered by a secure waterproof covering (nitrile glove and bandage). Bandages must be a distinctive color so they will not blend in with product and packaging.

If the injury occurs during production follow these steps,

- Notify the producer or person supervising the sugarhouse
- Immediately stop working with any food or packaging and seek the necessary treatment.
- Contain the potentially contaminated product or packaging. You may need to dispose of it.
- Do not continue working with food or packaging again until you have treated the injury sufficiently and are capable of handling food, packaging and any food contact surfaces without the possibility of contamination.
Food contact surfaces that were contaminated with blood or other bodily fluids due to the injury will need to be thoroughly cleaned and disinfected. It is a good idea to purchase a blood spill kit for use in this situation.

**Visitors** to the sugarhouse must also participate in the same cleanliness and hygiene standards as those working in the sugarhouse.

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**Hand Washing**

Soap only helps get the dirt off the hands; it doesn't kill anything so if you don't give the soap time to work you are wasting your time. Singing the song *Happy Birthday* while vigorously washing hands is a good way to ensure they have been washed long enough. Drying hands thoroughly is also an important step in the hand washing procedure. Damp hands are much more likely to become contaminated as bacteria love moist environments. Be sure to use a single use paper towel or other single use system to properly dry hands. There is no point in drying clean hands with a dirty towel. Using a sanitizer designed for hands is also a very good idea. Sanitizers help to kill bacteria but are not a replacement for proper hand washing as there is no point in sanitizing dirty hands.

Proper hand washing technique:
1. Wet hands, using hot water.
2. Apply soap and scrub vigorously for at least 15 seconds, including between the fingers and under nails.
3. Rinse well and dry with a single use towel.
4. Use a clean paper towel to turn the water off and, if necessary, to open the door.

**Posted Hand Washing Instructions**

It is a great idea to have a simple sign above the sink in the bathroom or as a reminder near the door of the bathroom, instructing all employees to wash their hands prior to returning to work. A designated hand washing sink, separate from equipment washing is also recommended.

Downloadable signs to print and post are available on the MPANS website.

**Cleaning and Sanitizing Equipment**

- Only equipment designed and manufactured for the production of maple syrup and products should be used in condensing and evaporation of maple sap to syrup.
- Equipment should be kept clean and sanitized. Only approved products should be used to clean/sanitize and they should be used according to their labels.
- Tubing and buckets should be washed soon after each producing season. Tubing systems, which are usually left installed in the woods year around, should be flushed using either pressure or vacuum, rinsed, drained and spiles capped soon after the sap season is complete. Buckets should be washed with hot water, rinsed well, left to air dry and then inspected before they are put into storage.
- Evaporator pans and finishing pans should be cleaned soon after the season ends with heated soft water and a stiff bristled brush or a nylon pad. Chemical cleaners should only be used if necessary. If chemical cleaners are required, only products found on the
CFIA’s Reference Listing of Accepted Construction Materials, Packaging Materials and Non-Food Chemical Products should be used, and their use must be according to the labels. Pans should be cleaned when necessary during the season. Sap pans often need to be cleaned 3 to 5 times per season. Syrup pans require cleaning after each 8-10 hours of use. Sap and syrup storage tanks should be cleaned and rinsed with potable water as required during the season, as well as soon after the season.

**Chemical Use**

Increasingly chemicals are being utilized for pan and tube cleaning as well as reverse osmosis (RO) equipment. The majority of these chemicals are hazardous and of industrial quality/grade. For your own safety as well as others please make sure to use protective equipment as stated with the safety data sheets (SDS) and the label; as well as use the appropriate concentration (more is not always better).

**Basic Safety Guidelines for Using Chemicals:**

- Obtain the SDS (Safety Data Sheet) for the chemicals; keep them in the sugar house so that they are readily accessible in case someone needs to take them to the hospital if an accident occurs
- Read the SDS, review and train your family members/employees on the SDS and how to safely handle the chemicals
- Have the PPE (personal protective equipment) on hand and use it
- Have an emergency plan; never handle chemicals alone if at all possible, have the right first aid/emergency equipment on hand eye wash, chemical spill kits etc.
- Know how to store and dispose of the chemicals and empty containers safely
- Follow the label directions for use
- Use chemicals approved for use on food equipment and better yet specific for the maple production industry. Please inquire with the manufacturer of the chemical you are using to ensure that it is for use in a food facility and safe for your equipment.
- Never guess, always ask the company you purchased the chemical from or the manufacturer directly.

Not all household cleaners are approved for food equipment and surface use, not all chlorine bleach is the same. Some have scents that will transfer into your product.

**Water Quality**

Water used for washing equipment (includes steam) and handwashing must come from a potable source. Potable means that it is safe to drink and meets Health Canada’s Requirements for drinking water. Testing frequency does depend on your water source. At minimum you should test your water for microbiological.
parameters biannually; fall and spring (before you begin production).

Water results must meet the Canadian Drinking Water Potability Standards for:

- Total Coliforms    None detectable per 100 mL
- E. coli                  None detectable per 100 mL

Chemical and physical parameter testing (i.e. mineral content, quality parameters such as color, turbidity, odor etc.) should be conducted annually. There are many local accredited labs that can test your water. Please see the link below. Follow their sampling and transport instructions. http://www.novascotia.ca/nse/water/waterlabs.asp

if the sample does not pass, please follow guidelines that are supplied from the lab and do not use the water until a test passes.

Pest Management

Pests must be kept out of the sugarhouse by making sure that there are no openings for them to get in.

If pests do get into the sugarhouse, they should be controlled and eliminated with traps. Do not bait indoor traps, if a rodent gets out of the trap that bait will be transferred throughout your sugarhouse. Place traps close to walls on either side of all outside openings. Bait stations positioned outside will need to be secured.

Pests include but are not limited to all wildlife, insects and rodents.

To discourage nesting and hiding spots keep debris and “spare parts” at a minimum and well away from the exterior of the sugarhouse.

Pets must not be allowed in the sugarhouse. Dogs and cats are not effective pest control.

Calibration

Hydrometers, refractometers, hydrotherms, thermometers are all examples of critical equipment that is typically arrives calibrated from the manufacturer however needs to be checked periodically to ensure that they continue to be calibrated.

**Thermometers:** A 1°C difference in temperature in a thermometer means that Brix calculations must be corrected by 0.1° or the Brix reading will be incorrect. Checking the calibration on a thermometer is relatively simple, see below. It's always best to have a newly calibrated thermometer that hasn’t been in use on hand to compare.

<table>
<thead>
<tr>
<th>Hot water bath – Temperature 100°C (212°F):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fill a container with water and bring water to a rolling boil/continuous bubbling.</td>
</tr>
</tbody>
</table>
- Place the thermometer in the bath (without touching the sides or bottom of the container) and let sit for 5 minutes in order to stabilize. There are clips that could be used or you can hold it in place with protective gloves.

- Read and record the temperature. Thermometer must read 100°C (212°F) +/- 1 degree.

- If it’s not reading accurately adjust the thermometer until it reads 100°C. Recheck to ensure the thermometer is reading 100°C. If it cannot be calibrated, replace it with a thermometer than can.

**Refractometers:** Typically come with calibrating solutions when first purchased or distilled water may be used. Place the water or solution on the clean glass prism, close the cover and look to see if the shadow line matches the appropriate number on the scale (0). If not adjust the screw (or if it’s a digital device, press the calibration button as per the manufacturer’s instructions) until the line is in the correct place. Make sure you calibrate the refractometer at 20°C (68°F).

Record the results and date when equipment is calibrated so it will be easy to determine when it is due for calibration again.

Low batteries in any instrument can cause inaccurate readings so ensure fresh batteries are installed in any digital instrument at the beginning of each season, especially if the instrument has been sitting in an unheated sugarhouse all winter. This small expense can save a lot of headaches. Be wary of readings from digital instruments if the battery level indicator is less than half.

**CAUTION:** Under no circumstances is a mercury (silver filled vs the alcohol ones that are clear) based thermometer to be used in or around a sugar house. Mercury is a neurotoxin and is very dangerous. It’s presence around a food processing facility such as a sugar camp poses a great risk to food safety. Replace any thermometer or piece of equipment that contains or is thought to mercury as soon as possible. Consult your local government on the proper disposal of such equipment in a safe manner for human health and the environment.

**Allergens and Cross Contamination**

**Allergens**

What is an allergen? An allergen is any substance which can cause an allergic reaction in certain people. For an ever increasing number of people, allergens and allergic reactions are becoming a significant threat and an important factor when choosing which food products to buy or eat.
According to the Canadian Food Inspection Agency an estimated 1.2 million Canadians may be affected by food allergies. These numbers are growing every year, and the portion of society for which the numbers are increasing the fastest is children.

The Canadian Food Inspection Agency has identified 10 priority allergens for Canada that **must** be included on the label when included in a product:

1. Eggs
2. Milk
3. Mustard
4. Peanuts
5. Seafood (fish, crustaceans, shellfish)
6. Sesame
7. Soy
8. Sulphites, greater than 10 ppm
9. Tree nuts
10. Wheat

Note: Priority allergens differ by country. You must know the allergens and labelling requirements for any countries you are exporting to. i.e. celery is considered an allergen in Europe but not in North America.

The list of potential allergens is growing quickly, so make sure to stay up to date on what the new ones are and where they come from. The Canadian Food Inspection Agency is a great resource for this. Visit the CFIA website at http://www.inspection.gc.ca for up to date information and trends.

**Cross Contamination**

In its basic form, maple syrup is not a known allergen and is relatively safe. There could, however, be many sources of contamination of maple syrup, so it is important to be keenly aware of what you are doing and how you are doing it to ensure maple products do not come in contact with known allergens.

Allergens can be inadvertently added through poor hygiene and production practices via cross contamination. It doesn't take much of an allergen to cause a problem. The simple act of placing raw or unpackaged food on a surface where another food with an allergen was previously sitting, can introduce enough of a contamination to cause an allergic reaction in someone. If you are not careful, you can create a very deadly situation for a growing number of people.

Here are some of the ways where you could unintentionally cross contaminate your product:

- Eating food or drink that contains an allergen in the sugar house. It may sound harmless but it can be deadly. If you eat a peanut butter sandwich for lunch on a table that will later be used to stir maple butter or make sugar, you are potentially exposing your maple products to peanuts, the most widely-known allergen.
- Improper washing or not washing your hands after eating or drinking foods containing allergens. Don't forget to wash your hands when you are done eating. Not only are there bacteria on your hands but also potential allergens.
- Having an allergen on your clothes (spills from eating/drinking)
• Mishandled or improper packaging materials (cans, jugs, bottles, boxes and wrappers) (i.e. If you package maple cream or candy into reused boxes or containers that once contained chocolates, you are potentially exposing your maple cream to wheat, nuts, milk, eggs and soy, all of which can cause people to become very sick or even die.)
• Using improper cleaners and defoamers. If you use butter to stop maple syrup from boiling over while cooking it to produce cream, candy or sugar, you are introducing a substance that could cause an allergic reaction. If you need to use butter as a defoamer, be sure to declare the butter on your label.
• Cross-contaminated food contact surfaces (tables, pans, utensils and pots).

It is important to note that this is not a complete list. As every operation is different, it is up to you to survey your operation and identify threats.

It is extremely important to use the correct tools for the job you are doing. The best policy is to only use approved defoamers, cleaners and packaging supplies. If you are not sure, check with the manufacturer to ensure the product you are using is designed for the intended purpose.

It is best practice to never eat or drink in any area of the sugar house where maple products are produced or packaged. It is a good idea to have one designated area with a table where all meals are to be eaten. This area should never be used for open or unpackaged maple products. This is an easy way to reduce the risk of cross contamination.

Sometimes allergens in your sugarhouse are unavoidable. If you want to make that special maple fudge that contains dairy and wheat and that everyone comes out to buy from you, it can still be done. Simply designate a special area for making and handling products that people could be allergic to. Buy separate utensils, pots and pans that are to be used only for allergen containing products. A good way to do this is buy a different coloured spoon or spatula and ensure everyone knows that colour is to be used for products with potential allergens. As well, label all products containing allergens and place them in a designated area to keep them all together. Preferably, this designated area for allergens would be on a shelf below anything else so they will not spill onto things that do not contain allergens. These simple steps will reduce the risk of cross contamination of your other non-allergen products, such as maple syrup, by products containing allergens.

**PACKAGING**

Packaging Selection and Storage

If you are producing bulk product, ensure that whomever you intend to sell it to can handle the containers you want to package your syrup in. Some buyers only accept drums, not pails. Others can only handle pails. Acceptable choices are stainless steel drums and food grade plastic containers. Barrels must be filled in one continuous operation, so size your bulk container appropriate to your operation. If bulk containers will be reused ensure that you wash, rinse and dry your containers thoroughly, even if the buyer has washed them. Steam cleaning is ideal, or hot/boiling water, if cleaning chemicals are used make sure they are approved for use.
use in a food facility or better yet for maple production cleaning purpose, are compatible with the container type and that your containers are thoroughly rinsed after washing.

Regardless of size, make sure that your containers have not been previously used for a non-food purpose (chemicals, pesticides etc.). Containers must be in good repair and not have any dents, holes, defects of any kind. Other containers may be available from MPANS or your local equipment dealer. Many containers purchased from these sources will contain all required basic labelling for your product (with the exception of your company name, address, lot coding and allergen information if you are adding an ingredient or produce an allergen containing product with the same equipment in your sugar house)

When receiving packaging look at it to ensure that all packaging material is free from yeast and mold, that it doesn’t have a strong smell (chemicals, musty, etc. maple syrup will pick up those odors) and that it’s free from metal pieces, glass, plastic shavings, evidence of rodents (droppings, hair) or any other foreign material. Make sure that the packaging you do receive stays clean by storing it in a clean, dry area where it’s and covered and stored off the floor and away from non-food contact items (chemicals, lubricants, wood, fuel etc.)

Packaging and Storage of Maple Products

- Maple syrup should be tested for lead content at the beginning, in the middle and towards the end of the maple season.
- Maple sap should be condensed/evaporated as soon as possible after it is collected, ideally within 24 hours.
- If producers use a reverse osmosis machine to remove some of the water from sap, they should make sure that it is well maintained.

If syrup is to be stored before it is packaged or sold on the bulk market, it should be stored in stainless steel or food grade plastic barrels. It should be packed hot between 85 and 87°C (185-190°F). Do not allow the syrup in the container to fall below 82°C (180°F) before sealing tightly. The barrels or drums should be washed, rinsed, drained and dried before using. The containers should be checked for odors before they are filled. A sample of syrup from each barrel that is filled should be kept for future reference. The sample should be clearly identified and can be placed in the freezer. Each barrel or drum should be identified and necessary information such as date packed, barrel number, syrup density, syrup grade, and any comments about the syrup should be recorded. After syrup cools, full barrels should be stored in a cool, dry and dark room.

Containers for syrup packaged for sale in the retail market should be new and food grade and should have airtight, tamper-evident lids. All containers should be inspected prior to use. Syrup should be packed at a temperature between 85°-87°C (185°-190°F). Once the caps are tightened, the filled containers are placed on their sides or inverted so that the top and lid are sterilized. When containers reach room temperature, they can be labeled and packed into boxes. Each container should have a permanent batch number, code or symbol on it to easily identify it from all other batches. Each batch should be identified by providing information such date packed, batch number, syrup density, syrup grade, and any comments about the syrup.

Labelling
When syrup is packaged for the retail market, it requires a label. The label should include the name of the product, the weight or volume, and the name and address of the producer/packer. If the syrup was produced in a federally licensed establishment, the grade must also be declared on the front face of the container in the proper font size. The establishment or license number must also appear on the label. Only federally licensed establishments are permitted to apply a grade to maple syrup.

**Traceability**

It is becoming increasingly important for maple producers to put a code or identification on maple syrup and other products that are to be sold. Your ability to trace your product through the supply chain helps protect you, protect your customers and ensure the safety of your products.

Batch or lot coding is important so that producers can identify lots of product in case a problem is discovered. It is also a requirement for the majority of retailers. If a small batch, such as product made on one particular day, cannot be identified, the entire year’s production might have to be sacrificed if the problem discovered is severe. Some identification needs to be put on the container, case or barrel that corresponds to the particular day and time that it was produced and packaged. Good records must be kept in case it is necessary to locate products that have been sent to the marketplace. These records should include the name of customer/account, contact name, address, phone and fax numbers, and amounts/types of products shipped and batch codes.

Luckily, a traceability program is not difficult and does not have to be expensive. It can be as easy or as complicated as you want it to be. Traceability can be simple, quick and easy, yet extremely helpful in helping to avoid unnecessary headaches if the day arrives that you need to recall product.

Here are a few tips to help you begin or even strengthen your traceability of your products.

**What is a batch or lot code?** It is the actual unique code you physically place on your containers.

**When do I apply one?** All products should contain a batch code, whether it is a case of jugs of syrup being shipped to the local store, a few bottles being sold off the shelf at the sugarhouse, or bulk syrup in drums being sold to a packer or shipper.

**What should my batch/lot look like?**

- The first step is to decide how big you want your batch to be. The batch should be small enough that if you do have to recall and need to destroy it for health reasons, it won’t be overly damaging to your bottom line. For maple syrup, a batch should never exceed one day’s production.
- The next step is to decide what system you want to use. You can simply give a day’s production a number to identify it, or you could give every barrel a unique number. Some people divide the days up by hour and every hour of production is a batch. Another common system is to place a best before date on the product. This can act as a batch number and has the added benefit of letting you know when it was produced and
when it should be removed or consumed. It is completely up to you. Just ensure the system is easy enough to do so it will be done and easily understood.

### Sample Batch Code Formats (examples only)

<table>
<thead>
<tr>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single number (1, 2, 3, 4, 5, etc.)</td>
<td>Starting at one you simply give each batch a new number.</td>
</tr>
<tr>
<td>Date (03/14/2012) (MM/DD/YYYY)</td>
<td>The date the product was produced.</td>
</tr>
<tr>
<td>Day of Year (1-365) (YYDay)</td>
<td>12074 = 12 is the year 2012 and the 074 means day 74 of 2012, March 14 in this case. This is often referred to as the Julian date.</td>
</tr>
<tr>
<td>Combination</td>
<td>MR120741 - MR is the month, 12074 is the Julian date and 1 is the batch.</td>
</tr>
</tbody>
</table>

Which even code you use, be sure to have the meaning of it prominently displayed in your sugar house for everyone to see and reference. You need to avoid the chance of someone accidently applying the wrong code.

**How do I applying the code?** One of the simplest and quickest ways of applying batch codes to your products is to use a price gun. A price gun can be purchased at most office supply stores and allows you to label large quantities of product with ease. Check with your customers first as many retailers require your code to be permanently legible which rules out the sticker option. Another possibility is to use a permanent marker. Before you invest too much, check with the stores where you will be selling your products. They often will be able to tell you what they require.

**Where do I place the code?**

- The code, no matter what format you choose, needs to be legible and in a place on the container or package where it can be read even after the container is opened. Often a problem is identified after the product is opened, so if the batch code is on a piece of outer packaging that may be thrown away, it will be hard or even impossible to retrieve it.
- If possible, the batch code should be permanently affixed to the container or label. This is sometimes hard (or expensive) to do, but if it is possible you should consider it. Many retailers demand that the batch code be permanently affixed to avoid its removal while on the shelf or damage during shipping/handling that could make the code illegible.
- If you place your products in cases, the batch code should also be placed on the outside of the case so you can easily identify from what batch that particular case comes. It is a good idea to avoid placing different batches in one case. If this is unavoidable, ensure every batch number corresponding to the product inside is also on the outside of the case.
Why do I need to keep a record?
Applying batch codes to your product is vital, but it is only half of the equation. The other half is keeping accurate distribution records. Without accurate records of where each batch code went, it will be very hard or even impossible to get the entire batch back in the event of a forced or voluntary recall.

Production and distribution records should include at least:

- The amount of product produced, what is in inventory and what has been distributed.
- The name, description (or item code) size, and batch/lot numbers of the product.
- Area of distribution of product e.g., local, national, international.
- The name, address, phone number and contact person for each store or account where the product was shipped.

Above all, it is very important that the records are kept up to date and accurate. Often simpler is better.

Administration and Personnel

Training

This Best Management Practices document is intended to be used by maple product producers to help them produce the best quality and safe product for all Nova Scotia maple product consumers. However if your employees and family members are not trained to follow these best practices then all your efforts are for naught. One of the best ways to ensure this happens is to train your employees and family members in the best management practices as well as any particular procedures and practices you do. This will ensure that everyone at your operation is on the same page when it comes to producing your product and will ensure that your valuable knowledge is passed down to the next generation. Training can be formal; send them to a grading course, first aid training etc.; or informal around the camp kitchen table.

To ensure that all of your employees understand your requirements and to ensure continuity, it is recommended that each maple producer develop his/her own written standard operating procedures (SOP) for their specific operation. For example an SOP for batching and traceability can outline what your batch code looks like, what it means, where and when it is applied and who is responsible for it. Document your training as well to ensure you have trained everyone on any procedures that they need to follow and give them copies of the training materials and have them sign off on that training.
Documentation

Even if you are a small operation it is a good idea to write down or document how your operation should be run and product should be made. At some point you may need to add employees or someone may have to take over for you if you cannot do the work yourself. Typically documentation is in the form of a Standard Operating Procedure (SOP) or a Work Instruction and supporting records.

SOP's do not necessarily need to be long or overly detailed and it's likely best if they are light on words and to the point. Work instructions/directions are always easier to follow if they are clear and concise. You need to document how the task is completed, not how you wish it was done. SOP's are meant to be a working document not sitting in a binder on a shelf gathering dust.

Of course written work instructions are great, however if you can't prove that they are being followed correctly you really won't know if they are effective. Records are a great way to prove that you have a well-run operation. If you didn't document it, it didn't happen. When creating your records remember to capture only the information you need and use the existing forms of documentation that you already have (i.e. invoices). You can also combine documents; this is especially helpful when you have a very small operation or one person doing a number of tasks.

In some cases log books and calendars are ok as well.

In both cases make sure that you get others that will be completing the task to read and give you feedback. What is clear or makes sense to you may not be as clear or as easily understood to another. If records are too long or difficult to complete then they are less likely to be filled out at all, let alone correctly.

Record Keeping

When you record information on forms/records please keep in mind the following best practices:

- Use pen, not pencil,
- No liquid paper or correction tape. If you make a mistake draw a single line through it and initial.
- Complete them in real time not on scrap paper then rewrite them later. Well used documents show an honest operation, just make sure they are still legible and any food debris is carefully wiped off them to prevent mold from growing in storage.
- All entries need to be dated and initialed by the person who recorded the information. This can be beside, under or at the end of the page.
Member Resources

For additional information on MPANS, maple production, the maple industry, nutritional facts tables, labelling, etc., please refer to the MPANS web-site at: www.novascotiamaplesyrup.com

North American Maple Syrup Producers Manual; produced by Ohio State University Extension in cooperation with the North American Maple Syrup Council

The University of Vermont, Proctor Maple Research Center, has a number of research publications that contain valuable information. You can access them on their website at: http://www.uvm.edu/~pmrc/?Page=publications.html

International Maple Syrup Institute: http://www.internationalmaplesyrupinstitute.com/


Bolduc Drill Bit Sharpening:
Les Mèches Bolduc Inc
432 Rue Paquet, St-Théophile, QC G0M 2A0

http://www.lesmehesbolduc.com/

Keven Lefebvre
Phone # 418-597-3913

The International Maple Syrup Institute Maple Grading School, University of Maine
http://umaine.edu/maple-grading-school/