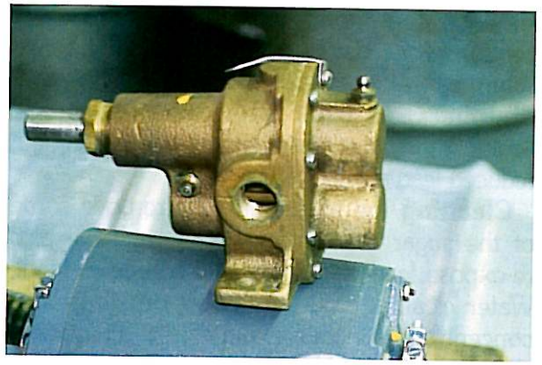
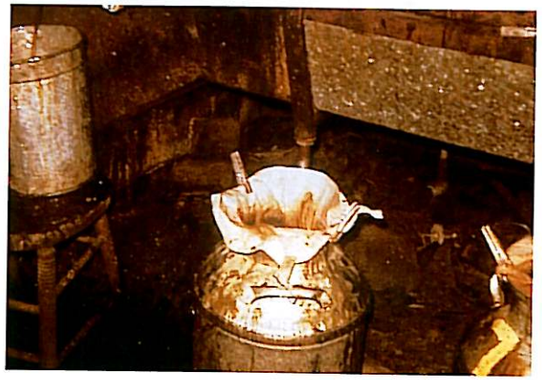


Bronze used in the manufacture of gear pumps usually contains lead, and these pumps can add lead to sap and syrup. Unnecessary pumping, particularly of sap, should be avoided. Other pump models are available which contain little or no lead.



Old milk cans frequently contain terneplate, an alloy with a high lead content, and should never be used for syrup filtering or storage.

Syrup kept in older, heavy galvanized **barrels** like these had a much higher lead content after 8 months of storage. Newer galvanized barrels do not add appreciable lead in this amount of time.

Standards for lead concentration are based on models of the maximum syrup consumption by children. Standards vary within the maple producing regions of the U.S. and Canada. Syrup producers and health officials share the goal of a healthy and fine tasting product that is safe from contaminants. We are committed to the words "Pure Maple Syrup" that we put on our containers.

Lead testing is available at:

Agricultural and Environmental Testing Lab.
220 Hills building, University of Vermont
Burlington, VT 05405
phone: 802-656-3030

Most state universities have a laboratory where lead testing can be performed.

For more information contact:
Proctor Maple Research Center
P.O. Box 233, Underhill Center, VT 05490
802-899-9926
www.uvm.edu/~pmrc
email: pmrc@uvm.edu
or your local extension or agricultural agent.

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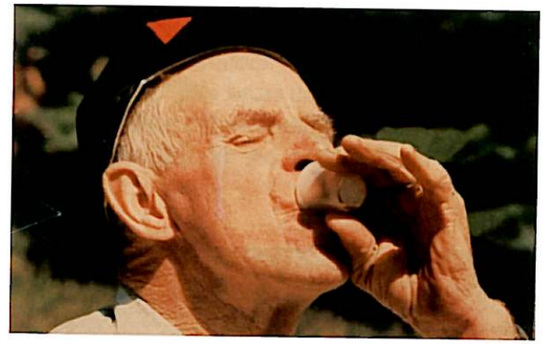
Keeping Lead Out of Maple Syrup

A Guide to the Use of Sap Collecting and Syrup Making Equipment



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The lead content of most maple syrup is extremely low, even when it is made with lead containing equipment. However: the only way to know the lead content of your syrup is to have it tested. If tests show that your syrup has lead levels within acceptable standards (below 250 ppb in Vermont), then the use of your older equipment is satisfactory, provided that you manage the equipment properly and retest for lead periodically. If syrup lead is high, then you need to make some changes.

How to test for lead: Samples sent for lead testing should be representative of most of your syrup, not necessarily your best syrup. Try to sample from several syrup batches, and try to sample syrup made at both the beginning and end of a sap run. Take only syrup that has received the final filtering. Collect samples in clean glass or plastic containers and pool everything into one lot. You need only a few ounces to send to a lab. Suggestions for where to send syrup for lead testing are at the end of this leaflet.

Sources of lead: Lead does not come from trees. Sap collected using lead-free plastic materials had virtually no lead in it. Sap collecting and syrup making materials that contain lead include: 50/50 solder, used before 1995 for evaporators, tanks, and some buckets (Leader evaporator switched to lead-free solder in 1991); galvanized equipment made before 1994; most brass and bronze; and terneplate, an alloy used for some older equipment. Sugar sand concentrates any lead in the sap as it is formed, so it should also be treated as lead containing. Roadside dust and dirt may also contain lead.

In tests of several models, all older **metal spouts** added lead to maple sap. Very old spouts may be made of terneplate and will leach large amounts of lead into the sap. Lead-free metal spouts are now available.

Not all **buckets** are equal when it comes to lead. In our tests, Wheeling buckets (2nd from left) added the least amount of lead, while old "tin" buckets (extreme right) added the most. Some old buckets have shinier terneplate bottoms (3rd from left); beware of these. Lead-free bucket is on the extreme left.

Lead containing buckets begin to leach lead into sap within the first few hours, and continue to add lead to sap as long as it is in contact with metal surfaces. Storage of sap in buckets for several days, which may occur when sap runs slowly, can result in very high sap lead concentrations.

Galvanized and lead-soldered tanks also add some lead to sap, although usually less than buckets, because their surface-to-volume ratio is smaller.

In an **evaporator**, a lead-soldered back pan adds more lead than a lead-soldered front pan, due to the many solder seams. The lead content of partially made syrup often decreases in the front pan, as lead is precipitating and sticking to the pan in the form of sugar sand.

After the evaporator is shut down, lead will continue to accumulate in the partially boiled syrup (sweet) from lead solder. We found that **draining the front pan** into buckets and adding the sweet again once boiling resumed, reduced lead accumulation.

Cleaning the front pan may remove some of the sugar sand (a source of lead) but also re-expose lead solder (another source of lead). Water cleaning had little effect on syrup lead concentration in our experiments. Frequently cleaning a lead-soldered pan with acid will likely result in higher syrup lead content.

Sugar sand may contain extremely high amounts of lead, depending on the concentration of lead in the sap and presence of lead solder in the evaporator. It can reach levels of 1,000,000 ppb. Good filtering is essential for keeping lead out of syrup.

In our tests, cone filters were as effective as filter presses in removing lead. A large percentage of lead in syrup is in a dissolved form, however, which is not filterable.