

The result of lead phase-out in fuel has been a major drop in ambient air levels over the last 20 years. Between 1973 and 1986, the average levels of lead in ambient air dropped by 78% (Hilborn and Still, 1990). In 1993, an announcement was made that the only remaining plant in Canada producing TEL would be closed. Leaded gas is still sold in many countries throughout the world.



Lead in Water

Lead is slightly soluble in water. It is present in water as the result of atmospheric deposition, effluent and industrial discharge and natural causes. It can be found primarily dissolved in sediments but can be resuspended due to wave action or sediment disturbance. Lead sediment concentrations in the Great Lakes region range from 5 ug/g to 20,000 ug/g with a Provincial Sediment Guideline of 31 ug/g proposed as the lowest effect level on aquatic

organisms. Levels as high as 850 ug/g dry weight have been measured in sediments taken from Toronto harbour. Lead can be taken up by aquatic plants and animals and there are several surveillance programs in place to monitor concentrations of toxic chemicals, including lead, in varieties of Great Lakes fish.

Because of its solubility, lead can be present in municipal drinking water supplies. It is estimated that drinking water represents about 12% of total lead intake (3 ug/day) for adults and 8% for children (MOEE, 1994).

Since 1984, the Ontario Drinking Water Surveillance Program has monitored raw water quality at over 50 drinking water treatment plants and found lead levels to be very low. **The primary source of lead in drinking water is the distribution system, including plumbing in the home or other**

buildings, which can introduce lead from lead pipe, lead solder, or fixtures with lead alloys. Lead can also be found in the piping and submersible pump systems used in private wells. Any fixture made of metal alloys such as brass (or bronze) may contain lead which is added to make the metal easier to manufacture into metal parts and machinery. The concentration of lead in consumer tap water depends upon several factors, including the pH and alkalinity of the raw water and whether the tap has been flushed or allowed to run before drinking water is obtained. The Ontario Drinking Water Objective for lead is 10 ug/l (ppb) revised in 1991 and reduced from 50 ug/l.

LEGISLATION

Federal Drinking Water Guideline

0.01 mg/l (10 ppb) (maximum allowable-flushed sample)

Ontario Drinking Water Objective

0.01 mg/l (10 ppb)

Open Lake Disposal of Dredged Materials Guideline

50 ppm

Confined Fill Guideline

45 ppm

Ontario Plumbing Code (1989) - solder used in plumbing for potable water supplies must not contain more than 0.2 % lead

Drinking water supplied from ground water may also contain lead depending upon water chemistry and the geology of the groundwater formation.

Control technologies for lead abatement in drinking water supplies include decreasing the corrosivity of the water supply, replacement of lead pipe and solder and flushing the lines to remove standing water. At the community level, many works departments have lead pipe replacement programs which systematically replace old lead pipe as funds are available or when other street repairs are made. There are also technologies, such as flexible plastic pipe liners which can be placed within existing pipe systems. Corrosion can be minimized by decreasing acidity, increasing alkalinity or adding corrosion inhibitors, such as zinc orthophosphate. Hard water, which has higher amounts of dissolved minerals, is less likely to leach lead from the distribution system than soft water, which is more acidic and thus more corrosive to plumbing.

In Canada, the use of lead solder in plumbing for potable water supplies was restricted in 1989 although lead solder is **still available in hardware stores** and may be used by unlicensed plumbers, including homeowners, doing their own work. Lead solder used in new plumbing can produce high levels of lead in drinking water as pipes will not have had time to develop a coating of mineral deposits which assist in reducing corrosion. In addition, there is a galvanic reaction between the copper in new pipes and the lead in solder which further elevates lead levels. Lead solder and fluxes (used to connect pipes) which are used in potable water supplies must not contain more than 0.2% lead according to an amendment to the Ontario Plumbing Code in 1989. Old supplies of solder, which are likely to contain 50% lead, should be disposed of and replaced with solder clearly labelled for use in potable water supplies.

For individual dwellings, owners can attempt to determine if lead pipe has been used in either service connector lines or interior plumbing. Some municipalities can tell dwelling owners if service lines contain lead while others do not have records. Determining the type of interior plumbing and/or solder used is more problematic. Plumbing fixtures, such as faucets, may look chromed but contain brass interiors with lead as a component of the brass alloy. Many interior pipes may be covered and solder has the same appearance whether or not it is lead free. Visible signs of corrosion, such as leaks or rust-coloured water should be warnings of problems with the plumbing system. The homeowner can determine if lead pipe is used within the dwelling by comparing the results of lead testing done before and after flushing. First-draw water samples (water drawn immediately after the tap is turned on and not allowed to run) high in lead usually indicate the problem is in the pipes or solder joints inside the house. Water that is high in lead after flushing is usually the result of lead service connectors. Water may need to be flushed several times during the day depending upon use patterns and the amount of leaded material in the system.