D FHP Guidance on the Application of the New Lead (Pb) Drinking Water Guidelines

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Amendments

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- Added information on the sampling protocol for single residential housing units (RHU), semi-detached and row houses (para 5)
- Updated information on the approved lead portable direct-reading device (para 6)
- Additional guidance on where lead testing should occur (para 11)
- Additional guidance on the impact of stagnation on lead concentration (para 15-16)

Background

1. Health Canada has recently updated the drinking water guideline for lead (Pb) to reduce the maximum acceptable concentration from 0.01 mg/L, set in 1992, to 0.005 mg/L. Included with this new guideline are changes to how sampling should be conducted to better represent typical exposures to Pb. The goal of this advisory is to provide guidance on the application of the new guideline and sampling protocol.

2. Pb is usually found in drinking water after leaching from distribution and plumbing system parts. It was historically used in service lines and in plumbing fittings and solders. Until 1975, Pb was an acceptable material in pipes based on the National Plumbing Code of Canada, so it is more likely to be found in older buildings. Since Pb was regularly used in these plumbing system parts for many years, drinking water systems, including municipal system parts that provide water to DND's bases and wings or some that make up the bases' and wings' water systems, may still have some Pb components in place today.

Pb Sampling Protocol for DND buildings

3. Sampling protocols will differ depending on the desired objective (i.e., identifying sources of lead, controlling corrosion, assessing compliance, estimating exposure to lead). The objective of the sampling protocol summarized in this advisory is to monitor for average or typical exposure to Pb to determine whether there are concerns related to effects on human health. This sampling protocol is for multi-dwelling (i.e., more than six residences) buildings or other types of large buildings as well as for single residential housing units (RHUs), semi-detached or rowhouses, located within a given potable water supply zone. For additional information please review Health Canada's technical document for lead referenced below and/or reach out to ADM(IE) or the Health Services Group for site-specific guidance.

4. In multi-dwelling buildings, a randomized daytime (RDT) sampling protocol is recommended. This is done by collecting samples from a cold drinking water tap randomly during the day, without prior flushing and with no stagnation period prescribed. At each sampling point, either two 125 mL samples or a single 250 mL sample should be collected, preferably in wide-mouth sample bottles, at a medium to high flow rate without removing the aerator. The samples need to be held for a minimum of 16 hours after they are acidified using a 2% nitric acid solution (by volume) and prior to analysis. Samples may be preserved at the laboratory up to 14 days after collection. Each sample should be thoroughly mixed prior to being analyzed and the analysis should be conducted by an accredited laboratory. The Pb concentration at each sampling point is determined by averaging the results from the two 125 mL samples or by using the result of the single 250 mL sample.

5. RDT sampling in RHUs, semi-detached or rowhouse is done in a similar way except that a 1 L sample should be collected randomly during the day from a cold drinking water tap in each of the residences, without prior flushing and with no stagnation period prescribed. A larger volume of water is recommended for these residences to better represent consumer use.

6. Alternatively, the Palintest Kemio Heavy Metal portable Pb analyser can be used to test for Pb in drinking water either to conduct RDT sampling or for trouble shooting purposes. This particular device is the only portable direct-reading one currently approved for this purpose.

7. Within a given building or residence, priority should be given to sampling drinking water taps. In workplaces, drinking water taps typically include kitchens, breakrooms and drinking water fountains while the main drinking water taps in RHUs are the kitchen taps. Generally, bathroom sinks are less important consumption points while utility sinks or janitor sinks rarely constitute an important consumption point. As a precaution, at taps where water is not tested and where exceedances of Pb are suspected, signage could be posted to inform that the water should not be used for consumption.

8. For any given potable water supply zone, sampling should be conducted at least once per year, with the total number of sites to be monitored determined based on the size of the drinking water system and the type of building. These zones represent the

extent of the drinking water supply in a given area and should not have a population greater than 50 000. Individual bases and wings could be considered being part of one water supply zone. Typically, a minimum of 20 samples is required for each water supply zone. For small water systems, fewer samples may be appropriate. Also, the frequency may be reduced if no exceedances have occurred within the preceding two to three years.

9. It is recommended that for every large building, Pb be monitored at least once per year, in a manner such that each of the drinking water fountains and a proportion of cold water taps where water is used for drinking or food preparation is sampled within a specified period. The whole building should be tested as soon as feasible (ideally within two to three years). The sampling should occur when the buildings are occupied and functional.

10. Schools and daycares require more sampling. Pb should be monitored, at least once per year, at each of the drinking water fountains or cold water taps where water is used for drinking or food preparation. Sampling in schools and daycares should be conducted between the months of June and October (recommended to be in either June or October for schools), at a time when they are fully occupied and functional. This sampling regime can be reduced when Pb issues in schools and daycares have been identified and appropriately addressed.

11. Pb monitoring should focus on areas known or likely to have Pb service lines or that have older buildings and should include zones supplied by potentially corrosive water (e.g., dead ends in a chloraminated system) and consecutive systems (i.e., public water systems whose drinking water supply is from another public water system).

12. ADM(IE) usually conducts routine chemical water testing, including testing for Pb. Consult Ref A to obtain additional information on drinking water monitoring and flushing requirements for Pb developed by ADM(IE). However, the provision of safe drinking water is a shared responsibility between ADM(IE) and the Canadian Forces Health Services Group. For that reason, the elaboration of the Pb testing protocol to assess water safety described in this advisory should be a collaborative effort between the two groups locally and the testing results should be shared between the two groups locally as well.

Methods of reducing Pb in drinking water

13. The only permanent solution to removing Pb from any drinking water system is to replace all Pb-containing components, which is expensive and time consuming. In the meantime, the following simple actions can reduce Pb levels at point of use in DND's buildings:

a. Flush out the pipes of a building when it is suspected that the water has been sitting in the pipes for several hours as outlined in the technical bulletin on Drinking Water Monitoring and Flushing Requirements for Lead referenced below. Run the tap until it is cold before drinking or cooking with the water from that tap. Only use cold tap water for drinking or cooking, since hot water

increases the leaching of Pb and other metals from plumbing. It should be kept in mind that this approach alone has not been found to sufficiently reduce Pb exposure in certain circumstances.

b. Clean taps monthly. Every month, remove and inspect the aerators or screens at the tap. Remove any debris found before replacing them since they may contain Pb particles.
c. Replace brass fittings since brass faucets and valves can contain some Pb. These can be replaced with fittings that are certified to the standard on low Pb content.

14. In buildings where the above simple actions are not sufficient to reduce Pb to levels below the guideline level, a filter can be used at dedicated water taps to remove Pb from water as an interim measure. The filter must be installed and maintained properly or it could become ineffective. The water should be tested for Pb before installation and during use to confirm the filter is working. Only filters that are certified to the NSF International standard for removal of Pb should be used. For example, NSF/ANSI Standard 53 devices that are generally based on activated carbon adsorption technology are good and affordable option but devices certified to Standards 58 (Reverse Osmosis Drinking Water Treatment Systems) or to Standard 62 (Distillation Drinking Water Treatment Systems) are also acceptable. Although treatment devices are currently certified to remove Pb down to 0.01 mg/L, the technology is able to remove Pb to well below that level. Many can achieve the new guideline of 0.005 mg/L and this is reflected in the recent change to 0.005 mg/L for the removal of Pb in the NSF standards. Point of use (POU) systems installed at the faucet, as opposed to point of entry (POE) systems, are preferred for the removal of lead, as lead levels may increase in the plumbing system and because exposure to Pb from drinking water is a concern only if it is ingested (i.e., inhalation and dermal absorption are not significant routes of exposure and thus, bathing, showering and similar water uses do not pose a substantial lead exposure risk).

Water Stagnation causes Pb accumulation

15. Pb is usually found in drinking water after leaching from distribution and plumbing system parts. It is expected that municipal system parts that provide water to DND's bases and wings or some of those that make up the bases' and wings' water systems still have some Pb components in place today. The longer the stagnant water remains in water systems, the more likely it is to accumulate Pb, hence the need for a flushing protocol in buildings during low or no-occupancy. Refs A and B provide additional information on the development of flushing protocols.

16. As an added precaution, the following signage could be added at points of consumption during periods of low occupancy:

> *"Additional flushing is being conducted during this period of reduced occupancy to ensure the continued safety of the potable water system in the building.*

How you can help:

- *Let the water run until cold before consuming it.*
- *When washing your hands (min twenty (20) sec), let the water run to help with flushing the system."*

The Issuance of a Drinking Water Advisory

17. Tap water with Pb levels below the drinking water guideline of 0.005 mg/L reduces the risk for health effects. At 0.005 mg/L, Canada's new guideline value for Pb in drinking water is currently one of the lowest in the world.

18. At taps where the Pb levels cannot be lowered to below the drinking water guideline of 0.005 mg/L, a 'do not consume' drinking water advisory should be put in place. At these taps, the water should not be used for consumption, preparing food, or brushing teeth. However, since Pb from drinking water is not absorbed through the skin, nor is it absorbed by breathing in vapours while showering or bathing, it is safe to bathe and shower in water that contains levels of Pb above the guideline value.

19. Pb drinking water advisories are usually issued for taps rather than at the building or the base level. Base-wide drinking water advisories are issued when detected contamination originates from the source water, i.e. from the provided municipal water or from one of the base wells. This is rarely the case for Pb because it is usually found in drinking water after leaching from distribution and plumbing system parts of older buildings.

Risk and Health Effects Related to Pb

20. Exposure to Pb poses a risk to everyone's health but children, infants and fetuses are most at risk because of their developing brains. The health effects of being exposed to Pb include effects on neurological development and behaviour in children, including reduction of intelligence quotient (IQ), and increased blood pressure or kidney problems in adults.

Additional Information

21. The technical information contained in this advisory has been adapted from the list of references below. Please refer to them to obtain additional information.

a. Water Talk - Lead in drinking water - Canada.ca
b. Drinking water: what about lead? - Canada.ca
c. Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Lead

Inquiries

22. Sampling inquiries, selection of Pb filter inquiries as well as any health related inquiries can be directed to D FHP by e-mail at: +DFHP Inquiries@CMP DGHS@Ottawa-Hull (intranet/DWAN) or DFHP-DPSF@forces.gc.ca (internet).

23. Inquiries related to drinking water production and distribution can be directed to ADM(IE) by email at: +DAES Struct Civ Svcs-DSIAG Svcs Struct Civ@ADM(IE) DAES@Ottawa-Hull (intranet/DWAN) or DAES3_Common-DSIAG_Commune@forces.gc.ca (internet).

24. All media related inquiries are to be directed to your Public Affairs representative.

References

A. ADM(IE) DAES TB 2021: Drinking Water Monitoring and Flushing Requirements for Lead (Pb).
B. DFHP Advisory 6635-44: Guidance for Drinking Water in Low Occupancy and Closed Buildings