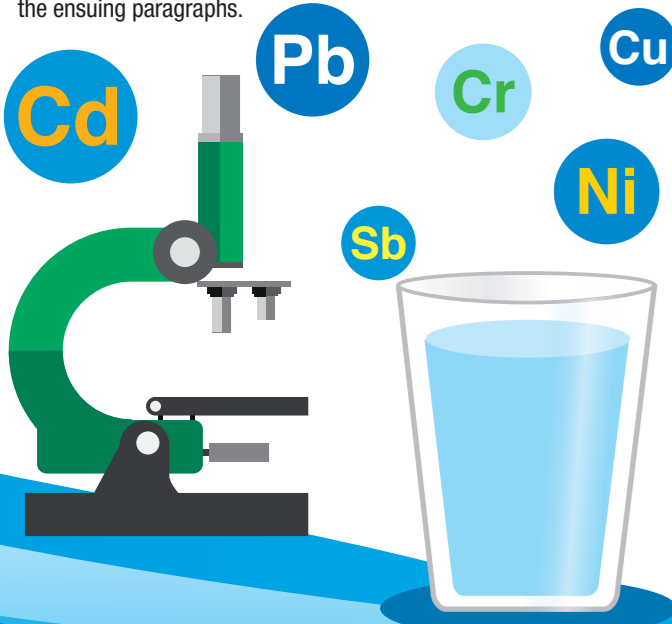


1. Preamble

Over the years, the Water Supplies Department (“WSD”) has been supplying drinking water in full compliance with the World Health Organization’s Guidelines for Drinking-water Quality (“WHO Guidelines”). WSD has simultaneously implemented a water quality monitoring programme by taking water samples annually from water treatment works, service reservoirs, connection points and some randomly selected publicly accessible taps (such as those in shopping centres, clinics, community facilities, sports grounds, markets, government offices and estate management offices) with primary focus to check quality of water as supplied to consumers for compliance with the WHO Guidelines. Furthermore, WSD also commenced the Enhanced Water Quality Monitoring Programme (“Enhanced Programme”) in December 2017 to take water samples from users randomly selected all over the territory to monitor the quality of drinking water at the consumers’ taps. Details of the Hong Kong Drinking Water Standards (“HKDWS”) and the Enhanced Programme are provided in the ensuing paragraphs.



2. Hong Kong Drinking Water Standards and Enhanced Programme

WSD has engaged an expert consultant to review the approaches, rationales and practices of two international organisations (i.e. the World Health Organization (“WHO”) and the European Union) and seven overseas countries (i.e. the United Kingdom, the United States of America, Canada, Australia, Singapore, New Zealand and Japan) in establishing their drinking water standards.

The expert consultant has already completed the review on the 12 metal parameters in the WHO Guidelines. Having taken into account the expert consultant’s findings and consulted the International Expert Panel on Drinking Water Safety appointed by the Development Bureau, the government adopts the WHO’s guideline values (“GVs”)/provisional guideline values (“PGVs”) as HKDWS for these metal parameters. Among them, six metals viz. antimony, cadmium, chromium, copper, lead and nickel could be present in internal plumbing systems. Further, the expert consultant will also review the remaining WHO’s parameters. Pending the completion of the review, the government adopts the corresponding WHO’s GV/PGVs as HKDWS for these remaining parameters. In addition, WSD will, according to the WHO Guidelines, collect local water quality data for reviewing the drinking water standards with a view to assessing the appropriateness for some parameters to adopt a standard beyond WHO Guidelines (“WHO+”). Against this, WSD has launched the Enhanced Programme to enhance its water quality monitoring programme to collect random water samples from consumers’ taps for testing the six metals that could be present in internal plumbing systems. WSD will review the need to include other parameters in the drinking water sampling test at the consumers’ taps as and when appropriate.

The possible sources and risk of contamination of the six metals in internal plumbing systems are tabulated below:

Possible Sources and Risk of Contamination of the Six Metals in Internal Plumbing Systems

Parameter	Possible Sources	Risk of Contamination
Antimony (Sb) HKDWS = 20 µg/L	<ul style="list-style-type: none">Antimony is a possible replacement for lead in solders.	<ul style="list-style-type: none">Solder materials using antimony are not commonly available in the market. The risk of exceedance for oral exposure to antimony from drinking water is known to be low.
Cadmium (Cd) HKDWS = 3 µg/L	<ul style="list-style-type: none">Cadmium is a possible impurity in the zinc of galvanised steel pipes, silver brazing materials, fittings, water heaters, water coolers and taps.	<ul style="list-style-type: none">The use of unlined galvanised steel pipes has been banned in Hong Kong since 1995 and the risk of excessive leaching of cadmium from unlined galvanised steel pipe is known to be low.The lining in the lined galvanised steel pipes has guarded against possible leaching of zinc.Silver brazing materials with excess levels of cadmium are not commonly available in the market.The risk of exceedance for oral exposure to cadmium from drinking water is known to be low.
Chromium (Cr) HKDWS = 50 µg/L	<ul style="list-style-type: none">Due to defects during the electroplating process, chromium may seep into the wetted surfaces of taps leading to possible dissolution of chromium into drinking water.	<ul style="list-style-type: none">As taps hold very small amount of water (less than 150mL) under stagnant condition, the leached chromium from water taps, if any, could be flushed away within one to two seconds after turning on the taps.The risk of exceedance for oral exposure to chromium from drinking water is known to be low.

Parameter	Possible Sources	Risk of Contamination
Copper (Cu) HKDWS = 2 000 µg/L	<ul style="list-style-type: none">Copper may come from internal corrosion of copper pipe in water of pH below 6.5.	<ul style="list-style-type: none">The risk of exceedance is low in Hong Kong as the pH of the drinking water is slightly alkaline (pH 8.2 to 8.8) to prevent copper corrosion from the pipe.
Lead (Pb) HKDWS = 10 µg/L	<ul style="list-style-type: none">Lead may come from leaded solders and copper alloy fittings especially new copper alloy fittings.	<ul style="list-style-type: none">Leaded solders are prohibited for use in inside services. WSD has enforced strict control on prohibiting the use of leaded solders through (i) material control; (ii) prior written permission from the Water Authority if the method of soldering is to be used; (iii) material check; and (iv) water sampling test.WSD has introduced a systematic flushing protocol for newly installed inside services to reduce the leaching of lead from new internal plumbing systems.
Nickel (Ni) HKDWS = 70 µg/L	<ul style="list-style-type: none">Due to defects during the electroplating process, nickel may seep into the wetted surfaces of taps leading to possible dissolution of nickel into drinking water.	<ul style="list-style-type: none">As taps hold very small amount of water (less than 150mL) under stagnant condition, the leached nickel from water taps, if any, could be flushed away within one to two seconds after turning on the taps.

3. Invitation for Participation in the Enhanced Programme

The Enhanced Programme monitors the quality of drinking water at consumers’ taps. Participating premises are randomly selected from all water accounts using a random sample selection methodology. The selection process is administered by an independent consultant appointed by WSD. The Registered Consumer(s) (“RC(s)”) and occupiers of the selected premises will receive invitation letters from WSD. The property management agencies, if any, will also be informed of the sampling visit to the building.

To ensure sufficient water samples are collected, our consultant will issue invitation letters to more premises than the target number of samples required¹. Thus, WSD would not collect water samples from all the premises that have received the invitation letters under the Enhanced Programme. The WSD will send a sampling team for each visit comprising a WSD water sampler and a licensed plumber appointed by the consultant. A sampling period will be stated in the invitation letter and will usually start two weeks after the date of issue of the invitation letter.

4. Non-mandatory Participation in the Enhanced Programme

Although the participation in the Enhanced Programme is by invitation only and is non-mandatory, randomly selected RCs and occupiers’ participation will greatly help WSD monitor the drinking water quality at the districts where the premises are located, which will also enable the creation of a territory-wide database of drinking water quality for reviewing the drinking water standards in Hong Kong.

¹ It is to cater for unsuccessful entry to some of the invited premises (e.g. the door is not answered) for collection of water samples.

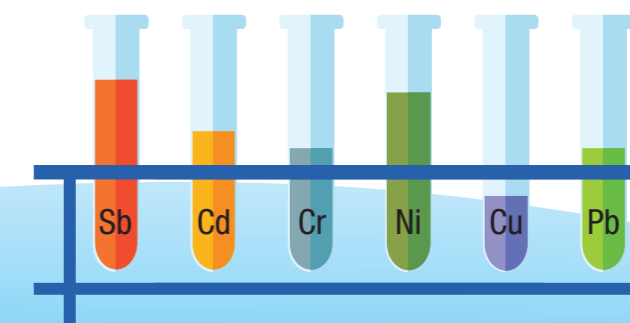
5. On the Day of Visit and Sampling

The sampling team will visit the premises during daytime (i.e. from 9:00am to 5:00pm). The sampling staff will wear uniforms and staff cards for identification.



Sample staff card of WSD’s water sampler

If consent is obtained from the occupier during the visit, the sampling staff will collect water samples from any one of the kitchen water taps or any water tap used for potable purpose. The process will take about one hour.



6. Two-Tier Sampling Protocol for Six Metals

A two-tier sampling protocol is adopted for testing the six metal parameters at consumers’ taps under the Enhanced Programme:

Tier 1

Random Day Time (“RDT”) sampling: the purpose is to monitor the water quality in respect of the six metals². A 1-litre unflushed sample will be randomly taken during daytime.

Tier 2

30-minute stagnation (“30MS”) sampling: the purpose is to verify the metal exposure of consumers³ (will only be tested if exceedance is found in the Tier 1 sample). The tap will first be flushed for 5 minutes and then stagnated for 30 minutes. After stagnation, a 1-litre unflushed sample will be taken at the tap.

The complex block contains two illustrations. The first, for Tier 1, shows a hand turning a tap to fill a blue 1-litre bottle. The second, for Tier 2, shows a hand turning a tap, a 30-minute timer, and then a hand filling a blue 1-litre bottle.

During collection of the above two-tier samples, WSD’s water sampler will also take auxiliary samples at the same time which will only be tested to provide supplementary information if exceedance is found in the two-tier samples. A number of 1-litre sequential samples from taps (generally 2 to 6 samples) will be taken for assessing whether the problem is confined to the premises or not, while a 2-minute flushed sample will be taken to confirm applicability of flushing advice as a mitigation measure in case of exceedance.

² The levels of the six metals consumed by the consumer through drinking water on a regular basis

³ To verify that the exceedance in the Tier 1 sample is not caused by unduly long stagnation (e.g. a water tap that has not been used for a long time due to long vacation or other reason) or sporadic presence of metal particles

7. Notification of Water Testing Results and Follow-up Actions

If no exceedance is found in the Tier 1 sample, WSD will provide the test result of the water sample(s) to the RC and occupier of the concerned premises within two weeks from the sampling date by mail and there is no need for the RC or the occupier to take further action.

If exceedance is found in the Tier 1 sample but not in the Tier 2 sample, this will indicate that the exceedance of the Tier 1 sample is likely due to unduly long stagnation time before sampling or sporadic presence of metal particles, and again no further action is required. Similar to the above, WSD will provide the test result of the water sample(s) to the RC and occupier of the concerned premises within two weeks from the sampling date by mail.

However, if there are exceedance in both Tier 1 and Tier 2 samples, it suggests possible contamination of water in the internal plumbing system of the concerned premises, WSD will:

- 1 after confirming the test results, notify the occupier and RC (and the owner as far as practicable) of the concerned premises as soon as possible by hand and by mail respectively, and in some cases the relevant Government bureaux and departments, the relevant licensing authorities and the relevant parties of the water test results, and request them to notify other water consumers in the same premises of the exceedance;
- 2 provide information on the related health risks. For details, please refer to the pamphlets “What you need to know about Lead in Drinking Water on health?” and “What you need to know about antimony, cadmium, chromium, copper and nickel in drinking water on health?” published by Department of Health;
- 3 advise on possible mitigation measures, details are provided under paragraph 8 below;
- 4 provide technical information such as possible source of the exceedance and options to deal with the problem including the

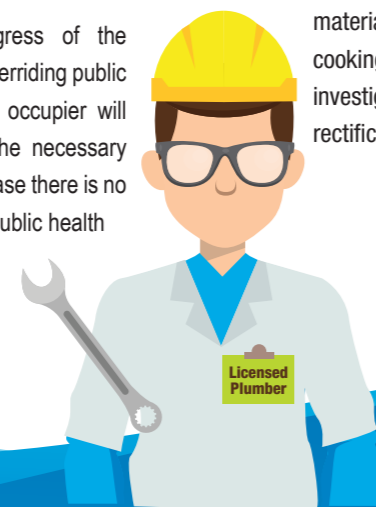
engagement of designated person(s) (e.g. licensed plumbers) to rectify the internal plumbing system; and

- 5 offer the RC a one-off free investigation into the cause and location of exceedance. Alternatively, the RC can choose to engage a qualified person (i.e. building services engineer, building surveyor or licensed plumber who has been included in the list of qualified consultants/persons providing investigation services) for conducting the investigation work.

Moreover, WSD will take appropriate follow-up actions for certain types of premises. For the premises where drinking water is supplied for potable consumption either by the general public (e.g. restaurants) or, in case of lead exceedance, the more easily affected groups (e.g. kindergartens), the below additional measures will be taken:

- 6 WSD will work with the RC and occupier of the premises with a view to implementing contingent measures for stopping contaminated water that exceeds the respective HKDWS of certain parameters from being supplied, such as arranging alternative sources of water supply including installation of certified water filters tested by accredited organisation for potable consumption and engaging a plan for subsequent rectification of the internal plumbing system.

WSD will undertake to follow up the progress of the mitigation/rectification work bearing in mind the overriding public health interest. Whilst the respective RC and occupier will normally take cooperative action to carry out the necessary mitigation or long term rectification measures, in case there is no effective measures being carried out resulting in public health being jeopardised, WSD will consider taking further actions including appropriate enforcement action in order to protect public health.



8. Mitigation Measures for Exceedance of Six Metals

If there are exceedances for both two-tier samples, the following mitigation measures should be taken before the completion of rectification work:

- 1 If result of the 2-minute flushed sample shows no exceedance, upon notification of WSD, consumers should run the drinking water tap for at least two minutes each and every time before drawing water for cooking or drinking. Moreover, if lead is the contaminant, alternative water sources, such as distilled water or water drawn from a certified filter (e.g. NSF 53 certified filters that have been tested for filtering and removal of lead) should be used for the more easily affected groups (i.e. children aged below 6, pregnant women and lactating women) for maximal protection.
- 2 If result of the 2-minute flushed sample shows exceedance as notified by WSD, consumers should use only alternative water sources for cooking, drinking or baby formula preparation.

The above flushing measure is to remove the stagnant water including, if any, the loose metal particulates in the internal plumbing system. It serves as one of the general effective interim measures to substantially reduce the metal content in water. In any event, as hot water may increase the amount of metal leaching from the pipe materials, consumers are advised to use only cold tap water for cooking or drinking. Nonetheless, it is of utmost importance to investigate the cause of the exceedance and carry out necessary rectification of the internal plumbing system.

9. Will Exceedance of Water Samples in One Premises Reflect a More Generalised Problem in the Building?

Renovation and/or routine maintenance of a premises often involves alteration of the plumbing installations (e.g. replacement of water taps or realignment of water pipes) and the use of non-compliant water pipes and fittings may give rise to water samples exceeding the drinking water standards. In other words, exceedance of water samples in one premises may either be a standalone case or there may be a possibility of similar exceedance in other premises in the same building.

If WSD discovers that there is a possibility of exceedance in other plumbing systems in the same building, it will notify the relevant parties responsible for maintaining and managing the building (such as building management, owners' associations as appropriate). They will be advised to arrange detailed investigations by engaging a qualified consultant to follow up to verify the problem of exceedance and to establish its extent in the building. WSD will provide the relevant parties with the necessary technical advice and recommendations as appropriate. The relevant parties will also be advised to notify all the owners and occupiers in the building to make arrangements to ensure all water users are aware of the problem and to implement the recommended mitigation measures until the extent of problem has been ascertained. A list of qualified consultants/persons providing investigation services is available at WSD's website (www.wsd.gov.hk/en/dwsewqmp).

10. Rectification of the Problem

The long term solution to exceedance is to replace any non-compliant pipes and/or fittings in the concerned plumbing system. The concerned RC should engage designated person(s) (e.g. licensed plumbers) to carry out the replacement works.

11. Publication of Water Quality Statistics

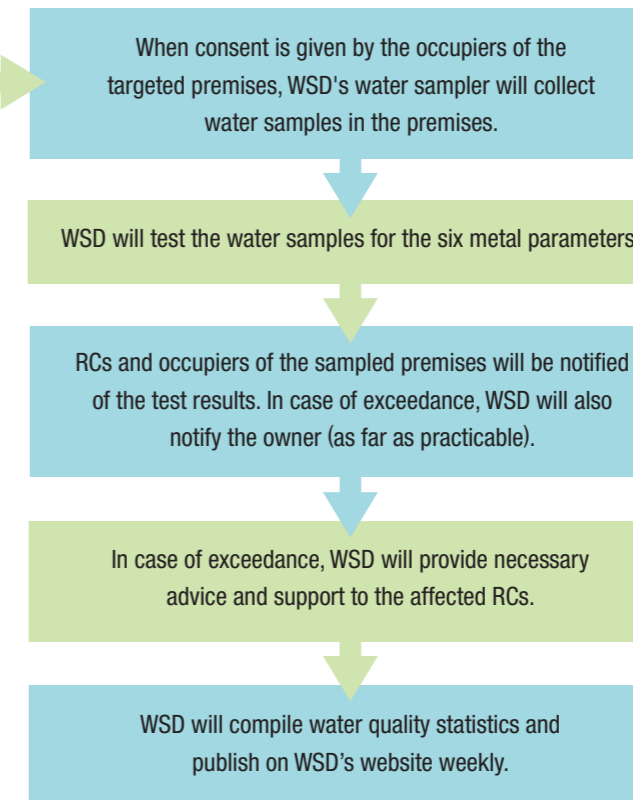
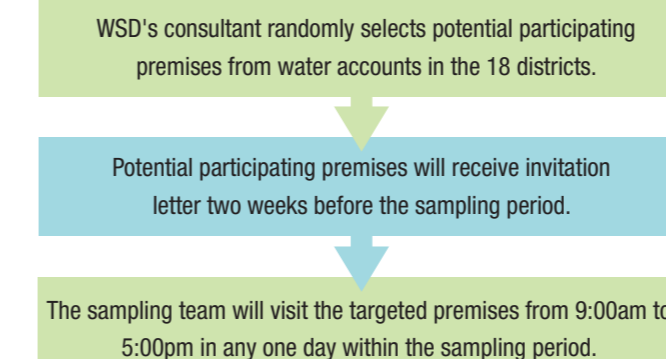
The test results of the water samples collected from individual premises will be used in the compilation of the water quality statistics for publication on WSD's website (www.wsd.gov.hk/en/dwsewqmp). The water quality statistics under the Enhanced Programme will be updated once every week.

The information collected under the Enhanced Programme

- 1 will be used for the purposes of the Enhanced Programme and the general administration of the Waterworks Ordinance and the Waterworks Regulations and any other purposes directly related thereto; and
- 2 may be transferred to other Government bureaux and departments, relevant licensing authorities, relevant parties responsible for maintaining and managing the building in which the premises participating in the Enhanced Programme are located (including but not limited to building management company and owners' association) and any other relevant parties for the purposes set out in 1 above.

WSD will not reveal the consumers' identities and their full addresses unless consent is obtained from relevant parties related to the premises concerned (such as the RC, the occupier or the property owner) or when general public health is at risk as revealed by the test result.

12. Flowchart of the Enhanced Programme



13. General Enquiries

If you have any queries about the Enhanced Programme, you may call the hotline of Action Plan for Enhancing Drinking Water Safety in Hong Kong:

- 2824 5000 (press 05 after language selection)⁴

For more information on health aspects concerning the six metals, please visit website of the Department of Health's Centre for Health Protection (www.chp.gov.hk/en/view_content/40434.html).

⁴ Please refer to WSD's website (www.wsd.gov.hk/en/contact-us) for the service hours of the hotline.

