#### DRINKING WATER SAFETY ADVISORY COMMITTEE

## Updates on Drinking Water Standards in Overseas Jurisdictions (Period from January to September 2021)

### **PURPOSE**

This paper aims to update the Drinking Water Safety Advisory Committee ("Committee") on revisions of drinking water standards made by overseas jurisdictions during the period from January to September 2021, and to seek the Committee's views on our recommended actions in response to such revisions.

# BACKGROUND

2. The Water Supplies Department ("WSD") has established a Radar System<sup>1</sup> to keep us abreast of, inter alia, the latest development of drinking water standards in overseas jurisdictions, and will report the department's finding and recommended follow-up action, if any, to the Committee<sup>2</sup>. On advice of the Committee<sup>3</sup>, the Drinking Water Safety Unit ("DWSU") of the Development Bureau ("DEVB") will initiate review of the parameters concerned in the Hong Kong Drinking Water Standards ("HKDWS"), Surveillance List ("SL") or Watch List ("WL") in accordance with the established framework<sup>4</sup>.

3. The revisions of drinking water standards made by overseas jurisdictions during the above period include:-

(i) the Australian Drinking Water Guidelines ("ADWG") of the National

<sup>&</sup>lt;sup>1</sup> The Radar System will regularly scrutinise reports, journals and websites of renowned organisations and institutes to keep abreast of, inter alia, the latest international development on drinking water quality and standards.

<sup>&</sup>lt;sup>2</sup> The item is reported to the Committee (i) on an annual basis primarily or (ii) on a need basis.

<sup>&</sup>lt;sup>3</sup> Based on the interim endorsement mechanism outlined in DWSAC Paper No. 6/2018, a review of the parameters in the HKDWS will be triggered if the World Health Organization ("WHO")'s Guidelines for Drinking-water Quality or drinking water standards commonly adopted by other leading jurisdictions are updated, or on recommendation of the Committee.

<sup>&</sup>lt;sup>4</sup> See DWSAC Paper No. 3/2019 for details of the framework.

Health and Medical Research Council of the Australian Government; and

(ii) the Lead and Copper Rule Revision ("LCRR") of the Environmental Protection Agency of the United States ("USEPA").

#### **REVISED ADWG OF AUSTRALIA**

4. The ADWG are revised on a regular basis to take account of the latest scientific evidence on good quality of drinking water. The latest ADWG were updated in March 2021.

5. The updates made in March 2021 mainly include a new guidance on short-term exposure values as given in Section 9.12 of Chapter 9 of the ADWG plus some editorial changes to correct minor errors. There are no changes in the guideline values for all types of parameters in the ADWG. The purpose of introducing the guidance on short-term exposure value is to assist water regulators and water suppliers in managing instances when short-term exceedance of health based guideline value(s) occurs following unusual circumstances such as extreme weather events or chemical spillage incidents. The short-term exposure values are only applicable to "once off" exceedances (defined as no more than one event in any 12-month period) but not intermittent The guidance provides recommendations on using acute and recurrent events. reference dose ("ARfD")<sup>5</sup> and the reference source of the ARfD for deriving the short-term exposure value if necessary. The short-term exposure values can be useful to:-

- (i) assess the risk posed by small and brief exceedances of health-based guideline values, and to communicate the risk to consumers effectively when exceedance in a guideline value has been identified;
- (ii) determine whether there is an imminent threat to public health; and
- (iii) provide the basis for deciding when water can continue to be supplied to consumers for a certain period without adverse health risk as suspension of water supply due to the exceedance of guideline values might pose significant risks to public health and safety (e.g. loss of water for sanitation and fire-fighting).

<sup>&</sup>lt;sup>5</sup> Acute reference dose is an estimate of the amount of chemical, normally expressed on a body-weight basis, that can be ingested in a period of 24 hours or less without appreciable health risks to the consumer.

#### Assessments and Recommended Actions

6. We do not recommend the introduction of short-term exposure values for the parameters in HKDWS at this moment for the following reasons:-

- With comprehensive water quality monitoring programme for raw and drinking waters as well as proper control measures<sup>6</sup> in place, the risk of exceedance of HKDWS is low<sup>7</sup>; and
- (ii) WSD has put in place the Water Quality Incident Management Plan which enables swift response be made to deal with exceedance in HKDWS, including the suspension of the supply of contaminated water and provision of alternative supply.

7. Instead, we will continue to keep in view the approach in derivation of the short-term exposure values adopted by overseas jurisdictions<sup>8</sup>.

## LCRR OF USEPA

8. The USEPA promulgates the Lead and Copper Rule ("LCR") to include a suite of actions to minimise lead and copper levels in drinking water<sup>9</sup>, primarily

<sup>&</sup>lt;sup>6</sup> Control measures have been identified and implemented according to risk summary tables of Water Safety Plan in WSD's Drinking Water Quality Management System. Operational targets and/or critical limits in ensuring the integrity of the multi-barrier approach and the operational performance of each treatment process for the compliance of HKDWS have been set against which the control measures are monitored. If critical limits are exceeded, WSD shall respond with the implementation of corrective actions in order to prevent or limit any potential adverse impact on water safety.

<sup>&</sup>lt;sup>7</sup> So far, only one exceedance case of *Escherichia coli* has been found in drinking water samples of a water supply system for remote villages where the water consumption rate is very low under the water quality monitoring programme, and there has been no exceedance case of chemical and radiological parameters in the past.

<sup>&</sup>lt;sup>8</sup> WHO has provided in its Guidelines for Drinking-water Quality: fourth edition incorporating the first addendum issued in 2017 the guidance on derivation of short-term exposure values for local authority to consider whether these values shall be derived and used to assess the risk posed by small and brief exceedances of health-based guideline values. Several chemical background documents published by WHO (see paragraph 15 below) have also proposed short-term provisional guideline values ("PGV") / provisional health-based values ("PHBV") for cyanobacterial toxins (i.e. short-term PGV for Cylindrospermopsins and Microcystins; short-term PHBV for Anatoxin-a and analogues). Based on the assessment in paragraph 6 of this paper, setting of short-term exposure values for these parameters is considered not necessary at this moment.

<sup>&</sup>lt;sup>9</sup> Lead and copper enter drinking water mainly from corrosion of lead and copper containing plumbing materials, due to the corrosivity of drinking water that attacks the lead service lines and/or lead solder installed. To address the problem, the United States banned the use of such plumbing materials in 1980s.

by reducing water corrosivity through corrosion control treatment ("CCT"). Whilst the LCRR was announced in January 2021, the USEPA has extended its effective date to 16 December 2021 and the compliance deadline to 16 October 2024, to allow sufficient time for primacy states to take necessary actions for regulatory compliance<sup>10</sup>.

9. Currently, the LCR adopts an Action Level ("AL") of 15  $\mu$ g/L for lead and 1.3 mg/L for copper based on the 90<sup>th</sup> percentile ("P90") level of tap water samples<sup>11</sup>. An AL exceedance will trigger further actions including water quality parameter ("WQP") <sup>12</sup> monitoring, corrosion control treatment ("CCT")<sup>13</sup>, source water monitoring/treatment, public education and lead service line ("LSL") replacement.

10. The updates made in LCRR announced in January 2021 and the rationale of these updates are detailed in **Annex 1**, and summarised as follows:-

- (i) using science-based testing protocols to more accurately and better locate elevated levels of lead in drinking water, which include prioritising collection of samples from sites served by LSLs<sup>14</sup>, collection of the fifth-litre of 6-hour stagnation sample in premises served by LSLs, revised sample collection procedures (i.e. using wide-mouth sampling bottles; prohibiting aerator cleaning/removal and pre-stagnation flushing prior to sample collection), etc.;
- (ii) establishing a Trigger Level ("TL") of 10  $\mu$ g/L for P90 lead level of tap water samples in addition to the current AL (15  $\mu$ g/L), so as to jumpstart mitigation earlier in more communities;

<sup>&</sup>lt;sup>10</sup> As provided by the Safe Drinking Water Act.

<sup>&</sup>lt;sup>11</sup> Results of water samples in each monitoring cycle (usually 6 months) are placed in ascending order, and the corresponding 90<sup>th</sup> percentile lead/copper test result (i.e. P90 lead/copper level) is used for checking if the AL is reached. In general, the total number of samples taken in each monitoring cycle is based on the system size (i.e. population size served).

<sup>&</sup>lt;sup>12</sup> WQP identified in the LCR include pH; alkalinity; orthophosphate (if a corrosion inhibitor is phosphate-based); silica (if a corrosion inhibitor is silicate-based); calcium; conductivity; and water temperature.

<sup>&</sup>lt;sup>13</sup> CCT is a treatment to minimise the dissolution of lead and/or copper during the delivery of water to consumers, which is a key component of the LCR. When the water systems are found to have the action level exceeded, the Water Suppliers are required to recommend a CCT method (e.g. alkalinity and pH adjustment, calcium hardness adjustment, and dosing of corrosion inhibitor) to the state's primacy agency, or to conduct study on CCT if required, and to install CCT facilities.

<sup>&</sup>lt;sup>14</sup> For details of the prioritisation, see the amended Title 40 Code of Federal Regulations Section 141.86(a) at https://www.federalregister.gov/d/2020-28691/page-4297.

- (iii) monitoring frequencies based on TL and/or AL exceedance;
- (iv) optimising CCT based on TL and/or AL exceedance;
- (v) requiring operators of water systems to identify and make public the locations of LSLs;
- (vi) driving more and complete LSL replacements through specifying LSL replacement programmes based on P90 level and customer's notification of replacement of customer-owned LSL portion; and
- (vii) requiring testing in schools and child care facilities with a view to enhancing protection of children who are most susceptible to risk of lead exposure. For the first 5-year testing cycle, compulsory sampling shall be conducted at 20% elementary school and child care facilities every year, whilst sampling at secondary schools shall be conducted on request. Thereafter, sampling shall be conducted on request of all schools and child care facilities.

#### Assessments and Recommended Actions

11. In Hong Kong, LSLs have been banned since the 1930s and no LSLs are left in our water supply networks. The use of lead solder has also been prohibited in Hong Kong since 1980s. In 2017, the Government launched the Action Plan for Enhancing Drinking Water Safety in Hong Kong ("Action Plan") which comprises, inter alia, the tightening up of plumbing material control and commissioning requirements for new plumbing installations to prevent any illegal use of LSL and lead solder in Hong Kong.

12. Under the Enhanced Water Quality Monitoring Programme ("Enhanced Programme"), which is one of the core elements of the Action Plan, premises including schools and child care centres are randomly selected from all water accounts, and no exceedance in lead or copper has been identified under the Enhanced Programme so far. In promoting Water Safety Plan for Buildings ("WSPB") in the territory, WSD has also developed a specific template for schools in which the risk of lead exposure for children has been included<sup>15</sup>.

<sup>&</sup>lt;sup>15</sup> For schools with copper pipes connected with solders and serving students aged at or below 6, it is recommended that water quality testing for lead be carried out for at least one tap for drinking and/or food preparation purposes.

13. We do not consider it necessary to take any immediate follow up action in response to LCRR for the following reasons:-

- (i) the enhanced measures of the LCRR related to LSLs are not relevant to Hong Kong (as deliberated in paragraph 11 above);
- (ii) the new TL of 10  $\mu$ g/L for lead in the LCRR is same as the corresponding value in HKDWS;
- (iii) the current corrosion control measure to keep drinking water slightly alkaline, the monitoring regime for six metals including lead and copper using the 2-tier sampling protocol under the Enhanced Programme, the triggering of remedial action by a single exceedance (as contrary to P90 level in the United States), and the notification and follow up mechanism of any lead or copper exceedance being adopted by WSD are considered adequate; and
- (iv) in regard to specific water sampling for schools as introduced in the LCRR, WSPB is being progressively implemented in all government schools from 2020 to 2024. WSD will continue to promote the implementation of WSPB in non-government schools. The two measures, viz. WSPB and the random water sampling under the Enhanced Programme, serve as an adequate monitoring regime in the Hong Kong context where LSLs and lead solder should be absent.

#### SUMMARY OF RECOMMENDATIONS

14. As deliberated above, we consider that there is no imminent need to trigger a comprehensive review of the HKDWS regarding the derivation of short-term exposure values for the parameters in the HKDWS, nor the water quality monitoring programme for lead and copper. We will continue to keep abreast of the approach in derivation of the short-term exposure values adopted by overseas jurisdictions, and also promote the implementation of WSPB in schools.

### **OTHER RELATED INFORMATION**

15. Whilst the World Health Organization published a number of chemical background documents<sup>16</sup> ("WHO's Documents") in 2020 and 2021, the revision of the WHO's Guidelines for Drinking-water Quality ("GDWQ") is still pending, which is expected to be released later on. Based on the WHO's Documents, the guideline values of some parameters would potentially be changed in the next revision of the GDWQ, which are summarised in **Annex 2**. By then, it may be opportune for us to initiate a comprehensive review of the HKDWS, SL and WL taking into account the Enhanced Programme's findings, and we will keep the Committee informed in this regard.

16. For the Committee's information, there has been no revision of the drinking water standards undertaken or proposed by other leading jurisdictions including Canada, European Union, United Kingdom, New Zealand, Singapore and Japan in the period.

### ADVICE SOUGHT

17. Members are invited to offer views on our recommendations as discussed in paragraphs 6 and 13 of this paper.

Development Bureau Water Supplies Department November 2021

<sup>&</sup>lt;sup>16</sup> These include new/revised documents for anatoxin-a and analogues, bentazone, chromium, cylindrospermopsins, iodine, microcystins (replacing that for microcystin-LR), saxitoxins, tetrachloroethene, trichloroethene; a document for organotins (replacing that for dialkyltins); and draft revised documents for asbestos, manganese, nickel and silver.

Annex 1

# Summary of the Lead and Copper Rule Revisions ("LCRR") by the Environmental Protection Agency of the United States ("USEPA")

Previous LCR	Revised LCR	Rationale of the Revision	Assessment and Recommended Actions
	Action Level ("AL")	) and Trigger Level ("TL")	
90 <sup>th</sup> percentile <sup>1</sup> ("P90") level above lead AL of 15 μg/L or copper AL of 1.3 mg/L requires additional actions.	<ul> <li>P90 level above lead AL of 15 μg/L or copper AL of 1.3 mg/L requires more actions<sup>2</sup> than the previous rule.</li> <li>Defines lead TL of 10 μg/L and P90 level &gt; TL but ≤ AL triggers additional planning, monitoring, and treatment requirements.</li> </ul>	The establishment of TL is to strengthen treatment requirements. At TL, systems with corrosion control treatment ("CCT") will be required to re-optimise their CCT and for those without CCT will be required to conduct a corrosion control study.	<ul> <li>Hong Kong Drinking Water Standards ("HKDWS") stipulate a standard value of 10 µg/L for lead and 2 mg/L for copper and remedial action will be triggered immediately upon a single exceedance in lead or copper during routine monitoring.</li> <li>Continue to monitor lead, copper and other 4 metals namely antimony, cadmium, chromium and nickel using current HKDWS and to collect data under the Enhanced Water Quality Monitoring Programme ("Enhanced Programme"), together with evaluation on metal leaching test results from commissioning test of new plumbing system for the review of HKDWS in future.</li> </ul>
	Lead and Cop	per Tap Monitoring	
<ul> <li>Sample Site Selection</li> <li>Prioritises collection of samples from sites with sources of lead in contact with drinking water.</li> <li>Highest priority given to sites served by copper pipes with lead solder installed after 1982 but before the state ban on lead pipes and/or lead service lines ("LSLs").</li> <li>Systems must collect 50% of samples from LSLs, if available.</li> </ul>	<ul> <li>Sample Site Selection</li> <li>Changes priorities for collection of samples with a greater focus on LSLs.</li> <li>Prioritises collecting samples from sites served by LSLs – all samples must be collected from sites served by LSLs, if available.</li> <li>No distinction in prioritization of copper pipes with lead solder by installation date.</li> <li>Improved tap sample site selection tiering criteria.</li> </ul>	The new requirements focus on sites with LSLs with a view to increasing sampling reliability.	<ul> <li>Not relevant to Hong Kong as lead pipes have been banned since the 1930s in Hong Kong and there are no LSLs in water supply networks. The use of lead solder has also been prohibited in Hong Kong since 1980s.</li> <li>WSD commenced the Enhanced Programme in December 2017 to take water samples from users randomly selected all over the territory for testing the six metals (viz. antimony, cadmium, chromium, copper, lead and nickel) that could be present in internal plumbing at the consumers' taps.</li> <li>Keep in view sampling protocols for monitoring lead, copper and other 4 metals at consumers' taps adopted by overseas jurisdictions.</li> </ul>

<sup>&</sup>lt;sup>1</sup> They refer to samples collected from consumer taps within each monitoring period of 6 months.

 $<sup>^2</sup>$  The revised LCR requires additional actions as summarised in the sections below.

Previous LCR	Revised LCR	<b>Rationale of the Revision</b>	Assessment and Recommended Actions
Collection Procedure	Collection Procedure	The revised collection procedure	• The Enhanced Programme is currently based
• Requires collection of the first litre sample after water has sat stagnant for a minimum of 6 hours.	<ul> <li>Requires collection of the fifth-litre sample in homes with LSLs after water has sat stagnant for a minimum of 6 hours and maintains first-litre sampling protocol in homes without LSLs.</li> <li>Adds requirement that samples must be collected in wide-mouth bottles.</li> <li>Prohibits sampling instructions that include recommendations for aerator cleaning/removal and pre-stagnation flushing prior to sample collection.</li> </ul>	will provide better information on the highest concentration of lead in drinking water and better identify elevated lead levels.	on a two-tier water sampling protocol (i.e. a Tier 1-Random Daytime ("RDT") sample (for most truly reflecting the water that the consumer drinks), a Tier 2 –30 Minute Stagnation ("30MS") sample). A 2-Minute flushed ("2MF") sample (for confirmation of the applicability of flushing advice in case of exceedance) and sequential samples (generally 2 to 6 samples for assessing whether the problem is confined to the premises or not) will be taken together during the sampling visit. The sampling protocol has also been shown to be effective in picking up particulate lead contamination in drinking water, which is particularly applicable in Hong Kong's context where lead contamination is mostly caused by lead solder.
			• As there is no LSL in Hong Kong, LCR specific monitoring requirement i.e. taking the fifth-litre sample adopted by USA for providing better information on highest/elevated lead concentration, is considered not applicable/appropriate in Hong Kong case.
			• According to the first addendum to WHO's Guidelines for Drinking-water Quality in 2017, RDT can reflect the quality of drinking water as consumed by consumers.
			• Wide-mouth bottles (>55mm) are already used for sampling of the Enhanced Programme. In addition, the current WSD's sampling protocol stipulates that the tap should be opened as much as possible.
			• Under WSD's current sampling protocol, the faucet aerator will not be removed or cleaned before sampling at consumers' taps.
			• Keep in view sampling protocols for taking water samples at consumers' taps adopted by overseas jurisdictions.

Previous LCR	Revised LCR	<b>Rationale of the Revision</b>	Assessment and Recommended Actions
Monitoring Frequency	Monitoring Frequency	More stringent monitoring	• The LCR monitoring programme focuses on
• Samples are analyzed for both lead	<ul> <li>Some samples may be analyzed for</li> </ul>	requirements for lead will better	LSLs. As Hong Kong has no lead problem
and copper.	only lead when lead monitoring is	identify elevated lead levels, which	from LSLs, the monitoring programme of
<ul> <li>Systems must collect standard</li> </ul>	conducted more frequently than	will result in more systems	LCR is not relevant to Hong Kong. WSD's
number of samples, based on	copper.	replacing LSLs.	Enhanced Programme is based on the
population; semi-annually unless	• Copper follows the same criteria as		sampling rate of 8 premises per 5,000-100,000
they qualify for reduced monitoring.	the current rule.		population with water samples collected from
• Systems can qualify for annual or	• Lead monitoring schedule is based on		about 670 randomly selected premises each
triennial monitoring at reduced	P90 level for all systems as follows:		year. Up-to-date monitoring results under the
number of sites. Schedule based on	- P90 > 15 $\mu$ g/L: Semi-annually at the		Enhanced Programme revealed no exceedance
number of consecutive years	standard number of sites.		of HKDWS, and did not reveal any particular
meeting the following criteria:	- P90 > 10 to 15 $\mu$ g/L: Annually at the		premises that have risk of elevated lead and
- Serves $\leq$ 50,000 people and $\leq$ lead	standard number of sites.		copper levels.
& copper ALs.	- P90 $\leq$ 10 µg/L: No new action,		
- Serves any population size, meets	monitoring frequency for lead same		• Keep in view the monitoring requirements for
state-specified optimal water	as previous rule:		lead in drinking water adopted by overseas
quality parameters ("OWQPs"),	<ul> <li>Annually at the standard number</li> </ul>		jurisdictions.
and $\leq$ lead AL.	of sites and triennially at reduced		
<ul> <li>Triennial monitoring also applies to</li> </ul>	number of sites using same		
any system with lead and copper	criteria as previous rule except		
P90 levels $\leq 0.005$ mg/L and $\leq 0.65$	copper P90 level is not		
mg/L, respectively, for 2	considered.		
consecutive 6-month monitoring	<ul> <li>Every 9 years based on current</li> </ul>		
periods.	rule requirements for a 9-year		
• 9-year monitoring waiver available	monitoring waiver.		
to systems serving $\leq$ 3,300.			

			Annex 1
Previous LCR	Revised LCR	<b>Rationale of the Revision</b>	Assessment and Recommended Actions
	Corrosion Control Treatment ("CCT"	') and Water Quality Parameters ("V	WQPs")
<ul> <li>CCT</li> <li>Systems serving &gt; 50,000 people were required to install treatment by 1 January 1997 with limited exception.</li> <li>Systems serving ≤ 50,000 that exceed lead and/or copper AL are subject to CCT requirements (e.g. CCT recommendation, study if required by primacy agency, CCT installation). They can discontinue CCT steps if no longer exceed both ALs for two consecutive 6-month monitoring periods.</li> <li>Systems must operate CCT to meet any primacy agency-designated OWQPs that define optimal CCT.</li> <li>There is no requirement for systems to re-optimise.</li> </ul>	<ul> <li>CCT</li> <li>Specifies CCT requirements for systems with 10 µg/L &lt; P90 level ≤ 15 µg/L:</li> <li>No CCT: must conduct a CCT study if required by primacy agency.</li> <li>With CCT: must follow the steps for re-optimizing CCT, as specified in the rule.</li> <li>Systems with P90 level &gt; 15 µg/L:</li> <li>No CCT: must complete CCT installation regardless of their subsequent P90 levels.</li> <li>With CCT: must re-optimise CCT.</li> <li>Community water systems ("CWSs") serving ≤ 10,000 people and non-transient non-community water systems ("NTNCWSs") can select an option other than CCT to address lead.</li> </ul>	Strengthening treatment requirements. Provision of flexibility for small systems so that they can protect public health by taking actions that make sense for their communities.	<ul> <li>No LSL in Hong Kong's water supply networks, and corrosion protection treatment of water mains e.g. lining, has been in place.</li> <li>pH of the treated water leaving water treatment works is adjusted to slightly alkaline (pH 8.2 to 8.8) to prevent corrosion of the pipes. Other CCTs as well as the monitoring of specific WQPs are considered not necessary.</li> </ul>
<b>CCT Options</b> : Includes alkalinity and pH adjustment, calcium hardness adjustment, and phosphate or silicate- based corrosion inhibitor.	<b>CCT Options</b> : Removes calcium hardness as an option and specifies any phosphate inhibitor must be orthophosphate.	Strengthening treatment requirements.	
<ul> <li>Regulated WQPs:</li> <li>No CCT: pH, alkalinity, calcium, conductivity, temperature, orthophosphate (if phosphate-based inhibitor is used), silica (if silica-based inhibitor is used).</li> <li>With CCT: pH, alkalinity, and based on type of CCT either orthophosphate, silica, or calcium.</li> </ul>	Regulated WQPs: • Eliminates WQPs related to calcium hardness (i.e., calcium, conductivity, and temperature).	The revised rule removes calcium carbonate stabilization as an option for CCT hence, monitoring of the WQPs associated directly with this CCT option is no longer necessary.	

Previous LCR	Revised LCR	<b>Rationale of the Revision</b>	Assessment and Recommended Actions
<ul> <li>WQP Monitoring</li> <li>Systems serving &gt; 50,000 people must conduct regular WQP monitoring at entry points and within the distribution system.</li> <li>Systems serving ≤ 50,000 people conduct monitoring only in those periods &gt; lead or copper AL.</li> <li>Contains provisions to sample at reduced number of sites in distribution system less frequency for all systems meeting their OWQPs.</li> </ul>	<ul> <li>WQP Monitoring</li> <li>Systems serving &gt;50,000 people must conduct regular WQP monitoring at entry points and within the distribution system.</li> <li>Systems serving ≤ 50,000 people must continue WQP monitoring until they no longer &gt; lead and/or copper AL for two consecutive 6-month monitoring periods.</li> <li>To qualify for reduced WQP distribution monitoring, P90 must be ≤ 10 µg/L and the system must meet its OWQPs.</li> </ul>	Strengthening treatment requirements.	
Sanitary Survey Review:	Sanitary Survey Review:	To ensure the water system is	
• Treatment must be reviewed during sanitary surveys; no specific requirement to assess CCT or WQPs.	• CCT and WQP data must be reviewed during sanitary surveys against most recent CCT guidance issued by EPA.	maintaining the optimal CCT and to assess if there should be modifications to the CCT to further reduce lead and copper levels in tap samples.	
<b>Find-and-Fix:</b> No required follow-up samples or additional actions if an individual sample exceeds 15 µg/L.	<ul> <li>Find-and-Fix: If individual tap samples &gt; 15 μg/L.</li> <li>Find-and-fix steps: <ul> <li>Collect tap sample at the same tap sample site within 30 days.</li> <li>For LSL, collect any litre or sample volume.</li> <li>If LSL is not present, collect 1 litre first draw after stagnation.</li> <li>For systems with CCT, conduct WQP monitoring at or near the site &gt; 15 μg/L.</li> <li>Perform needed corrective action.</li> <li>Document customer refusal or nonresponse after 2 attempts.</li> <li>Provide information to local public health officials.</li> </ul> </li> </ul>	The Find-and-Fix process is to identify the causes of elevated levels as well as take potential actions to reduce lead levels	<ul> <li>Under the Enhanced Programme, there are established procedures and mitigation measures to handle individual cases for exceedance of six metals including lead and copper that could be present in internal plumbing systems. The procedures include detailed investigation into the cause of the exceedance.</li> <li>Continue to keep in view the practice/procedures by overseas jurisdictions in handling cases of exceedance.</li> </ul>

Previous LCR	Revised LCR	<b>Rationale of the Revision</b>	Assessment and Recommended Actions
LSL Inventory and LSL Replacement Plan ("LSLRP")			
Initial LSL Program Activities:	Initial LSL Program Activities:	To identify areas with the greatest	In Hong Kong, lead pipes have been banned
• Systems were required to complete	• All systems must develop an LSL	potential for lead contamination of	since the 1930s, and therefore there is no
a materials evaluation by the time of	inventory or demonstrate absence of	drinking water.	relevance to Hong Kong's situation.
initial sampling. No requirement to	LSLs within 3 years of final rule	-	
update materials evaluation.	publication.		
• No lead service line replacement	• LSL inventory must be updated		
(LSLR) plan is required.	annually or triennially, based on their		
	tap sampling frequency.		
	• All systems with known or possible		
	LSLs must develop an LSLR plan.		
LSLR:	LSLR:	To replace LSLs systematically.	
• Systems with LSLs with $P90 > 15$	• Rule specifies replacement		
µg/L after CCT installation must	programmes based on P90 level for		
annually replace $\geq 7\%$ of number of	CWSs serving $> 3,300$ people:		
LSLs in their distribution system	- If P90 > 15 $\mu$ g/L: Must fully replace		
when the lead action level is first	3% of LSLs per year based upon a 2		
exceeded.	year rolling average (mandatory		
• Systems must replace the LSL	replacement) for at least 4 consecutive		
portion they own and offer to	6-month monitoring periods.		
replace the private portion at the	- If P90 > 10 to 15 $\mu$ g/L: Implement		
owner's expense.	an LSLR program with replacement		
• Full LSLR, partial LSLR, and LSLs	goals in consultation with the		
with lead sample results $\leq 15  \mu g/L$	primacy agency for 2 consecutive 1-		
("test-outs") count toward the 7%	year monitoring periods.		
replacement rate.	<ul> <li>Small CWSs and NTNCWSs that</li> </ul>		
• Systems can discontinue LSLR after	select LSLR as their compliance		
2 consecutive 6-month monitoring	option must complete LSLR within		
periods $\leq$ lead AL.	15 years if P90 > 15 $\mu$ g/L.		
-	• Annual LSLR rate is based on number		
	of LSLs and galvanised service lines		
	requiring replacement when the		
	system first exceeds the action level		
	plus the current number of lead status		
	unknown service lines.		
	• Only full LSLR (both customer-		
	owned and system-owned portion)		
	count toward mandatory rate or goal-		
	based rate.		

Previous LCR	Revised LCR	<b>Rationale of the Revision</b>	Assessment and Recommended Actions
	<ul> <li>All systems replace their portion of an LSL if notified by consumer of private side replacement within 45 days of notification of the private replacement. If the system cannot replace the system's portion within 45 days, it must notify the state and replace the system's portion within 180 days.</li> <li>Following each LSLR, systems must: <ul> <li>Provide pitcher filters/cartridges to each customer for 6 months after replacement. Provide pitcher filters/cartridges within 24 hours for full and partial LSLRs.</li> <li>Collect a lead tap sample at locations served by replaced line within 3 to 6 months after replacement.</li> </ul> </li> <li>Requires replacement of galvanised service lines that are or ever were downstream of an LSL.</li> </ul>		
<ul> <li>LSL-Related Outreach:</li> <li>When water system plans to replace the portion it owns, it must offer to replace customer-owned portion at owner's expense.</li> <li>If system replaces its portion only: <ul> <li>Provide notification to affected residences within 45 days prior to replacement on possible elevated short-term lead levels and measures to minimise exposure.</li> <li>Include offer to collect lead tap sample within 72 hours of replacement.</li> <li>Provide test results within 3 business days after receiving results.</li> </ul> </li> </ul>	<ul> <li>LSL-Related Outreach:</li> <li>Inform consumers annually that they are served by LSL or lead status unknown service line.</li> <li>Systems subject to goal-based programme must: <ul> <li>Conduct targeted outreach that encourages consumers with LSLs to participate in the LSLR program.</li> <li>Conduct an additional outreach activity if they fail to meet their goal.</li> <li>Systems subject to mandatory LSLR include information on LSLR programme in public education ("PE") materials that are provided in response to P90 &gt; AL.</li> </ul> </li> </ul>	Improving risk communication and enhancing public education/engagement. Increasing public actions to limit exposure to lead in drinking water.	<ul> <li>Under the Enhanced Programme, customers will be notified of the results within 2 weeks from the sampling date if there is no exceedance of the standard value of HKDWS based on the two-tier water sampling protocol. Customers will be notified as soon as possible if exceedance of the standard value is found and will be offered a one-off free investigation into the cause of exceedance.</li> <li>WSD's current procedures for Enhanced Programme are considered adequate to keeping the customer informed of the test results and also assisting them to investigate the cause of exceedance (for their necessary follow up). Further action is considered not necessary.</li> </ul>

Previous LCR	Revised LCR	<b>Rationale of the Revision</b>	Assessment and Recommended Actions
	Small Sys	stem Flexibility	
No provisions for systems to elect an alternative treatment approach but sets specific requirements for CCT and LSLR.	<ul> <li>Allows CWSs serving ≤ 10,000 people and all NTNCWSs with P90 &gt; 10 µg/L to select their approach to address lead with primacy agency approval:</li> <li>Systems can choose CCT, LSLR, provision and maintenance of point- of-use devices; or replace all lead- bearing plumbing materials.</li> <li>Public Educa</li> <li>CWSs must provide updated health</li> </ul>	Provision of flexibility for small systems so that they can protect public health by taking actions that make sense for their communities. Ation and Outreach Improving risk communication and	<ul> <li>No relevance to Hong Kong's situation.</li> <li>Details of the Enhanced Programme are</li> </ul>
<ul> <li>material in the annual Consumer Confidence Report ("CCR").</li> <li>Systems with P90 &gt; AL must provide PE to customers about lead sources, health effects, measures to reduce lead exposure, and additional information sources.</li> <li>Systems must provide lead consumer notice to individuals served at tested taps within 30 days of learning results.</li> <li>Customers can contact the CWS to get PE materials translated in other languages.</li> </ul>	<ul> <li>effects language in all PE materials and the CCR.</li> <li>Customers can contact the CWS to get PE materials translated in other languages.</li> <li>All CWSs are required to include information on how to access the LSL inventory and how to access the results of all tap sampling in the CCR.</li> <li>Revises the mandatory health effects language to improve accuracy and clarity.</li> <li>If P90 &gt; AL: <ul> <li>Current PE requirements apply.</li> <li>Systems must notify consumers of P90 &gt; AL within 24 hours.</li> </ul> </li> <li>In addition, CWSs must: <ul> <li>Deliver notice and educational materials to consumers during water-related work that could disturb LSLs.</li> <li>Provide information to local and state health agencies.</li> <li>Provide lead consumer notice to consumers whose individual tap sample is &gt; 15 μg/L as soon as practicable but no later than 3 days.</li> </ul> </li> </ul>	enhancing public education/engagement. Provision of understandable and consistent information about the levels of lead in drinking water, the sources of lead in a system, and the risks of lead in drinking water will increase public actions to limit exposure to lead in drinking water.	<ul> <li>available to public through information from WSD's website, TV API and leaflet/poster.</li> <li>Under the Enhanced Programme, customers will be notified of the results within 2 weeks from the sampling date if there is no exceedance of the standard value of HKDWS based on the two-tier water sampling protocol. Customers will be notified as soon as possible if exceedance of the standard value is found.</li> <li>If there are exceedance in both Tier 1 and Tier 2 samples, WSD will provide information on the related health risks published by Department of Health, advise on possible mitigation measures and provide technical information and options to deal with the problem to rectify the internal plumbing system.</li> <li>WSD will also take appropriate follow-up actions for 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).</li> <li>Current WSD's practice/procedures for the Enhanced Programme are considered adequate. Further action is considered not necessary.</li> </ul>

Annex 1

Annex			
Previous LCR	Revised LCR	Rationale of the Revision	Assessment and Recommended Actions
	Change in So	urces or Treatment	
Systems on a reduced tap monitoring schedule must obtain prior primacy agency approval before changing their source or treatment.	Systems on any tap monitoring schedule must obtain prior primacy agency approval before changing their source or treatment. These systems must also conduct tap monitoring biannually.	Changing a water source or treatment technology can result in a change in a water system's 90 <sup>th</sup> percentile tap sample value, and a water system's 90 <sup>th</sup> percentile lead value is important to determining regulatory requirements and cost under the rule revisions.	<ul> <li>WSD has developed a comprehensive and extensive water quality monitoring regime with water samples taken at catchment, intakes, receiving point of Dongjiang water at Muk Wu Pumping Stations and impounding reservoirs, water treatment works, service reservoirs, water distribution systems and consumers' taps to closely monitor the quality of raw water and treated water. WSD would assess the effect on water quality before changing raw water source at water treatment works.</li> <li>WSD's current monitoring regime is considered adequate. Further action is considered not necessary.</li> </ul>
	Source Water Mo	nitoring and Treatment	
<ul> <li>Periodic source water monitoring is required for systems with:</li> <li>Source water treatment; or</li> <li>P90 level &gt; AL and no source water treatment.</li> </ul>	<ul> <li>Primacy Agencies can waive continued source water monitoring if:</li> <li>System has already conducted source water monitoring for a previous P90 level &gt; AL;</li> <li>Primacy agency has determined that source water treatment is not required; and</li> <li>System has not added any new water sources.</li> </ul>	The revised LCR eliminates source water lead and copper monitoring that is not necessary to protect public health as lead and copper are rarely found in the source water in significant quantities.	<ul> <li>WSD has developed a comprehensive and extensive water quality monitoring regime with water samples taken at catchment, intakes, receiving point of Dongjiang water at Muk Wu Pumping Stations and impounding reservoirs, water treatment works, service reservoirs, water distribution systems and consumers' taps to closely monitor the quality of raw water and treated water.</li> <li>WSD's current monitoring regime is considered adequate. Further action is considered not necessary.</li> </ul>

Previous LCR	Revised LCR	<b>Rationale of the Revision</b>	Assessment and Recommended Actions	
	Lead in Drinking Water at Schools and Child Care Facilities			
<ul> <li>Does not include separate testing and education program for CWSs at schools and child care facilities.</li> <li>Schools and child cares that are classified as NTNCWSs must sample for lead and copper.</li> </ul>	<ul> <li>CWS must conduct sampling at 20% of elementary schools and 20% of child care facilities per year and conduct sampling at secondary schools on request for 1 testing cycle (5 years) and conduct sampling on request of all schools and child care facilities thereafter.</li> <li>Sample results and PE must be provided to each sampled school/child care, primacy agency and local or state health department.</li> <li>Excludes facilities built or replaced all plumbing after 1 January 2014.</li> </ul>	Since children are most susceptible to risk of lead exposure, strengthened sampling requirements would enhance the protection of children.	<ul> <li>Under the Enhanced Programme, premises including schools and child care centres are randomly selected from all water accounts and no exceedance in lead has been reported so far.</li> <li>WSD promotes implementation of Water Safety Plan for Buildings ("WSPB") and has developed relevant guidelines and templates, including a specific template for schools in Hong Kong.</li> <li>Under the WSPB, for schools with copper pipes connected with solders and serving students aged at or below 6, e.g. primary and some special schools, it is recommended that annual water quality testing for lead using 30MS sampling protocol be carried out for at least one tap for drinking and/or food preparation purposes. The testing frequency may be reduced to once every five years if the testing results are satisfactory for two consecutive years.</li> <li>As part of an initiative launched in 2020 to implement WSPB in government buildings, it is scheduled that WSPB will be implemented in all government schools by Q2/2024.</li> <li>WSD will continue to promote the implementation of WSPB in non-government schools.</li> <li>WSD's current monitoring regime is considered adequate. Further action is considered not necessary.</li> </ul>	

Annex 1

			Annex 1
Previous LCR	Revised LCR	<b>Rationale of the Revision</b>	Assessment and Recommended Actions
	Primacy A	gency Reporting	
Primacy Agencies must report	Expands current requirements to	Changes in reporting requirements	Special Duty Unit of WSD liaises and reports
information to EPA that includes but	include:	were proposed to inform state	regularly to the Drinking Water Safety Unit
is not limited to:	• All P90 levels for all system sizes.	decision-making and improve	("DWSU") of DEVB on issues in relation to
<ul> <li>All P90 levels for systems serving &gt; 3,300 people, and only levels &gt; 15 μg/L for smaller systems.</li> <li>Systems that are required to initiate LSLR and the date replacement</li> </ul>	<ul> <li>The current number of LSLs and lead status unknown service lines for every water system.</li> <li>OCCT status of all systems including primacy agency-specified OWQPs.</li> </ul>	implementation and oversight.	drinking water quality, including the monitoring programme, testing results, water quality incidents and progress of investigations and /or improvements. The current regime is considered adequate and further action is not necessary.
<ul> <li>Systems for which optimal corrosion control treatment ("OCCT") has been designated.</li> </ul>			

Reference:

USEPA, National Primary Drinking Water Regulations: Lead and Copper Rule Revisions (*Retrieved on 20 July 2021*); Available at: <u>https://www.govinfo.gov/content/pkg/FR-2021-01-15/pdf/2020-28691.pdf</u>

## Summary of Potential Revisions to Guidelines for Drinking-water Quality as Revealed by the World Health Organization's Chemical Background Documents

### (i) New Guideline Values ("GV") / Provisional Guideline Values ("PGV") proposed

Parameters	Proposed value (μg/L)	HKDWS <sup>1</sup> (µg/L)
Cylindrospermopsins	<ul><li>0.7 (PGV)</li><li>3 (short-term PGV)</li><li>6 (recreational water)</li></ul>	N/A (WL <sup>1</sup> only)
Manganese*	80 (PGV)	N/A (100 for Aesthetic Guidelines)
Saxitoxins	3 (GV - acute exposure) 30 (recreational water)	N/A (WL only)

#### (ii) **GVs/PGVs reviewed**

Parameters	Proposed value (μg/L)	HKDWS (µg/L)
Chromium	50 (PGV) → 50 (GV)	50
Nickel*	70 (GV) (unchanged)	70
Tetrachloroethene	$40 (\text{GV}) \rightarrow 100 (\text{GV})$	40
Trichloroethene	$20 (PGV) \rightarrow 8 (GV)$	N/A (SL <sup>1</sup> only)

<sup>&</sup>lt;sup>1</sup> HKDWS = Hong Kong Drinking Water Standards SL = Surveillance List WL = Watch List

Parameters	Proposed value (μg/L)	HKDWS (µg/L)
Anatoxin-a (ATX) and analogues (ATXs)	30 (PHBV for acute/short- term exposure) 60 (recreational water)	N/A (Only ATX in WL)
Bentazone	500 (HBV) (unchanged) 20,000 (acute HBV)	N/A (WL only)
Organotins	1.5 (HBV) for sum of tributyltin, triphenyltin, dibutyltin and di-n-octyltin	N/A

## (iii) Health-based Values ("HBV") / Provisional Health-based Values ("PHBV") reviewed/proposed

#### (iv) Short-term PGV proposed

Parameters	Proposed value (μg/L)	HKDWS (µg/L)
Microcystins	1 (PGV) (unchanged <sup>2</sup> ) 12 (short-term PGV) 24 (recreational water)	1 (For microcystin- LR)

## (v) Parameters reviewed with no GV/PGV recommended

Parameters	Proposed value (μg/L)	HKDWS (µg/L)
Asbestos*	N/A	N/A
Iodine	N/A	N/A
Silver*	N/A	N/A

\* Draft WHO's Background Document for these parameters

<sup>&</sup>lt;sup>2</sup> This PGV was previously for microcystin-LR (one of the variants of microcystins), but the WHO now recommends applying this PGV to microcystins.