

Memorandum for the Hong Kong Housing Authority

**Excessive Lead Content in Fresh Water Supply in
Public Housing Estates**

PURPOSE

Further to the briefing held on 16 July 2015, this paper informs Members about the major events relating to the incident of excessive lead in drinking water in public housing estates, follow-up actions taken and work to be undertaken by the Hong Kong Housing Authority (HA) and the Government as at 3 August 2015.

BACKGROUND

----- 2. **Annex 1** sets out the major events in chronological order since the end of June and early July when fresh water samples from Kai Ching Estate were first suspected to contain excessive lead ^{Note 1}. Since then, the Department has been working closely with the Water Supplies Department to conduct systematic tests on water samples collected from public housing estates ----- completed since 2011 (**Annex 2** refers). As at 3 August 2015, out of 25 projects involving 21 estates tested, samples were found in seven public housing developments containing excessive lead, and preliminary finding showed the existence of lead at the soldering material of pipe joint. Tests for the remaining estates are still on-going, and upon completion of this batch, the tests would be extended to cover those estates completed from 2005 to 2010 using copper pipes for fresh water supply system.

Note 1 Exceeding the provisional guideline value for lead in drinking water of 10 µg/L specified in the “Guidelines for Drinking-water Quality, Fourth Edition” published by the World Health Organization (WHO).

FRESH WATER PLUMBING SYSTEM

Materials of Fresh Water Supply Pipes

3. Galvanized Iron (GI) pipes were used in fresh water plumbing systems of early public housing estates. In the mid-1990s, lined GI pipes were introduced owing to its anti-rust property. However, this material was uncommon in the retail market and difficult to purchase in small quantities. Tenants would use copper pipes instead of lined GI pipes for alterations inside flats. From 2002 onwards, contractors were allowed to use either lined GI or copper pipes. Currently, building contractors are permitted to choose between copper and stainless steel pipes for fresh water plumbing systems in public housing estates. However, as stainless steel pipes are still uncommon in the retail market, even if contractors select stainless steel pipes for the plumbing system, copper pipes would still be used inside flats^{Note 2} to facilitate alteration by tenants.

4. We exercise quality control on water supply systems in public housing estates through specifications and testing. In selecting materials, we consider a number of factors, including construction techniques, availability of the material in the market, as well as compliance with the international standards stipulated in the Waterworks Ordinance (WO). All plumbing materials specified by HA comply with the relevant international standards as required under WO.

5. Connection methods of water supply pipes vary according to pipe sizes and materials. In general, soldering is adopted for copper pipe connections. Soldering materials need to comply with the relevant international standards as stipulated in WO, and our contract specifications adhere to such requirements. Both our contract specifications and WO do not permit the use of soldering materials which contain lead. The use of soldering materials containing lead in fresh water plumbing systems is a contravention of contract specifications and regulatory requirements.

Quality of Drinking Water

6. To safeguard the quality of water supply, we carry out tests upon completion of fresh water supply systems. For newly completed public housing estates, contractors are required to cleanse and disinfect the water supply system in each building. Water Supplies Department (WSD) collects water samples from water connection points for testing and analysis.

Note 2 Only one pilot project has stainless steel water pipes inside flats.

The quality of the water samples must comply with WSD's requirements ^{Note 3} before connection of water supply. The purpose of this arrangement is to ensure the water supply systems inside buildings are properly cleansed and disinfected to prevent them from contaminating the public water supply system upon connection to the latter.

7. After flat intake, to ensure tenants can enjoy quality water supply, HA has been participating in the "Quality Water Supply Schemes for Buildings – Fresh Water" (the Scheme), administered by WSD, since 2003. The objective of the Scheme is to encourage proper maintenance and repair of water supply systems in buildings by responsible parties. Under the Scheme, fresh water tanks must be cleaned at least once every three months, and water samples must be collected regularly from a randomly selected water supply points fed by each water storage tank in each building for testing. Water sampling tests must be conducted for each building at least once a year for new applications to participate in the Scheme, and at least once every two years for applications for renewal, to ensure the quality of water supply comply with relevant standards ^{Note 4}. Currently, all public housing estates under the management of HA have been awarded certificates of the Scheme by WSD.

8. To address the risk of Legionnaires' disease, starting from 2012, we stipulated the disinfection of the inside water supply systems of newly completed public housing estates prior to occupation by filling the systems with chlorinated water at a concentration of 50mg/L for at least two hours. After disinfection, the chlorinated water is drained and the systems are thoroughly flushed with fresh water. This disinfection process was completed for Kai Ching Estate before occupation in 2013 to ensure its water supply system is free of the Legionella bacteria at the time of tenant intake.

Current Supervision on the Installation of Fresh Water Supply Systems

9. All of HA's developments must comply with the Buildings Ordinance (BO). The Independent Checking Unit (ICU) exercises building control on HA's new projects and Alteration and Addition Works in existing buildings in accordance with BO, approves plans, issues consents to the commencement of works, carries out site monitoring and final inspections, and issues occupation permits for building works.

Note 3 Testing parameters include pH, colour, turbidity, conductivity, residual chlorine, E. Coli and total Coliform.

Note 4 According to the requirements of the Quality Water Supply Schemes for Buildings – Fresh Water, items to be tested include pH, colour, turbidity, conductivity, iron, E. Coli and total Coliform.

10. For the control on fresh water supply systems, WO is more relevant than BO. HA's building contracts follow the common practice in the building industry, and main contractors are responsible for carrying out plumbing installations in public housing projects^{Note 5}. With respect to the installation of fresh water supply systems, in compliance with WO –

- (a) the main contractor shall appoint a licensed plumber, who shall construct and install the fresh water supply system in compliance with drawings approved by WSD, WO and the contract specifications; and
- (b) the licensed plumber and the Authorized Person, in applying to the Water Authority for connection upon completion of the fresh water supply system, shall confirm that the system complies with WO, and shall attend the necessary inspection and testing.

Approval, Surveillance and Examination of Materials for Fresh Water Plumbing Systems

11. HA checks the materials proposed by main contractors, including catalogues, samples, certificates, test reports, approval documents from respective regulatory authorities (including WSD approval documents, etc.), the contractors' confirmations of full compliance with HA's and other recognized requirements, makes reference to the performance of the materials in other projects, and checks whether the material has ever been listed in the "Material Quality Alerts"^{Note 6}, before determining whether to approve the proposed materials for use.

12. We conduct checks on whether the materials or the documents of origin submitted by the main contractors showing compliance of standards are complete when materials are delivered to the site. Visual inspection and verification are carried out on materials against submitted catalogues and certificates. We also select samples on site for checking the appearance, construction, dimensions against relevant standards, and whether there are visible defects. HA's Components and Materials Team conducts laboratory

Note 5 In accordance with current legislation, the registered building contractor is required to provide continuous supervision and to comply generally with the ordinances; while the Authorized Person should give periodic supervision and make such inspections as may be necessary to ensure that the building works are being carried out in general accordance with the provisions of the Ordinance.

Note 6 The list of Material Quality Alerts contains 25 materials and is maintained by the Component and Materials Team. The team conducts surprise checks, selects and sends random samples to an accredited laboratory for thorough examination, and posts regular reports on findings.

tests on major components such as sink faucet, mixer and shower head, but excluding the relevant materials and fittings for fresh water supply system, to ensure compliance with the specified performance standards.

Surveillance at Construction and Completion Stages

13. Main contractors are responsible for continuous supervision of the works in order to ensure compliance with contract requirements. Our project teams conduct periodic inspection by carrying out surveillance checks and tests. We also conduct quarterly Performance Assessment Scoring System ^{Note 7} (PASS) assessments with contractors to assess the quality of works. These include assessments on the contractors' management of domestic sub-contractors.

14. We monitor main contractors' works regularly to ensure fresh water plumbing installations are executed in accordance with contractual requirements. For instance, we inspect the alignment of water pipes, position and quantity of brackets and whether they are firmly fixed, adequacy of pipe sleeves and spacing, the connection of pipes, whether the materials used comply with contractual requirements, etc. However, we do not inspect the joints between pipes (including the soldering materials) for lead content. The reason is the construction industry has all along believed that such widely accepted and broadly applied soldering materials comply with relevant requirements. However, with the recent discovery of lead in water, Housing Department (HD) has formulated follow up actions (see paragraph 27).

15. On completion of fresh water plumbing systems, main contractors inspect and test them to ascertain compliance with the drawings approved by WSD, statutory requirements and contract specifications, and the licensed plumbers apply to the Water Authority for inspection and approval of the plumbing systems. We also carry out final inspection and testing, including checking the main contractors' cleansing and disinfection of tanks and pipes, conducting pressure tests and checking for water-tightness. In the final inspection of each flat, we check the pipes and fittings for proper fixing and water-tightness, and whether the water supply and drains operate normally. Only upon the satisfactory completion of all tests do we apply to ICU for Occupation Permit.

Note 7 PASS scores affect the allocation of tendering opportunities to contractors and the evaluation of their submitted tenders. HA may impose regulatory actions on contractors with poor performance, including but not limited to restriction or suspension from tendering.

16. As mentioned in paragraph 6 above, WSD collects water samples at the connection points of the fresh water plumbing systems, and analyses them to ensure that the internal plumbing systems have been properly cleansed and disinfected before issuing certificates for permanent water connection. The certificates are pre-requisites for application for Occupation Permit from ICU. All along, the water samples have been tested in accordance with the WSD's requirement which includes the eight water sampling tests in footnote 3 and does not include test on heavy metal.

Prefabricated Kitchen and Bathroom

17. Since the early 2000s, HA has been advocating the use of volumetric precasting technology, including volumetric precast bathrooms, and successfully conducted pilots in the public housing developments at Tseung Kwan O Area 73B and the Ex-Kwai Chung Flatted Factory site. Upon the development of the Kai Tak Apron in 2009, considering the fact that the size of the projects was able to offer economies of scale in the use of prefabrication, we adopted extensive application of volumetric precast bathroom (VPB) and volumetric precast kitchen (VPK) in the two Kai Tak development projects (i.e. Kai Ching Estate and Tak Long Estate).

18. HD follows Building Department's requirements on quality control and supervision of precast concrete construction in the Mainland as set out in "Practice Notes for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers" (i.e. PNAP-APP 143). In addition, we also commission independent consultants to provide inspection services, which include full time deployment of resident supervisors to inspect the production of precast concrete components in factories. The independent consultants are also required to appoint Registered Electrical Workers (REW) to audit the fixed electrical installation in compliance with the Electricity (Wiring) Regulations. Moreover, HD regular visits the factories to audit the performance of resident personnel as well as the production process. For VPB and VPK construction, the resident supervisors inspect and check the installation of aluminium window frame, application of waterproofing, and fixing of wall and floor tiles according to the contract requirements. Upon completion of installation in the factory, the finished products would be delivered to the construction site, where HD's site inspection personnel would carry out relevant tests, such as water spray test for water-tightness, pull-off test for tile adhesion, and checks for whether sanitary fittings and partially installed pipes have been properly fixed.

19. All water pipes in HA's public housing developments, including those sanitary fittings and water pipes pre-installed in factories, are of surface-mounted design (i.e. exposed pipes). Since the water pipes are not fully installed in the factory and may suffer damage during transportation, the inspection of the water pipes is conducted by site inspection personnel after delivery to site. Upon completion of fresh water plumbing systems on site, main contractors are responsible for final inspection and for checking that the respective materials and the entire systems comply with WSD approved drawings and relevant regulations as well as the contract requirements. Based on the experience gained from the pilot conducted at Kai Tak Site 1A (i.e. Kai Ching Estate) of pre-installing sanitary fittings and water pipes in factories^{Note 8}, we observe that some of these pre-installed components were damaged during transportation. Upon further study and review, we decided not to pre-install sanitary fittings and water pipes in volumetric precast units in subsequent projects.

20. The bathrooms in all six blocks of Kai Ching Estate were prefabricated, and about half of them were partially fitted with water pipes before delivery to site. The kitchens of only two blocks were prefabricated, and about half of them were partially fitted with water pipes before delivery to site. The two vacant flats where lead was found in soldering material were not prefabricated, and were cast in-situ in Hong Kong. Out of the seven flats from which water samples were found to contain excessive lead, only one involved prefabricated kitchen with pipes fitted. Two of them had prefabricated bathrooms with no pre-installed pipes, while the remaining four had kitchens cast in-situ in Hong Kong with no prefabricated elements involved. As for Kwai Luen Estate Phase 2, Wing Cheong Estate, Lower Ngau Tau Kok Estate Phase 1, Shek Kip Mei Estate Phase 2, Tung Wui Estate and Hung Hom Estate Phase 2, no prefabricated bathrooms or kitchens were used. Hence, there is no direct relationship between excessive lead content in fresh water and the use of prefabrication.

INTERIM MEASURES TO ASSIST AFFECTED TENANTS

21. As at 3 August 2015, excessive lead content has been found in fresh water samples and preliminary finding also showed the existence of lead in the soldering materials of pipe joints in these seven public housing

Note 8 In the Kai Ching Estate development, about 14% of the total quantity of water pipes by length were pre-installed in precast kitchens and bathrooms at the factory.

developments, namely Kai Ching Estate, Kwai Luen Estate Phase 2, Wing Cheong Estate, Lower Ngau Tau Kok Estate Phase 1, Shek Kip Mei Estate Phase 2, Tung Wui Estate and Hung Hom Estate Phase 2. We have implemented the following measures in these estates.

22. HD and WSD have arranged temporary water supply, including the supply of bottled water ^{Note 9}, delivery of fresh water by tanker vehicles, and installation of temporary water tanks and pipes outside each block of the above seven public housing developments, to facilitate collection of water by the residents.

23. The Department of Health has set up a hotline (2125 1122) to respond to questions from the public on the effect of lead on health and to provide related health information ^{Note 10}. The more vulnerable groups, namely infants or children under six years of age, pregnant women and lactating mothers, may call the hotline to make appointments for free blood tests.

24. We have instructed and urged the contractors concerned to investigate and take all necessary actions to remedy the situation. First and foremost is to meet residents' daily need for fresh water. To further minimise inconvenience to the tenants in Kai Ching Estate, the contractor will install temporary water supply points on each domestic floor with supply drawn directly from the roof tank. We anticipate that such supply points can be in place before mid-August 2015. For Kwai Luen Estate Phase 2 and Wing Cheong Estate, we are making similar arrangement to provide temporary water points on each floor, and anticipate that they will be in place by the end of August and September respectively. We have accepted the proposals of the main contractors Kai Ching Estate, Kwai Luen Estate Phase 2, Wing Cheong Estate and Lower Ngau Tau Kok Phase Estate Phase 1 to install water filters with the United States National Sanitation Foundation (NSF) 53 certification for affected tenants. The main contractors will be responsible for the purchase, installation and replacement of the filters. We have urged the main contractors to expedite the ordering and shipment of filters from overseas suppliers to Hong Kong, such that the installation work could begin as soon as possible. For Shek Kip Mei Estate Phase 2, Tung Wui Estate and Hung Hom Estate Phase 2, we are liaising with corresponding main contractors to adopt the above measures accordingly.

Note 9 Priority is given to more vulnerable groups, namely infants or children under 6 years of age, pregnant women and lactating mothers.

Note 10 The hotline operates Monday to Friday from 9:00 a.m. to 9:00 p.m., and Saturday to Sunday from 9:00 a.m. to 6:00 p.m..

25. In relation to the case of Legionnaires' disease in Kai Ching Estate, we had disinfected the two water tanks and common areas of the whole building block of Mun Ching House on 14 July 2015. We would proceed to disinfect the water tanks of the remaining five blocks in the estate one by one, and thorough cleansing for Mun Ching House.

WAY FORWARD

26. HD will continue to thoroughly investigate the issue of lead in soldering materials used in fresh water plumbing systems. We will pursue all remedies available under contract against the contractors concerned, and will take appropriate action under HA's prevailing list management procedures. In the meantime, we are liaising with the contractors on pipe replacement plan and programme. The contractors will proceed with pipe replacement works as soon as the temporary water supply points have been put in place.

27. HA is implementing the following improvement measures –

Short and medium term measures

- (a) the latest additional water sample testing requirements, published under WSD's Circular Letter No. 1/2015 on 13 July 2015 ^{Note 11}, have been incorporated in all HA contracts;
- (b) strengthen inspection on soldering materials, ensuring compliance with contract requirements, i.e. –
 - revise the specification to require regular inspection of soldering materials at pipe joints of fresh water plumbing systems as well as intensifying spot checks on the same to ensure the material is lead-free;
 - liaise with the Hong Kong Accreditation Service (HKAS) to investigate the possibility of implementing an accreditation scheme for testing lead content in soldering materials for copper pipes under the Hong Kong Laboratory Accreditation Scheme (HOKLAS);

Note 11 The four new test parameters and acceptance criteria required under this Circular Letter are: lead ($\leq 10\mu\text{g/L}$), cadmium ($\leq 3\mu\text{g/L}$), chromium ($\leq 50\mu\text{g/L}$) and nickel ($\leq 70\mu\text{g/L}$).

- explore the use of hand-held equipment in speedy on-site checks for lead content in soldering material; and
- (c) minimise the risk of non-compliant materials by exploring the use of copper pipe fittings with mechanical joints (i.e. press or compression fittings) to ensure lead-free water pipes.

Other long term measures

- (d) collaborate with industry stakeholders to raise the safety standard of sink mixers, other fittings and materials in fresh water plumbing systems; and
- (e) work with WSD, the Construction Industry Council, the Hong Kong Construction Association Ltd., the Hong Kong Plumbing & Sanitary Ware Trade Association Ltd., the HK Licensed Plumbers Association Ltd., the Chartered Institute of Plumbing and Heating Engineering – Hong Kong Branch, the Hong Kong Institution of Plumbing and Drainage, the Hong Kong Water Works Professional Association, and the Hong Kong Plumbing General Union to strengthen the training of licensed plumbers and workers in the plumbing trade, and comprehensively promote quality construction and quality control.

----- 28. HA has formed a Review Committee (**Annex 3** refers) to review the quality assurance mechanism for materials and workmanship used in and the construction of public housing projects, including pre-fabricated components, and look into the quality system and supervisory procedures at various stages of the construction process as well as the enforcement situation. The Review Committee has held its first meeting on 30 July 2015, and it is anticipated that the review would be completed within this year.

----- 29. At the same time, Development Bureau has established a Joint Task Force (**Annex 4** refers) to investigate this matter and would make recommendations to prevent recurrence of similar incidents in future. The Joint Task Force will also follow up on a recent case of Legionnaires' disease in Kai Ching Estate. The Task Force is led by the Deputy Director of the Water Supplies and members include academics, professionals from relevant Government departments. The Department, its agents and contractors will fully co-operate with the Task Force to conduct investigations on the water supply chains in Kai Ching Estate and Kwai Luen Estate.

30. In addition, the Government has decided to appoint a Commission of Inquiry under the Commissions of Inquiry Ordinance (Cap.86) to conduct an independent and comprehensive investigation. The Commission of Inquiry (Annex 5 refers) will determine the cause of the incident; examine and evaluate the standard of the present system of control for drinking water supply system in public and private buildings; and make recommendations to ensure the safety of drinking water supply in Hong Kong.

31. We will keep Members informed about the progress of this matter.

INFORMATION

32. This paper is for Members' information.

Ivan KB LEE
Secretary, Housing Authority
Tel. No.: 2761 5003
Fax No.: 2762 1110

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c.c. Members of HA Committees/Sub-Committees

Major Events in Chronological Order

Date	Events
5 June 2015	Dr the Hon Helena WONG enquired HA by letter about the material and connection method of water pipes in public housing estates, water tank cleansing arrangement and whether regular water sampling tests had been conducted to ensure safety for drinking.
25 June 2015	HA replied to Dr the Hon Helena WONG by letter to address all her questions.
26 June 2015	Dr the Hon Helena WONG further enquired about the water pipe materials used in Kai Ching Estate. She also indicated that tests had been carried out on water samples collected from four flats in Kai Ching Estate. The test results revealed that the lead content of one sample was marginal while the other three samples did not meet the WHO standard, with lead content as high as 38 µg/L. A second test was being carried out to confirm the findings. Dr the Hon WONG suspected that the lead detected came from the soldering material for pipe connections and refused to disclose any further details.
29 June 2015	HA specifies the requirement of lead free pipe materials for all works projects, including Kai Ching Estate. The project team of Kai Ching Estate confirmed that the contractor had provided substantiation on compliance with the lead free requirement.
30 June 2015	HA decided to approach Hon WONG to enquire if the results of her water sampling re-test were available and to conduct water sampling tests at Kai Ching Estate to find out if there was any lead in the fresh water plumbing system.
2 July 2015	Dr the Hon Helena WONG advised that the re-test results showed that the lead content of three water samples met WHO's standard, while one did not (i.e. 11µg/L). She also indicated that the lead content of one water sample of the neighbouring Tak Long Estate was 2µg/L. She expressed her intention to announce the findings to media.

Date	Events
3 July 2015	HA contacted WSD and two HOKLAS accredited laboratories to collect water samples from 11 locations in Kai Ching Estate to verify the findings and for cross-checking.
5 July 2015	<p>Dr the Hon WONG held a press conference to announce that heavy metals, such as copper, lead, zinc and silver, were found in 27 water samples taken from 13 estates/buildings in Kowloon West region between April and June 2015. She stated that lead was found in some of the water samples taken from Sheung Ching House and Lok Ching House of Kai Ching Estate at levels which exceeded the WHO standard, i.e. lead content in drinking water exceeding 10 µg/L.</p> <p>HD responded in a press statement on the same day that water samples collected earlier from 11 locations in Kai Ching Estate all met the WHO standard, i.e. lead at levels below the WHO standard of 10 µg/L.</p>
6 July 2015	Representatives of HD, Department of Health (DH) and Water Supplies Department (WSD) held a joint meeting to discuss the follow-up action after the fresh water at Kai Ching Estate was suspected of containing excessive lead. After the meeting, the Government spokesman announced that all the results of the tests on 33 drinking water samples from Kai Ching Estate commissioned by HD and WSD earlier this month indicated that the lead content met the standard of WHO. On reports that non-compliant lead content had been detected in the drinking water supply for four households in Kai Ching Estate on 3 July 2015, the authorities would conduct more tests on their drinking water and would announce the results as soon as possible subject to the agreement of the four households. The authorities would extend the water sampling tests for Kai Ching Estate systematically to alleviate residents' concerns.
7 and 8 July 2015	HD and WSD collected another 16 water samples from Kai Ching Estate for testing. The lead content in these tested samples met the WHO standard.

Date	Events
9 July 2015	<p>HD announced in a press statement that lead was found in the soldering materials used in two water pipe joints in Kai Ching Estate and this contravened both the relevant legislation on water supply and the conditions of HA building contract. HD would replace non-compliant parts systematically. From the health point of view, DH opined that if the lead content in drinking water met the WHO standard, acute lead poisoning would be unlikely. Nevertheless, infants or children under six years of age, pregnant women and lactating mothers were recommended to take additional precautions, including flushing each faucet individually before using the water for drinking or cooking. It would also be preferable to use alternative source of drinking water.</p>
10 July 2015	<p>The Government spokesman noted that amongst the 30 water samples tested on 9 July 2015, the lead content of four samples did not comply with the WHO standard, with readings at 11, 14, 17 and 23 µg/L respectively. HD had instructed the building contractor to provide a plan to locate all possible pipe parts which might contain lead, and to replace them as soon as possible with the least disruption to residents. A resident forum with the presence of representatives from DH, Hospital Authority and HD was held in Kai Ching Estate in the evening.</p> <p>The media were also informed that the main contractor of Kai Ching Estate was China State Construction Engineering (Hong Kong) Ltd.</p>
11 July 2015	<p>A press conference was jointly held by the Transport and Housing Bureau, the Development Bureau, HD, WSD, DH and the Hospital Authority to explain the details of the follow-up actions discussed at the inter-departmental meeting chaired by the Chief Secretary of Administration. The test results of the last batch of 36 water samples collected from Kai Ching Estate was announced. 35 samples were taken from residential flats and one from a facility in the common area of the estate. 33 samples met the WHO standard. Three samples, all from residential flats, did not meet the WHO standard, with readings at 10.8, 11.6 and 35.1 µg/L respectively. WSD set up two temporary water supply points and commenced the laying of a temporary water</p>

Date	Events
	<p>pipe to the ground floor of each block in Kai Ching Estate to facilitate collection of fresh water by the residents.</p> <p>Overall for Kai Ching Estate, a total of 115 samples in four batches were tested, 108 samples met the WHO standard and seven did not.</p> <p>As for the licenced plumber of Kai Ching Estate, WSD announced that it would also follow up on the water works projects recently completed by the licenced plumber in four other housing estates under the Hong Kong Housing Authority, namely Lung Yat Estate, Cheung Sha Wan Estate, Shui Chuen O Estate and Kwai Luen Estate Phase 2. Water samples and soldering materials from these estates will be taken to test their levels of lead and the results will be announced in due course.</p>
13 July 2015	<p>A press conference was jointly held by the Transport and Housing Bureau, the Development Bureau, HD, WSD, DH to give an update on the latest follow-up work. It was also announced at the press conference that a tenant of Mun Ching House in Kai Ching Estate had contracted Legionnaires' disease earlier. Water samples taken from water pipes supplying the patient's flat as well as the same floor, and from the water pipe on the first floor of the building had also been tested positive for this bacteria. HD expressed that disinfection of Mun Ching House was necessary. To ease tenants' concern, consideration would be given to carry out disinfection for the remaining five blocks in the estate.</p> <p>HD and WSD proceeded to take water samples for testing on the same day from four other housing estates (Kwai Luen Estate Phase 2, Shui Chuen O Estate, Cheung Sha Wan Estate and Lung Yat Estate) where the same licensed plumber as Kai Ching Estate was appointed for installation of the fresh water plumbing systems.</p> <p>The Government announced the formation of a task force, led by WSD, to investigate the cause of excessive lead content in drinking water at Kai Ching Estate and make recommendations for prevention of similar incidents from happening in the future.</p>

Date	Events
14 July 2015	<p>An inter-departmental meeting chaired by the Chief Secretary for Administration discussed both temporary and long-term measures to tackle excessive lead content in drinking water. The Secretary for Transport and Housing announced that the likely cause of drinking water not meeting the WHO standard was lead in the soldering material of water pipes. A number of follow-up measures were announced, including the provision of temporary water points on each floor of each domestic block in Kai Ching Estate in around three weeks' time to facilitate water collection by tenants. He also expressed that the possibility of replacing all water pipes would not be ruled out, but priority would be given to replacing those pipes with non-compliant soldering material in public areas outside the residential units.</p> <p>It was also announced on the same day that out of the four other public housing estates and two other facilities for which the same licensed plumber as Kai Ching Estate had carried out pipe works, the lead content of water samples from Kwai Luen Estate Phase 2 did not comply with the WHO standard while more water samples had to be collected from Shui Chuen O Estate for testing. More than 40 water samples were taken from Kwai Luen Estate Phase 2 in Kwai Shing Circuit, among which five samples were found with lead content levels of 10.4, 10.5, 16.8, 19.4 and 23.3 µg/L, exceeding the WHO standard. An open forum with the presence of representatives from DH, WSD and HD were arranged in Kwai Luen Estate Phase 2 in the evening.</p> <p>In summary, the water sample test results as at 14 July 2015 were as follows –</p> <ul style="list-style-type: none">● Kai Ching Estate – 115 samples tested, seven did not meet the WHO standard.● Kwai Luen Estate Phase 2 – 44 samples tested, five did not meet the WHO standard.

Date	Events
	<ul style="list-style-type: none"> ● Shui Chuen O Estate – 43 samples tested, samples from Long Chuen House, Ching Chuen House and Yan Chuen House met the WHO standard but one sample taken from a vacant unit at Hei Chuen House was found to have a lead level of more than 14 µg/L, which did not meet the WHO Guideline. On 15 July 2015, WSD took 10 more samples from the same block, including one from the vacant unit, for testing and all met the WHO standard. It was concluded that the water sample which exceeded WHO standard was affected by the environment and was discarded. Total 53 samples tested and all met the WHO standard. ● Cheung Sha Wan Estate – 42 samples tested, all met the WHO standard. ● Lung Yat Estate – 33 samples tested, all met the WHO standard.
15 July 2015	<p>HD announced that although there was no indication of any problem of lead level in drinking water in the following estates, in order to ease residents' concerns, water samples would be collected from nine public housing estates completed since 2013, namely, (1) Wing Cheong Estate, (2) Mei Chuen House of Mei Tin Estate, (3) Shek Foon House of Shek Lei (II) Estate, (4) Fung Wo Estate, (5) Tak Long Estate, (6) Mei Tak House of Mei Tung Estate, (7) Yee Ming Estate, (8) Cheung Lung Wai Estate and (9) Hung Fuk Estate Phases 1, 2 and 3, for lead-testing. In addition, although Kwai Luen Estate Phase 1 was completed prior to 2013, since it was located near to Kwai Luen Estate Phase 2 where five out of 44 samples were found not complying with the WHO standard, it would also be included in the sampling exercise.</p> <p>On the same day, the Government announced the membership of the Task Force to be chaired by the Deputy Director of Water Supplies. The Task Force would investigate into the cause of excessive lead content in drinking water found recently at public housing estates and recommend measures to prevent recurrence of similar incidents in future. It would also follow up on a recent case of Legionnaires' disease at Kai Ching Estate.</p>

Date	Events
16 July 2015	HA held a briefing session to discuss the issue and proposed to set up a Review Committee to carry out comprehensive examination on the existing system and mechanisms for quality assurance of materials and parts, and the supervision work of the construction process.
17 July 2015	The Chief Executive announced the appointment of a Commission of Inquiry under the Commissions of Inquiry Ordinance (Cap. 86) to conduct an independent and comprehensive inquiry.
20 July 2015	<p>From 17 to 19 July, HD and WSD had taken 370 water samples for lead testing from six PRH estates completed in 2013 and Kwai Luen Estate Phase 1. The test results were as follows –</p> <ul style="list-style-type: none">● Kwai Luen Estate Phase 1 – 41 samples tested, all met the WHO standard.● Mei Chuen House of Mei Tin Estate – 33 samples tested, all met the WHO standard.● Shek Foon House of Shek Lei (II) Estate – 26 samples tested, all met the WHO standard.● Fung Wo Estate – 50 samples tested, all met the WHO standard.● Mei Tak House of Mei Tung Estate – 24 samples tested, all met the WHO standard.● Hung Fuk Estate Phases 1, 2 and 3 – 150 samples tested, all met the WHO standard.

Date	Events
	<p>For Wing Cheong Estate, 46 samples were taken. One of the samples taken from the estate management office on the ground floor of Wing Chun House was found to have a lead level of 14µg/L, not complying with the WHO standard. Preliminary finding by an X-ray fluorescence detector also showed the existence of lead at the soldering material of a pipe joint.</p> <p>As the lead content level in a water sample did not meet the WHO standard and as lead was detected in the soldering material of a pipe joint in Wing Cheong Estate, a series of measures actions similar to those adopted in Kai Ching Estate and Kwai Luen Estate Phase 2 were put in place.</p> <p>It was also announced that the scope of water sampling would be extended to those public housing estates completed in 2011 and 2012. Conducting such tests was simply to ease residents' concerns, not because evidence had been found pointing to unacceptable lead levels in drinking water there.</p>
21 July 2015	<p>Latest blood test results of public housing estate residents affected by the lead in drinking water incidents were announced. Health condition of all the lactating women and children with borderline raised blood lead level would be followed up by DH and Hospital Authority experts according to the care plan formulated. DH would also make special arrangements for those children whose blood lead level had exceeded the normal level to receive development assessments.</p> <p>Arranging blood tests for three more easily affected groups of residents, expanding the scope of blood test to children who were under six years old when moving into the affected estates, and consideration of increasing the capacity of blood taking and testing were also announced.</p> <p>We briefed at the press release about the feasibility study on using water filters with NSF standard on filtering lead, and progress of the task force on identifying the causes of excessive lead content in drinking water.</p>

Date	Events
22 July 2015	A special meeting of the Housing Panel of Legco was held to report the incident on excessive lead in drinking water.
23 July 2015	<p>Water sampling test results of three public housing estates completed since 2013 were released –</p> <ul style="list-style-type: none">● Cheung Lung Wai Estate – 42 samples tested, all met the WHO standard;● Yee Ming Estate – 102 samples tested, all met the WHO standard;● Tak Long Estate – 198 samples tested, all met the WHO standard; and● Ching Long Shopping Centre – 20 samples tested, all met the WHO standard.
24 July 2015	<p>HA approved the terms of reference and membership of the Review Committee which would conduct a health check on the HA's system for quality control and works supervision in relation to fresh water supply systems in public housing estates.</p> <p>It was announced that water sampling tests would be extended to cover 12 estates completed in 2011 and 2012, and then for 26 estates completed from 2005 to 2010 in a systematic manner so as to relieve residents' concerns. After completion of the estates completed since 2005, HA will plan the water sampling tests for the remaining public housing estates.</p> <p>Meanwhile, HA had decided, after discussion with other Government Departments, to accept concerned main contractors' proposals to provide water filters certified to NSF53 for lead reduction as one of the interim relief measures for individual flat units.</p>

Date	Events
29 July 2015	<p>Water sampling test results of three public rental housing estates were announced –</p> <ul style="list-style-type: none"> ● Lower Ngau Tau Kok Estate Phase 1 (5 domestic blocks) – 130 samples tested, 6 samples exceed the WHO standard; ● Mei Tung Estate (Mei Yan House) – 27 samples tested, all met the WHO standard; and ● Shek Kip Mei Estate Phase 5 (4 domestic blocks) – 73 samples tested, all met the WHO standard. <p>Lower Ngau Tau Kok Estate Phase 1 and Shek Kip Mei Estate Phase 5 were completed in 2011 and 2012 while Mei Yan House was in the same estate as Mei Tung House of which water sampling tests had been conducted in the earlier batch.</p> <p>Relief measures and follow-up for Lower Ngau Tau Kok Estate Phase 1 were announced. The progress of relief measures and the latest blood test results.</p>
30 July 2015	<p>The Review Committee on Quality Assurance Issues Relating to Fresh Water Supply of Public Housing Estates of HA held its first meeting. The Chairman announced after the meeting that the study would be completed in about three to five months' time.</p>
31 July 2015	<p>The water sampling test results of three public rental housing estates and Domain completed in 2011 and 2012 were released –</p> <ul style="list-style-type: none"> ● Un Chau Estate Phase 5 (Un Mun House, Un Wai House and Un Yat House) – 55 samples tested, all met the WHO standard; ● Choi Fook Estate (Choi Foon House) – 27 samples tested, all met the WHO standard; ● Choi Tak Estate (Choi Yan Hous, Choi Yee House) – 40 samples tested, all met the WHO standard; and ● Domain (a shopping centre and Yau Tong Community Hall) – 8 samples tested, all met the WHO standard.

Date	Events
3 Aug 2015	<p>The water sampling test results of three public housing estates completed in 2011 and 2012 were released –</p> <ul style="list-style-type: none">● Tung Wui Estate – 52 samples tested, 4 samples exceed the WHO standard;● Hung Hom Estate Phase 2 – 74 samples tested, 16 samples exceed the WHO standard;● Shek Kip Mei Estate Phase 2 – 59 samples tested, 5 samples exceed the WHO standard. <p>Relief measures and follow-up actions for these three estates were announced. The latest blood test results were also reported.</p> <p>Following findings that lead content in drinking water of Kai Ching Estate exceeded the standard limit of WHO, HD and WSD have jointly conducted water sample tests for other public housing estates systematically. So far, amongst 25 projects in 21 public housing estates, water samples from 7 estates were found to have excessive lead. Lead content was also found in some welding joints of the water pipes.</p>

Summary of Public Rental Housing(PRH) Estates with water sample test

(as at 3 August 2015)

(25 projects (21 PRH estates) are involved in the result announcement)

Name of Estate	Completion Year	Total number of flats	Main Contractor	No. of Water Sample taken	Number of sample exceeded the WHO standard
Announced results of water sample test					
Cheung Lung Wai Estate	2015	1 358	Yau Lee Construction Company Limited	42	0
Hung Fuk Estate Phase 1 & 2 (Hung Foon House, Hung Yan House, Hung Hei House, Hung Lok House)	2015	2 097	Hsin Chong Construction Company Limited	150	0
Hung Fuk Estate Phase 3 (Hung Long House, Hung Yat House, Hung Yuet House, Hung Cheong House, Hung Shing House)	2015	2 808	Yau Lee Construction Company Limited		
Shui Chuen O Estate Phase 1 (Ching Chuen House, Long Chuen House, Yan Chuen House, Hei Chuen House)	2015	3 039	China State Construction Engineering (Hong Kong) Limited	53(Note)	0
Kwai Luen Estate Phase 2 (Luen Yat House, Luen Yuet House)	2014	1 507	Shui On Building Contractors Ltd	44	5
Mei Tung Estate (Mei Tak House)	2014	990	Able Engineering Company Limited	24	0
Yee Ming Estate	2014	2 059	Hanison Construction Company Limited	102	0
Tak Long Estate	2014	8 164	Yau Lee - Hsin Chong Joint Venture	198	0
Fung Wo Estate	2013	1 607	Hsin Chong Construction Company Limited	50	0
Cheung Sha Wan Estate	2013	1 390	China State Construction Engineering (Hong Kong) Limited	42	0
Lung Yat Estate	2013	990	Shui On Building Contractors Ltd	33	0
Mei Tin Estate (Mei Chuen House)	2013	1 216	Hsin Chong Construction Company Limited	33	0
Kai Ching Estate	2013	5 204	China State Construction Engineering (Hong Kong) Limited	115	7
Shek Lei (II) Estate (Shek Foon House)	2013	839	Hip Hing Construction Company Limited	26	0
Wing Cheong Estate	2013	1 488	Paul Y. General Contractors Limited	46	1

Annex 2
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Name of Estate	Completion Year	Total number of flats	Main Contractor	No. of Water Sample taken	Number of sample exceeded the WHO standard
Ching Long Shopping Centre	2013	-	Zone A: China State Construction Engineering (Hong Kong) Limited Zone B: Yau Lee - Hsin Chong Joint Venture	20	0
Lower Ngau Tau Kok Estate Phase 1 (Kwai Leung House, Kwai Yuet House, Kwai Hin House, Kwai Sun House, Kwai Fai House)	2012	4 238	Yau Lee Construction Company Limited	130	6
Shek Kip Mei Estate Phase 5 (Mei Yick House, Mei Yin House, Mei Sang House, Mei Shing House)	2012	2 496	Shui On Building Contractors Ltd	73	0
Un Chau Estate Phase 5 (Un Mun House, Un Wai House, Un Yat House)	2012	1 486	China State Construction Engineering (Hong Kong) Limited	55	0
Shek Kip Mei Estate Phase 2 (Mei Wui House, Mei Leong House, Shek Kip Mei Estate Ancillary Facilities Block)	2012	1 558	Yau Lee Construction Company Limited	59	5
Tung Wui Estate (Wui Yan House, Wui Sum House, Tung Tau Community Centre)	2012	1 333	Paul Y. General Contractors Limited	52	4
Domain	2012	-	China State Construction Engineering (Hong Kong) Limited	8	0
Choi Fook Estate (Choi Foon House)	2011	915	Hsin Chong Construction Company Limited	27	0
Choi Tak Estate (Choi Yan House, Choi Yee House)	2011	1 586	Hsin Chong Construction Company Limited	40	0
Kwai Luen Estate Phase 1 (Luen Yan House, Luen Hei House)	2011	1 470	Shui On Building Contractors Ltd	41	0
Hung Hom Estate Phase 2 (Hung Yat House, Hung Yan House, Hung Yiu House)	2011	1 938	China State Construction Engineering (Hong Kong) Limited	74	16
Mei Tung Estate (Mei Yan House)	2010	799	China State Construction Engineering (Hong Kong) Limited	27	0
Water sample test in progress, result would be announced in due course					
Choi Tak Estate (4 more residential blocks) and Choi Tak Shopping Centre	2011	2 704	China State Construction Engineering (Hong Kong) Limited		
Shatin Pass Estate (Total 2 residential blocks)	2011	1 278	Chevalier (Construction) Company Limited		
Yan On Estate (Total 3 residential blocks) and Yan On Shopping Centre	2011	2 587	Yau Lee Construction Company Limited		

Annex 2
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Name of Estate	Completion Year	Total number of flats	Main Contractor	No. of Water Sample taken	Number of sample exceeded the WHO standard
Yau Lai Estate Phase 5 (total 2 residential blocks) and Phase 6 (Yau Lai Shopping Centre)	2011	2 002	Shui On Building Contractors Ltd		
Shin Ming Estate (Total 2 residential block)	2011	1 974	Shui On Building Contractors Ltd		
Tin Ching Estate Tin Ching Amenity and Community Building	2011	-	Paul Y. General Contractors Limited		

(Note) In Shui Chuen O Estate, one sample taken from a vacant unit at Hei Chuen House was found to have a lead level of more than 14 µg/L, which did not meet the WHO Guideline. Samples from the other three blocks (Long Chuen House, Ching Chuen House and Yan Chuen House) met the WHO standard. WSD took more samples from the Hei Chuen House and all met the WHO standard. It was concluded that this water sample which exceeded WHO standard was affected by the environment, and hence was discarded in the total sampling.

**Review Committee on Quality Assurance Issues Relating to
Fresh Water Supply of Public Housing Estates**

Terms of Reference

1. To comprehensively review the present arrangements for quality control and monitoring in relation to the installation of fresh water supply system in public housing estates.
2. In the process of (1), to critically review various aspects of quality inspection relating to materials used (including prefabricated components), quality inspection and works supervision at different stages of construction.
3. To report findings to the Housing Authority and recommend any improvement in procedures/guidelines and follow-up actions as necessary.

Task Force on Excessive Lead Content in Drinking Water

Terms of Reference

1. To carry out investigation to ascertain the causes of the recent incidents leading to presence of lead in water drawn by households.
2. To recommend measures to prevent recurrence of similar incidents in future.
3. To follow up on a recent case of Legionnaires' disease found at Kai Ching Estate.

Commission of Inquiry

Terms of Reference (as at 17 July 2015)

1. Determine the causes of the incident.

2. Examine and evaluate the adequacy of the present system of control for drinking water supply system including the technology, standards and monitoring of the design, construction, repairs and maintenance, installation and the use of materials, etc, in public and private buildings.

3. Make recommendations to ensure the safety of drinking water supply in Hong Kong.