

2016年2月16日

上午9時34分恢復聆訊

出席人士：石永泰資深大律師、許偉強大律師及鄭欣琪大律師，為外聘律師，代表食水含鉛超標調查委員會

王鳴峰資深大律師、陳樂信大律師及羅頌明大律師，由律政司延聘，代表水務署署長

李柱銘資深大律師及吳思諾大律師，由何謝韋、李偉業律師事務所延聘，代表啟晴邨及葵聯二邨公屋居民代表 Lee Pui Yi、Chong So Nga 及 Lui Hui Ping

何沛謙資深大律師及殷志明大律師，由羅夏信律師事務所延聘，代表香港房屋委員會

林定韻大律師，由孖士打律師行延聘，代表中國建築工程（香港）有限公司

李頌然大律師，由顧增海律師行延聘，代表有利建築有限公司、明合有限公司及伍克明

許佐賓大律師，由的近律師行延聘，代表保華建築營造有限公司

孖士打律師行陳宇文律師，代表瑞安承建有限公司

食水含鉛超標調查委員會的專家證人第一證人：李行偉教授（香港科技大學土木及環境工程學系講座教授、香港科技大學副校長（研發及研究生教育））宣誓繼續作供
王先生繼續盤問

問：早晨，李教授。

答：係。

問：我想帶你去睇睇你個 figure 1，喺 V149 嗰個圖嘅。V149，figure 1。我哋睇到，如果去到第四十秒嘅時候呢，即係 T 等如四十嘅時候，其實就已經過咗 20 米嘍，係咪？嗰個喉管嘅長度，用

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flushing 嘅角度嚟講，啱唔啱？

答：係。

問：因為四十...

答：請你再講，即係 T 去到四十五嘅時候...

問：即係去到四十秒嘅時候。

答：四十秒，係。

問：T 等如四十 second 嘅時候，flushing 嗰個喉管呢就已經超過 20 米嘞，咁樣啱唔啱？

答：係，超過 10 米，係，係。

問：20 米。

答：50 米。

問：唔係，20。

答：20，係，啱，啱，啱，啱，係。

問：係嘞，係嘞。咁你嗰個 horizontal pipe 個 length 就係 20 嘍嘛，你係用 20 米嚟計嘍嘛。即係個 plumbing volume，你就用 20 米嚟計嘍嘛？

答：一個典型嘅，係；但係個個都有啲唔同嘅，係，係。

問：即係你嗰個計算喇，即係喺呢個案入面你嗰個計算係 20 米喇？

答：係，係，係。

問：好嘞，咁即係話去到第三，即係去到 T 等如四十嘅時候呢，就整個 horizontal pipe 都已經 flush 咗一次嘍嘞；一次，啱唔啱？

答：應該係出-可以咁講，係。

問：好嘞，咁我哋去到 T 等如六十嘅時候呢，就去到四十幾米囉嗱，差唔多 40 米嘍喇，啱唔啱？

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答：係，唔好意思，可唔可以大聲少少？

C

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問：哦，唔好意思吓。

D

E

答：係，唔好意思，係。

E

F

問：即係去到 T 等如 60。

F

G

答：係。

G

H

問：即係第四個 draw 嘅時候。

H

I

答：係。

I

J

問：就差唔多去到四十幾米。

J

K

答：係。

K

L

問：T 等如 80 嘅時候呢，就去到五十幾米㗎嘞。

L

M

答：係。

M

N

問：就等於將--用你個 bumping volume，就等於將條管洗咗兩次㗎嘞，
啱呵？

N

O

答：可以咁講，可以咁講。

O

P

問：咁樣咁理解正確呵？

P

Q

答：係呀。

Q

R

問：好，我想帶你睇兩個數，如果你睇 173.2。

R

S

答：17...

S

T

問：173.2。

T

U

答：係。

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V

問：即係呢啲數據就係我哋禮拜六先攤到嘅，就係應該係你嗰個報告
attach 嘅數據。

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答：係，係，係。

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問：173.2 個度。

答：係。

問：咁我就睇仁（欣？）安邨個度，有兩個數據我想同你睇睇嘅。

答：仁（欣？）安呀，等陣先，仁（欣？）安。

問：仁（欣？）安。

答：係，係，係。

問：仁（欣？）安個仁（欣？）逸樓，如果我哋睇 920 個個單位。920。

答：仁（欣？）悅，仁（欣？）悅，係。仁（欣？）悅，係。

問：仁（欣？）悅，仁（欣？）悅，920 個個。

答：欣悅，係。920，係。

問：個 flow rate 269，就同你個 average flow rate 差唔多嘅。

答：係。

問：即係所以都比較 approximate 頭先 figure 1 個個模形。

答：係，係。

問：第一啖水就 0.005；第二啖水 0.005；第三啖水 0.007--唔係，
0.006。

答：係。

問：好，我哋去到第四啖水，T 等如 60 秒嘅時候，0.0027 嘞。

答：係。

石先生：027。

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問：Sorry, 0.027。Sorry, 0.027, 即係呢個就高咗好多而家。

答：係，係。

問：好嘞，呢個 T 等如 60，呢個時候嗰個管其實就已經去到 down pipe，係咪？即係因為 40 米，即係已經唔喺 horizontal pipe 嗰度。

答：唔可以完全咁講，因為你--而且我哋頭先咁講，都係好線性嘅，即係話當樣樣都係 translation。但係其實個流體就係三--即係 three dimensional 咁嘅。

問：唔，唔，唔，係。

答：又有啲 trappings 又盛。所以即係我哋頭先 figure 1 係一個好概括性嘅 conceptual，即係概念性嘅嘢。但係真係--譬如話--譬如舉例呢個六十個 second, 0.027, 係咪喺 down pipe 呢？你未必係，可能就係嗰個 horizontal。因為喺嗰個--因為... (聽不清) twists and turns, 即係咁嘅 system, 會有好多啲 recirculation。

即係話一粒 particle, 可能兜咗幾轉, 再出嚟㗎嘛。所以呢個完全係--即係我哋 interpret, 完全有可能就係--唔係可能, 即係我睇, 直情喺嗰個 supply chain。即係當然呢個唔排除你 down pipe, 即係有, 但係我 assumption 就係基於以前嘅數據, 就係嗰度就基本上冇乜嘢嘅。

所以--我講番個物理先, 即係話我喺嗰個 supply chain 個 20 meter, 咁嗰度--figure 1 係一個純粹係 translational 嘅 interpretation, 但係實際嘅情況就唔係 translational 嘅, 你 with all 呢啲 bends, 其實就某一粒 flow particle 都會唔同。

即係話因為水--你想像喺嗰個供水鏈入面, 譬如話有鉛, 喺唔同嘅供水鏈嘅唔同部分, 唔同嘅位置--喺一個斷面唔同嘅位置有鉛, 咁佢可以係好多原因, 喺 60 秒先見到。譬如, 譬如琴日講到就話突然有一個--因為佢本身有一種 randomness 喺度, turbulence, 突然你 picked up 咗個 particle, 咁個 particle 可能不撈都喺度, 咁佢嗰個時候 picked up 都得。所以即係我哋嚟講就--我哋嚟講就有乜矛盾。即係只可以講有乜矛盾。

問：明白。

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答：其實唔係--嘎。

問：明白，明白，多謝你嘅解釋。好，另外一個 observation 就係咁，如果我哋以 902 作為一個例子，其實如果我哋淨係攞頭啖水，我哋淨係攞頭啖水，或者我淨係攞第二啖水，其實我哋都睇唔到個嗰，嗰個 effect，係咪？因為我哋係去到攞到第四啖水，然後變咗 0.027。即係話其實你 flush 咗，一樣係可以攞到嗰個 result。即係話如果你想睇下嗰個喉管入面 con 唔 contribute to leached of lead into water，你 flush 咗一分鐘之後，你依然睇到，係咪？

答：即係琴日我哋都講過，即係有啲 outliers，譬如呢啲都類似一個 outliers，即係好似唔係好合--即係一般有啲唔係好合個趨勢，一般嘅趨勢。

問：我一陣間會講，逐個逐個--有好多睇，都好多 outliers，即係如果用呢個。

答：係，係。

問：呢個表好多 outliers。

答：係，係，係。

問：即係唔係一個。

答：即係--對唔住，即係答你個問題，就話係，flush 水一、兩分鐘都有個價值。即係嗰個都代表啲嘢。即係代表某一個程度上 lead condemnation，即係尤其是相對嚟講，絕對有代表性，但係就偏--即係會係偏低。即係因為個物理嘅原因，就會--即係 flush sample 仍然有價值，即係你--我哋而家都即係間接上證明呢樣嘢。即係相對譬如邊個有事，邊個冇事，相對總體嚟講，都係有個價值，但係就唔係 maximum exposure，即係相信--嘎，即係...

問：即係我同意，即係我同意你嘅，唔係 maximum exposure，我同意你嘅。

答：嘎，嘎。嘎，嘎。

問：好，我睇多一個數，我就轉去第二個 topic。我哋同一個，睇個 Yan Chung。即係對上嗰度，Yan Chung。

答：欣涌，係。

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問：2403。

答：係。

問：呢個 flow rate 就細少少，146 嘅。

答：係。

問：All right, flow rate 細少少。第一啖水係 0.003；第二啖水係好乾淨，乜都冇嘅。

答：係。

問：All right? 第三啖水就去到 0.012；第四啖水落番嚟 0.008 第五啖水又上番去，0.030。

答：係。

問：其實 Prof Lee，你覺唔覺得，其實攞，唔單只即係攞嗰個 flushed 嗰個 sample，其實都可以睇到嗰個 lead leached into water 嗰個變化呢？個數據似乎係咁睇。

答：有少少嘅--即係某一個程度上有道理。但係我 interpretation，所謂 flushed sample，你真係開大個水喉㗎嘛，開大個水喉 flushed 兩至五分鐘。即係 maximum flow，就唔係呢啲，即係唔係 minimum flow。即係我理解 fully flushed sample。

問：你呢個都唔係 minimum flow 嚟，你有啲都係...

答：呢個唔係，呢個--呢個即係話--呢個唔係，呢個因為就咁去到開到大咁，就咁係呢個。

問：係，呢個都係開到大。

答：係，係。

問：不過你有 variation 㗎嘛。

答：係，係，係。但係呢個係偏細嘅 flow，係，偏細嘅 flow。

問：偏細嘅 flow。

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答：係。

問：我想帶你去睇睇，Prof Fawell 有一段，喺佢個 expert report，
paragraph 25。

答：25。25。

問：喺 V/98。V/98，佢嗰度咁講，佢話：

“The most probable cause of the lead exceeding 10 micrograms per litre in flushed samples is particles of lead compounds mobilised by the flushing process from the deposits downstream of the joints containing lead solder.”

呢一個 conclusion 你同唔同意？

答：我嘅理解，就係高鉛含量就有兩個 components，兩個成因，一個就係 dissolved，一個就係 particle。

問：係，係。

答：兩邊由我哋啲實驗，即係今次 sampling 嘅數據，兩種 form 都有，兩種 form 都有。所以呢個--即係呢個 statement，我嚟講一個比較 general 嘅 statement。即係同我哋而家--以前講啲冇乜矛盾，但係我唔覺得全部係 particles。即係呢個我哋啲 chemist 即係睇到嘅，即係你係 dissolved 㗎嘛，dissolved 都有 occasional particle 都有。即係我哋有啲 measurement 就係咁嘅。

問：係，唔該你。我而家去另外一個 topic。Prof Lee 你喺第六段嗰度，你嘅第 6 段，132 嗰度。

答：諗--諗...

問：第 6 段。第 6 段。

答：132，係。

問：132。你喺嗰度就話：

“There is currently no universal accepted method for sampling lead in drinking water; the appropriate method depends on the particular purpose for which

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sampling is carried out.”。

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答：係，係。

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問：呢度我哋係絕對同意嘅，all right？即係話嗰個 sampling method，其實就好 depends on 你個目的係乜嘢。

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答：係，係。

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問：如果你個目的係要攞 maximum 嗰個--capture 個 maximum amount，當你 decide 個 sampling protocol 嘅時候嗰個方法，同你譬如 example，你想攞一個有代表性嘅日常飲用水個方法又唔同，同唔同意？

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主席：等陣，你所講嘅日--代表性嘅日常飲用水，你講緊乜嘢嘢先？

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王先生：我係講緊嗰個 representative sample。

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問：或者我咁講喇，...

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主席：咩嘢叫做代--咩嘢叫做 representative sample 先？

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王先生：Okay，得。

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問：我哋睇一睇世衛嗰個標準。

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王先生：Chairman，等我一陣。

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主席：似乎我哋又返番去尋日嘅問題，好似。

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講者（不能辨別）：唔。

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王先生：Chairman，等我一陣間。

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問：Okay, C2/1258。喺 C2/1258, 呢個就係世衛嗰個文件, all right?
佢嗰度就係話, "The Guidelines", 喺嗰個右手邊第二行第二段
嗰度, 最後嗰句:

"The Guidelines do not attempt to define minimum
desirable concentrations for chemicals..."

主席：對唔住，喺邊一度？我睇唔到。第幾段？

王先生：第二段最後嗰句，右手邊嗰度，1258。

主席：係。

王先生：係。

問：最後嗰句：

"The Guidelines do not attempt to define minimum
desirable concentrations for chemicals in drinking
water."

跟住下一段：

"Guideline values are derived for many chemical
constituents of drinking-water. A guideline value
normally represents the concentration of a constituent
that does not result in any significant risk to health
over a lifetime of consumption."

主席：呢度係咁寫，啱，繼續。

問：即係 Prof Lee 我就係話，即係如果我哋有個 sampling protocol，

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嗰個 decide 個 purpose 去 find out 個 maximum 個 lead concentration, 個 decide 嘅時候有呢個目標喺個 mind 度, ...

主席：聽唔到，聽唔到你講咩嘢嘢。

王先生：哦。

問：Prof Lee, 即係話如果我哋喺個 decide 個 sampling method 嘅時候, 嗰個目的係要去搵個 maximum the lead concentration 喺個 drinking water, 我哋有呢個目的 in mind, 當然我哋 decide 嗰個 maximum 嘅時候, 就因應呢個目的而 decide 咗個 formula 出嚟。For example, 擺幾多 first-draw、個 sampling volume 幾多、個 weighting 幾多、條數點計法, 啱唔啱?

好, 如果我個目的, sampling method 係要講 compliance with 世衛個標準, 即係講緊個 lifetime consumption, representative of 個 lifetime consumption。

主席：再講多一次, 唔該。

問：如果我哋 sampling method 個目的係去搵一個 representative 嘅嘢去 represent 個 concentration of a constituent that does not result in significant risk to health over a lifetime of consumption。如果我哋個 mind 係呢一樣嘢嘅話, 我哋 decide 個 sampling protocol 就會又唔一樣, 你同唔同意?

答：即係唔同嘅 purpose 係會唔同嘅 sampling, 呢個我同意。但係喺呢個--即係我哋而家講緊呢個事件度, 就--即係我諗個 purpose 始終係搵個--即係搵個 risk, lead contamination risk。所以即係我睇唔到嗰個--即係琴日都講過, 即係而家個 compliance at the lot boundary 冇問題, 即係 general quality 冇問題, 但係如果喺個 building 入面, building 入面, 係咪--即係--咁我諗主要尋日都講過。

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但係我再重複一點就係，如果你話 average over a lifetime，如果唔知 maximum，其實好難知個 mean，好難知個 average over lifetime，係咪？即係--即係我 made 個 point。

問：明白，你尋日都講咗，好。我而家帶你睇另一頁紙，就係你個 preliminary report 就 mention 過 ISO 5667，啱唔啱？

答：唔，唔。

問：好，我想帶你 ISO 5667，我而家同你想講 flushed sample，all right。1539 頁，C2/1539。呢個 ISO 5667，呢個 sampling protocol，其實你都睇過，係咪，教授？

答：係，係，睇過，睇過。

問：好。我就想睇，喺中間嗰度，我會帶你睇 6.4.1，第一段我會帶你睇，但係我而家想帶你睇第三段嗰度一句，“For”--唔該你：

“For non-microbiological sampling, all fittings should be removed and faucets cleaned then flushed for 2 min to 3 min (to constant temperature) before samples are collected.”

問：你見到嘛？

答：唔，唔，係。

問：就咁睇落去，ISO 就係 International Standard。就咁睇落去，for non-microbiological sampling，即係而家我哋講緊 lead，chemicals 嗰啲，all right。呢度似乎寫到好清楚：

“all fittings should be removed and faucets cleaned then flushed for 2 min to 3 min (to constant temperature) before samples are collected.”

問：李教授我想問你，點解要 maintain 個 constant temperature，個作用喺邊度？

答：即係我就唔知佢呢個 guideline，即係嗰個--當然有個背景，但係即係我估計你唔同 temperature 亦都會影響個化學作用，亦都會影響 biological behavior。所以 as a general procedure，即係我估佢有個--即係會有個背景，呢個會有個背景。但係即係

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主席：等一陣先，呢度係咪淨係講緊 faucets？

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王先生：係，faucets。

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主席：咁同我哋要--而家講嘅全部嘅有咩嘢關係？

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王先生：Chairman，因為我...

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主席：呢度淨係講水龍頭，係咪呀？

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王先生：Chairman，我會一陣間睇埋上面嗰段，因為李教授係篩咗上面一段，喺個 preliminary report 嗰度。我跟住會解釋，主席。

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主席：繼續講。

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問：李教授，我帶你睇...

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主席：李教授個 preliminary report 邊一度講呢啲嘢先，你講畀我聽。

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王先生：係，係，好，V6，唔該，V6。

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問：Okay，第二段，李教授。

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主席：V6？

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王先生：V6。V1 嘅 page 6。V1 嘅第六頁。

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主席：係，邊一度講？

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王先生：第二段嗰度：

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"The International Standards Organization Standard (ISO 5667) on sampling techniques of drinking water from treatment works and pipe distribution systems states that 'If the effects of materials on water quality are being investigated, then the initial draw off should be sampled. Samples may also be taken after a specified period of stagnation to provide information on the rate at which materials affect quality or the maximum likely effect. For example, in the UK (England and Wales) standards for drinking water quality. the sampling requirement is to take..."

主席：唔使，唔使，唔使讀啲啲。

王先生：Okay。

主席：跟住你讀咗呢一段，呢一句，跟住點？

問：好。李教授，我睇番 6.4.1，你 quote 嗰段就係喺第一...

主席：6.4.1.，我哋返到 6.4.1。

王先生：係，6.4.1

主席：係。

問：你篩嗰段，其實就係第一段嘅第五行嗰度，啱唔啱？

主席：你係咪篩 6.4.1，李教授，抑或篩其他嘅段落？

答：即係一個--我哋其實就 refer to 個...

主席：抑或其他嘅段落都有講。

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答：即係總體嚟講，因為呢個我--5667-5 就 cover 好--即係好大，因為成個 manual。所以我哋嗰陣時 refer，其實就主要就話即係需要 stagnation，需要考慮個 first draw，由嗰個角度出發。就唔係話--應該就唔係話針對呢個 particular--即係呢個單一嘅 6.4.1。

主席：呢個淨係 faucets，係咪？

答：Faucets，呢個就咁 faucets。“flushed for 2 min before samples to constant temperature.”

王先生：主席，或者我問一問先。

黎先生：唔係，你自己可以講清楚個 linkage 喺邊度，你唔好--你咁樣問，好難跟你講。即係事實上你會拎一段同呢一段個關係喺邊度呢？

王先生：係。

黎先生：你要講到出嚟先得。

王先生：係。主席，我想--或者委員我想講就係話，我嘅理解，所以我想問清楚李教授，就係話你睇第五行嗰度，...

主席：我哋睇到第五行，不過呢個第五行係 under 呢個大概 heading “Faucets”。

王先生：係，係。

主席：啱唔啱先？Where as 李教授喺佢個 preliminary joints opinion 裏面係講緊一個好大概 picture。

王先生：係。

答：係。

主席：咁你將呢個同呢個點樣樣 link 埋一齊先得？

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問：我問--李教授，我想問一問。

答：係。

問：你喺 V1/6，第 6 頁嗰個 quotation，係咪喺 6.4.1 呢個抽出嚟，抑或喺第--喺呢一個 ISO 嘅 sampling protocol 嗰面，另外一頁抽出嚟，我想知道，你可唔可以同我哋講？

答：但係應該同 6.4.1 又有直接--有直接嘅關係。一個係 general 嘅--係一個 general 嘅 source 嚟，一個 general 嘅 source。

主席：喂，咁好大問題，因為點解呢？你將呢啲咁樣樣一句裏面完全抽出嚟，out of context 咁樣樣講，係完全唔 make sense。

黎先生：好 confusing。

王先生：唔係，我--我--主席，對唔住。

主席：你應該--你應該做晒功課，你應該返屋企--喂，我睇勻成份呢個都有呢個--呢一段嘢，係喺呢一度先至搵到呢一段嘢，呢度直情係講 faucets。所以你個 opinions 呢度係唔啱嘅，你應該咁樣樣講。

王先生：主席，我點解咁樣講呢，因為委員會大律師問嘅時候，問我哋嘅證人嘅時候，都係擺 6.4.1 嚟問。都係 refer 返去諗 Prof Lee 呢一個 preliminary report。

主席：咁當時你出聲喇嘛。

王先生：所以我就...

主席：你代表水務署，你可以 challenge 石大律師，或者許大律師，「喂，你咁樣樣斷章取義咩嘛」。

王先生：Okay，為咗避免爭議，或者我 move on to 另一個 topic。

主席：唔係，你而家--即係譬如你而家好簡單，preliminary joint report 裏面第二段係咁樣樣講，有呢一句咁樣樣嘅嘢，你而家係咪話呢一句嘢係完全唔啱嘅先？

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王先生：我唔係話唔啱，我話啱。但係個問題就係你要睇晒成段。即係如果...

主席：呢第二段就係講 faucets，而家係講緊--depending on--第一句就係：

“Depending on the objectives of the monitoring programme, it should be decided whether samples are required from faucets.”

跟住下面就 “For non-microbiological sampling.”。Faucets 講緊。

王先生：係。

主席：而家講緊 general quality of water 咩？

王先生：Chairman，佢呢度有講 general-- general quality of water，呢一段都有講嘅。

主席：呢度係講緊呢一樣嘅--investigate 呢一度啲水經過呢一度出嚟啲嘢。係咪呀？係咪講緊個 faucet 點樣樣 contaminate 啲水呀？

王先生：或者咁喇，主席，我問一問李教授係咪咁。

主席：唔係，你話畀我哋聽，因為你而家話--喂，我哋好簡單，我日日坐喺度做法官，當然我知道你講咩嘢。我隔離位委員，唔係日日都坐喺法庭嗰度聽你哋講嘢。你而家要--你而家要 show 一樣嘢出嚟，你要話畀我聽，你想表達啲咩嘢嘢，你個 objective 係咩嘢嘢，等人哋明白你想講咩嘢先得。

王先生：係。

主席：係咪？

王先生：係。

石先生：公允嚟說，其實 6.1 同 6.4 都有講到，就係 flushing 或者--如果王大律師個 point 話 flush 與唔 flush 就 depends on 你個 objective。

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主席：呢個我明白。

石先生：其實 6.4、6.1 都有講。

主席：係。

石先生：就話如果你要搵 general quality 係要用 fully flushed，或者要 flush 咗先。

主席：啱吖，我哋...

石先生：其實而家個爭議就唔係在於如果你要搵 general quality，需唔需要 flush。即係大家都會同意，就話你要搵 general quality，係要 flush。而家個問題唔係在於你個目的係搵 general quality，使唔使 flush，而家個問題係，你個問題問得啱唔啱。你 set 錯 objective，你自然就用錯方法。

主席：啱吖，係。

石先生：係咪？你如果即係一路係個心裏面只係諗住我要搵 general quality，不斷地人肉錄音機 general quality 嘅話，你只有一個答案，就係要 flush。而家我哋即係其實--其中一個要調查嘅方向，同埋專家嘅 preliminary report 都提出就話，你根本第一個問題已經問錯咗。你執着於死口都係要話住我要搵 general quality 嘅話，唔使再問嘅，大家都知道你搵 general quality 係要 flush 嘅。

主席：唔係，exactly，唔需要問，你如果 general quality 嘅話唔需要問，係咪？好簡單。flush 囉，因為你唔 flush 嗰個係--可能係最高嗰個--我唔敢講一定係個 maximum，因為 depends on 嗰個 stagnation 個 period 究竟有幾耐，你可以八個鐘頭、你可以六個鐘頭、你可以十二個鐘頭。Depending on 個 period，咁你個所謂 maximum concentrations 就 depend on 你嗰個 sampling 嘅 protocol 係點樣做。啱唔啱先？

不過個問題咁樣樣，如果你話，我而家要想知道喺--譬如喺十二個鐘頭裏面，個 maximum 個 concentration 係幾多，你就一定係用 stagnations。如果你話我要只不過係想知道，喺晏晝 12 點，所有人都可能已經起晒身，除咗啲 odd one out，嗰陣時嘅 water quality 係幾多，咁你咪 flush 囉，係咪？你話--你認為嗰個係一個--先至係一個 representative 嘅數據，你咪講。

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不過個問題就係好似阿黎先生琴日咁講「喂，全香港有好多人呀，朝頭早起身就係開水，就係飲水嚟嘞，係咪？你可唔可以--你水務署長可唔可以話新界東唔該你 flush 兩個 minute，新界西你就可以即刻飲；九龍東你呀 flush 30 秒；九龍西你呢就你唔得，你危險，你 5 分鐘。」邊一個先至係 representative 嘅 sample？

王先生：主席，呢度有兩樣嘢，我明你嘅講法，呢樣嘢我想澄清。

主席：係咪？其實返番去石大狀頭先嗰個--佢企起身嗰陣時候個 opposition。如果你話 fully flush 嗰個就係一個 representative sample，你咪講，我哋唔需要拗，係咪？

王先生：係。

主席：唔使問李教授，呢個係你嘅 stance，你嘅 stance 我哋好清楚。因為陳先生，你個 chief chemist 已經出嚟講咗。係咪？啱抑啱唔啱就另外一件事。

王先生：係。

黎先生：因為實際上我想講講，就係咩嘢，我哋好清楚知道係--水務署嘅睇法就係咩呢，最安全就係每朝每次用水你就 flush 嗰個 system 先至用水就最安全。如果你 flush 咗之後，驗嘅水仍然有鉛就一定有問題。即係而家嗰個立場就係咁樣樣，係咪？好清楚。

王先生：唔，唔，唔。

黎先生：但係另一個睇法，有啲人嘅睇法就係咩嘢呢，係咪真係一定要 flush 咗啲水，然後先至可以去飲用嘅呢？有啲人嘅睇法可能覺得我哋嗰個水準係咪應該要求係高一啲，喺任何時候開水都可以係安全呢。

事實上亦都睇得到我哋見到好多屋邨嘅水係完全係冇事，無論你咩嘢時候做 sampling，flush 咗之後，或者即刻開個水都有事嘅，係唔係？我哋見到大部分嘅屋邨都係咁樣樣嘅。點解呢個唔可以係一個標準呢？喺外國嘅情況，因為譬如英國、美國，佢哋因為以前嗰啲鉛嘅水喉，嗰個制度喺度好長時間，佢哋事實上係做唔到香港可以做到嘅水準。

我哋因為禁咗呢啲鉛水喉係好長時間，根本我哋喺原本嗰個水喉上面釋放啲鉛出嚟呢，個情況已經係好低。根本我哋可以係達到一個

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高嘅標準，係任何時候開水喉嗰陣時啲水都係冇事，係可以做得到。咁呢一個係另外一個嘅睇法。

事實上大家係好清楚，你唔同時間去攞 sample，係可能出嚟嘅 result 係唔同。亦都我琴日所講，攞 sample 就係攞 sample，我唔係每一個--我每一個水喉嘅水都去化驗。係有啲如果用咗係含鉛嘅焊料嚟到去做燒焊嗰陣時，有啲唔係，有啲係呢，實際上嗰啲嘅單位。所以變咗出嚟嘅 result 肯定會有唔同嘅情況出現，呢樣我哋都接受。

即係呢個睇法，我哋大家已經好清楚。即係事實上呢，我哋而家喺度睇就係究竟水務署嗰個嘅方式，就話每一次大家用水，唔該你都 flush 咗去。呢一個係咪我哋應該要--要我哋認為接受嘅一個水準咁解。個情況已經好清楚。

王先生：黎專員，好多謝你呢個睇法。我自己就代表水務署，就係話如果我哋水務署其實個目標一路以嚟都係希望個飲水嘅安全，喺水龍頭開出嚟係唔需要 flush，都可以好安全畀市民飲用。呢個喺我哋自己個 WSD 嘅時候，嗰個目標都係咁樣樣。我哋喺嗰個 water treatment 嘅時候，亦都係朝住嗰個目標去做。

主席：如果係咁樣樣嘅話，咁個 representative sampling--sample 就應該係...

黎先生：任何時候都係。

主席：...任何時間。

王先生：呢一個就咁樣。

主席：Stagnation 又好。

黎先生：如果你咁講嘅話。

主席：係嘞，如果你咁樣講嘅話，用邊一個 sampling method 都有分別，出嚟都應該係 minimal。

王先生：主席，個原因就係因為嗰個 first draw，好似我琴日咁講，係有個 transient 嘅 nature，所以如果你睇...

主席：你如果咁講你就錯。呢個一定唔係水務署嘅 stance，如果你咁樣講，如果你嘅意思即係話「啊，stagnation 出嚟嗰啲水我哋唔接受嘅」。如果你咁樣樣講。

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王先生：主席，或者我咁--可以容許...

主席：你嘅意思即係咁樣樣，你...

王先生：唔係，主席，或者你容許我澄清，我解釋一下。因為我哋個目標呢，當然就係希望喺水龍頭擺出嚟嘅水都係可以安全飲用。但係入咗嗰個內部供水系統，係有一啲不確...

主席：我哋絕對明白你入咗屋，入咗個 inside service 之後，你哋有你們嘅 limitations。

王先生：係。

主席：我哋絕對明白。出嚟嘅水未必好--可以係等如你入去嘅水咁完美，我哋都明白。

王先生：明白。

主席：不過，我哋今日而家討論嘅唔係呢一個議題。

黎先生：嗰個就係另外一個，就係個責任嘅問題，係去咗間屋之後，你水務署就係話我去到 connection point，我啲水好乾淨，冇事嘅，係一個問題。入咗之後，去咗個 building 之後，喺個水龍頭開出嚟嘅水有問題嗰陣時，係另外一個問題。

你嗰個責任喺邊個--究竟係邊個負責，嗰個係入咗間屋之後，然後呢啲水開出嚟仍然有鉛嗰陣時，你可以喺度爭議就係話個責任究竟係誰屬。係水務署嘅責任，定其他嘅人都有責任呢，咁解。

王先生：唔。我其實唔...

主席：得，我唔同你討論，李教授有嘢想講。

問：係，李教授，係。

答：大律師，我想答你個問題，因為我有機會睇真嗰句嘢。“If the quality of the water as supplied to premises is to be checked.”呢個就即係喺個 lot boundary “If the quality of the water as supplied to premises” 即係喺個 lot boundary, “is to be checked, then the faucets should

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be cleaned and flushed at a uniform rate for 2 min to 3 min or longer if necessary to achieve constant temperature”。

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咁我明點解要 constant temperature，因為你 constant temperature 你就明白係完全 supplied，因為如果喺入面啲水就會 at different temperature。所以即係我覺得就唔係我頭先個原因。

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問：明白。

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答：即係因為個目的係 check the quality of water as supplied。所以正如答你個問題，嗰陣時我諗係一個好 general picture，如果 6.4.1 都 apply，即係對我哋嘅 statement。

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問：係，都 apply。

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答：但係個 constant temperature 個原因呢，我而家睇番，因為你個 purpose 唔同，你個 purpose 係 check the quality of the water as supplied，所以個...

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王先生：其實 chairman，我都想同你解釋一下，如果我哋去--即係李教授係完全正確，如果我哋睇 1538 頁。

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主席：我知道佢係正確，其實佢呢份嘢我哋完全明白李教授想寫啲乜嘢嘢。我哋尋日已經講，你想知道個 general quality of 你個個水，你 either 喺嗰個 boundary--lot boundary 嗰度 take，又或者你 flush，你可以 flush 半個鐘頭、一個鐘頭，flush 到成層樓都已經係你入啲水咁乾淨，你嗰陣時 take 個 sample，咪又係 general quality of 你個 water supply。

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王先生：諗--阿...

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主席：係咪？不過我哋呢一個 enquiry，唔係--我哋個 focus 唔係 on 個 general quality of water supplied。我哋而家係講入咗去個 inside service 之後，正如李教授要做嘅嗰啲 lead，同嗰啲水質嘅變化係點樣樣影響佢。

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王先生：明白，主席，好。就呢個課題我想跟進一下。

問：李教授，頭先你講：

“the quality of water as supplied to the premises to be checked, then the faucets should be cleaned and flushed at a uniform rate for 2 min to 3 min.”

我而家想知道你點樣理解嗰個 water quality as supplied to the premises, all right。我哋琴日睇到，個 plumbing volume，如果我哋今次用兩至三分鐘，攞嘅水係唔可以攞到 connection point，啱唔啱？有可能，因為你個 plumbing volume 都要幾個鐘，all right。所以 when 呢度佢講話，“If the quality of the water as supplied to premises is to be checked”，個 premises 嘅理解就唔可能理解話 at the connection point。個 premises 係指 individual house 或者 flat，你同唔同意？

答：呢個如果我就咁字面解，premises 就 lot boundary，即係我字面解就會--即係 Intuitively 似乎係--會係 lot boundary，...

問：但係如果呢個...

答：...就唔係--唔係 distribution system 呢個。即係...

問：即係如果呢個 premises 係解釋 lot boundary 嘅話，其實兩至三分鐘係攞唔到，香港。

答：係，係，係，係。

問：所以其實 flushing，就算係 for investigation purpose，你喺入面個內部供水系統攞兩至三分鐘，就算你係攞，喺入面嘅水，唔係攞 connection point 嘅水，都係 for investigation，都係有佢嘅價值，因為佢有 particles 會 carry through of 個 running water。啱唔啱？

答：係。即係你想--個問題係咩嘢，大律師，即係--即係，嘍。

問：我想--個問題就係話，嗰個 2 to 3 minute 個 flushing，嗰個 premises 其實就唔一定係指嗰--即係因應唔同嘅 contexts，唔一定係指個 connection point，唔一定係指 lot boundary，你同

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唔同意？

主席：我唔明你個問題問乜，對唔住。

王先生：哦，我...

主席：你可唔可以用啲簡單啲嘅問題去表達？

王先生：Okay，其實我問題好簡單，就係話嗰個--呢一句 "If the quality of the water as supplied to premises is to be checked"，個 premises 就唔一定係可--因應 context 唔一定理--唔一定理解話一定係 lot boundary。

主席：邊一度呀你而家講緊，邊一段，邊一度，王大律師？

王先生：6.4.1，即係頭先李教授讀出嚟嗰段，6.4.1。“If the quality of the water as supplied to premises is to be checked”。就唔一定係 context，有啲 context 兩、三分鐘都得，但係我哋香港呢個 context，個 premises 冇可能係指 lot boundary。你同唔同意呀？

主席：第一段你講緊？

王先生：係，第一段。

答：即係我有唔同意，但係我就會好懷疑呢個...

問：你有唔同意，係咪？

答：...--呢個 regulation 係 applicable to 香港。因為我相信呢個背景，即係應該唔係好似香港呢啲情況，即係寫呢個 guideline。所以你 adapt to local 情況，即係咁講。

所以你話--即係 premises 我覺得好似即係佢哋 single house，譬如你--即係 premises is very general--general 嘅嘢嚟。即係譬如--即係我相信唔會話佢會有個 lot boundary--喺個背景有個 lot boundary 喺度。

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呢個即係--即係呢個係一個好--我覺得係一個好 general 嘅原則就係話你要 flush 足夠嘅時候，令到你出嚟嘅水真係你係 supply 嘅水，唔係你嘅 system 嘅水，即係我嘅理解會係咁。

問：Okay，得。或者我帶你睇另一份文件。李教授，有睇過關於加拿大嗰個文件呢，如果睇--帶你去睇 C19.6 嘅 14593，C19.6 嘅 14593。李教授，呢一份就係陳健民，我哋嘅 chief chemist 嗰個 fourth witness statement，即係你哋出咗個 prelim 報告之後好快...

答：係，係，係，係，我睇過，係。

問：...，即係我哋就已經回應咗你哋嗰個 preliminary opinion。

答：係，係。

問：其中因為你哋篩咗英國、美國、同埋日本，我哋亦都篩咗加拿大。呢份文件有冇睇過嘍之前？

答：我睇過陳生個文件，睇過。

問：Okay。好，14593，你睇下 guideline 嗰度，就係加拿大，喺嗰個左手邊第一個 column 頂頂嗰度，有個 "Guideline"，佢就話：

"The maximum acceptable concentration"，佢叫 "MAC"，"for lead in drinking water is 0.010mg"，或者我哋叫 10 microgram per liter。"It is recommended that faucets be flushed before water is taken for analysis or consumption."

呢個就係佢個結論。我會帶你睇下佢嗰個...

主席：呢個咩嘢結論？呢個係個 guideline 咋嘛。

王先生：Guideline，係，係，係。

主席：係。

王先生：我會帶你去睇下佢個...

主席：咩嘢結論，recommended，recommendation。

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王先生：Recommendation，係，no higher than that，係。

主席：咩嘢 no higher than that，唔好 read 咁多嘢入去，人哋咁寫就係咁寫，係咪？

王先生：係，係，係，係，係，係。即係佢就 recommend 如果你將嗰個水質定為一個 maximum acceptable concentration 嘅話，佢就 recommend，如果你要測下究竟係咪 reach 到呢一個水準，咁你--佢就 recommend 個 faucets 就要 flushed。

主席：呢個 general quality of water 咁嘛，我哋冇問題，我哋接受，係咪？因為如果你話飲嘅話飲呢個。

王先生：係。

主席：如果你要 test 個 general quality，咪 flush 囉，by all means flush。

王先生：係。

主席：冇問題呀，我哋咪講咗。

王先生：係。唔係，我覺得...

主席：你唔需要我哋睇咁多，因為又返番去石大律師頭先嗰個問題，究竟你想問乜嘢問題，係問題一，抑或問題二。

王先生：因為我就想講呢...

主席：你如果想話畀我哋聽 general quality of water 就係要 flush 嘅，我哋全世界--我哋坐喺度嘅人都接受。李大律師都吸頭，接受。

王先生：唔係，或者我想講得更清楚，即係話如果...

主席：唔使更清楚，我哋好清楚。

王先生：唔係，我係想講，即係話如果我哋個 benchmark 係講緊世衛嗰個十個微克一升。

主席：係。

王先生：即係我哋係咪 reach 到個 benchmark。如果要做嗰個--呢一個

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exercise, ...

主席：做咩嘢話？

王先生：係要做一個 exercise，去測試下香港飲用水個 general quality, ...

主席：係呀。

王先生：... 是否符合世衛嘅標準。

主席：係呀。

王先生：就要用 flushed samples。

主席：啱，我哋接受，佢都接受，全部人坐喺度都接受。

王先生：Okay，得，如果咁我就可以慳番啲時間。

主席：你明唔明我哋講緊乜嘢嘅啫其實？

王先生：主席，我係...

主席：明白，係咪？

王先生：我係明白嘅，但係...

主席：係。

王先生：...--但係我就想 clarify 一下，就係因為即係似乎有一個講法，就係話我哋要 capture 個 maximum lead concentration 個 effect，然後將嗰個 benchmark 用世衛嗰個 10 微克攞嚟做 benchmark。我就...

主席：冇人咁講過呀，冇人咁講過咩？

王先生：如果冇就...

主席：點解話邊個--邊個講過出嚟話嗰個 maximum 就係嗰個世衛嗰個 benchmark，冇人咁講過。

王先生：可能係我理解錯誤，因為我以為攞嗰個--因為...

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主席：你個 maximum--maximum depends--正如我所講，depends on 你個 sampling protocol，你擺一年、擺六個月、擺三個月、擺二十四小時、八個小時，個 maximum 永遠都唔同。你點樣樣可以擺任何一個啲咁樣樣嘅數去同呢一個世衛啲個去做 benchmark。

王先生：係，但係因為--我--我--我明，主席，你講嘅嘢其實我好明，但係個問題就係 it seems that 我哋而家有少少 cross-purposes。因為...

主席：冇呀，冇--我而家話畀你聽--好清楚話畀你聽，頭先所講嘅立場，如果 general quality of water 10 micrograms per liter fully flushed 先至擺嚟測試 accepted。不過教授就行多一步，就係話你如果要--真係要 investigate，喺個 inside service 裏面，究竟 lead 有啲咩嘢 effects on 個 water quality，我哋就做呢一個 sampling protocol。

咁樣樣嘅時間，譬如 20、40、60 嘅話，咁樣樣就可以 capture 到啲水你開咗之後真係流嘅時候，點睇到啲 lead concentration 係點樣樣 decline。一分鐘之後點去到有三個單位我哋做到去 300 秒又好，幾多時間都好，就真係睇到。

跟住再睇番轉頭，擺啲數據去做個 computational fluid dynamic 嘅 modelling 就可以睇到啲嘢係咁樣樣喺個度 leach 出嚟，就係咁咋嘛。

王先生：主席，呢個我完全冇問題。我唯一冇問題，或者我唯一唔理解嘅就係話如果我哋個 modelling 係去擺 maximum 嘅 measurement，然後用個嚟計 flat concentration，再計 building concentration，然後再得出個結論，就話呢個 flat 或者呢個 building 符唔符合世衛嘅標準。個度就有一個 logical gap 喺度，即係我會完全理解，即係話行多步去擺個 maximum 個 amount，然後睇下個變化，呢個我完全冇問題。個 CFD model 完全冇問題，我個問題呢，或者我--如果我澄清咗可能我就唔使問咁多問題。

就係如果我哋用呢一個 sampling protocol，跟住去擺個 flat concentration，跟住擺 building concentration，跟住 benchmark 世衛十個，然後就話呢個超標咁樣樣。可能呢度喺個理解上就可能有個 logical thought 喺度，呢個就...

主席：得，得，唔緊要，如果你哋水務署認為咁樣樣唔超標，咪唔好--咪

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唔超標囉。因為而家 Prof Lee 個--佢唔係話你哋--佢而家佢個 reference 唔係要 determine 究竟呢一個係 affected 嘅 estate，抑或係一個 unaffected 嘅 estate。

王先生：唔，唔，唔。

主席：佢只不過係 determine 話畀我哋聽話咁樣樣，點樣樣啲 lead 喺邊度走出嚟，factually 係點樣樣走出嚟，就係咁多。你水務署或者房署，你見咗李教授啲 result，你哋認為我哋完全咩嘢嘢都唔需要做嘅，你哋自己承擔你哋嘅 political responsibilities。

王先生：主席，我理解，in fact 我就係一陣間都想問一問。因為 Prof Fawell 都有講過關於個 sampling protocol 係需--其中一個 recommendation，就係個 sampling protocol，關於...（聽不清）嗰度，嗰度係需要再做啲工夫。

問：所以我就係想問，因為我琴日問咗一啲嘢，關於呢個--李教授，關於呢個 model 入面有啲 components，譬如 sampling volume、譬如嗰個時間、譬如 size。李教授，即係如果我哋水務署想 ride on 你嘅 research，all right，想 benefit from 你嘅 research，你覺得你呢個 sampling 嗰個 protocol 是否有改善嘅空間？如果係要改善，喺邊一方面你覺得可以改善？

答：呢個我諗即係琴日都講咗，個 sampling 即係有一個客觀嘅環境，就有個目的，即係個 sampling 達到我哋個 objectives，達到我哋個目標。至於點改，同埋即係點樣演繹，喺呢個基礎上演繹一個合理嘅 sampling，我諗要留待水務署同房屋署。因為好多其他實際嘅情況我唔會知。即係個 best fit for purpose 嘅 sampling protocol 真係只有水務署先知。

問：明白。

答：因為你要符合個實際情況，我講冇用，即係要符合實際情況。

主席：因為太多 variations，你每一個屋邨嘅情況又唔同，係咪？你點樣 generalize？

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王先生：主席，即係我哋講法就係話，即係雖然每個屋邨都唔同，但係我哋如果要 water sampling 嘅時候都要即係有法可依，即係有個標準可依，我哋就唔係話即係每一次都創新科技，每一次每一個屋邨都重新設計一個 sampling protocol。

主席：咁你哋水務署訂囉。

王先生：係。

主席：你咪整個香港嘅 drinking water guideline 出嚟，你咪整個 sampling protocol 出嚟。你咪--世衛已經整咗一個喺度，人哋講到明，嗰個係一個 departure from 一個 scientific point。你咪因應你自己嘅 local circumstances 整一個出嚟。啱唔啱？唔係淨係畀公屋，因為你整出嚟你可以--你係應該要畀全香港所有嘅人，你唔係淨係考慮公屋。

王先生：因為我哋而家主要係跟 ISO 嗰個 standard。

主席：唔係，你 ISO 都係可以，任你--任你--ISO 冇可能話一--ISO 就全世界都啱用，因為香港比較係一個 developed 嘅 city，你去非洲一條邨乜都有，你想搵個 beaker 都有，咁佢點做？

王先生：唔，理解。

主席：啱唔啱？都係世衛標準。

王先生：係。

主席：係咪？都係 ISO，不過你要因時制--因--因--因時制宜，係咪，我唔記得咗，總之你要...

王先生：係，因時制宜。

主席：...改喇，係咪先？

王先生：所以--主席我就想睇下...

主席：你最好，你問--你問李教授，唔係啱，其實應該你返去問下你水務署，你啲啲 scientists，你哋先至係--真係飲用水嘅專家，你哋應該坐低 devise 一個 plan、devise 一個 protocol、devise 一個 sampling 出嚟、devise 一個 guideline 出嚟，適合全香港所有人用。

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王先生：呢個我聽到主席你個建議，我哋會返去--我會 relay 個 message。但係我都仲想係用一分鐘時間，或者五分鐘時間，睇下加拿大佢哋個 developed country，佢哋 developed 嗰個 water sample protocol for 飲用水嗰個理據同埋原則係乜嘢嘢。如果我哋可以睇少少時間睇 14601 頁，14601。

問：李教授如果你去睇 19.6 嘅...

答：係，14601，係。

問：...14601。

答：係。

問：14601 就有一個 rationale 喺度，all right，即係喺嗰個左下角嗰度有個 rationale 喺度，佢就計咗條 formula 出嚟，個 MAC 個 level 出嚟，all right。然後就喺右手邊嘅右上角嗰度，就有計咗呢個係 based on 一個兩歲細路仔，on the basis，佢係 consume 0.6 個 litre per day, average daily water consumption for a two-year-old children. All right。

答：係。

問：All right。好，跟住落去就話佢有兩段係 bold 咗，你睇一睇。

答：係，係。

問：呢度佢就係為咗要擺嗰個 maximum，嗰個 acceptable concentration，其實佢嗰度 for analytical sampling 都係要用 flushing to get rid of 個 system 入面有個 standing water。你睇到嘛？

“In order to minimize exposure to lead introduced into drinking water from plumbing systems, it is also recommended that only the cold water supply be used, after an appropriate period of flushing to rid the system of standing water, for analytical sampling, drinking, beverage preparation and cooking.”

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主席：呢個加拿大可能因為佢有用鉛水管。你明唔明？

王先生：可能係。

主席：咩嘢可能係，直情係。係咪？所以我就話你 quote 嘢你唔好斷章取義咁 quote。

答：你個問題係咩嘢，大律師？

問：我個問題就係話，你同唔同意呢一個 sampling protocol 喺加拿大？同埋你係咪因為呢個唔適合喺香港，就係因為加拿大有 lead pipes？

答：即係一般我諗大家--即係啲文件都講，即係佢係 average--即係 cumulative，即係 lead 嘅 impact cumulative，即係咁所以--你如果 cumulate 梗係 average concentration。

但係我諗琴日我哋都提到，你嘅所謂 mean concentration，即係 mean concentration 其實就係最緊要就係個 lead intake，即係琴日我哋講咗呢個 point。即係話--所以至於你話 flush 嗰度，我諗亦都有矛盾，即係你--因為你--如果好耐冇用，你梗係 flush 一陣，即係唔好有啲--啲結果有啲歪曲，有啲 distortion，都合理。譬如我哋啲 sampling 都前--sampling 前嗰晚叫佢 flush 5 分鐘。所以即係我諗係同樣嘅目的，即係話 flush 晒先，然後就睇啲 stagnation。

所以我睇唔到有咩嘢矛盾，即係 appropriate period of flushing，even 我哋 sampling 都做，不過我哋做 5 分鐘，即係咁--都--即係前嗰晚做 5 分鐘。

所以我諗呢個原則就大家都遵守，即係我只可以咁講。即係同埋你話 short term consumption 呢啲都大家 agree，即係冇乜話唔同意呢個觀點。

問：Okay，我想問一問你個 preliminary report 入面就講到美國同埋呢個英國。咁你喺寫 preliminary report 嘅時候，你嗰陣時有冇研究過加拿大、澳洲、New Zealand？

答：冇。因為我哋覺得即係一個好 fundamental 嘅嘢，即係同--同--

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即係唔係淨係我一個，Prof Fawell，就係--即係主要就話幾個大嘅體系都係咁，同埋我--一個常理都即係應該咁，似乎要--就呢個問題。所以呢個觀點就有話母個國家都參考，即係我就唔 recall 呢個--呢個，冇參考呢個。

問：好。之後陳健民就喺佢第四份嘅證人口供有提到加拿大、New Zealand、Australia 同埋 Japan。

答：係，有，係。

問：佢就話 benchmark 研究過呢幾個 developed country。

答：係，係。

問：佢哋攞水辦嘅時候，如果佢哋有 pledge 一個即係 maximum limit，佢哋都係攞 flushed samples。呢個你唔會爭議？

主席：再講多次你個問題，唔該。

問：咁喺陳健民嗰個第四份證人口供度，佢都有講過加拿大、澳洲、New Zealand、Japan 都係攞 flushed samples 嘅，咁呢個...

主席：如果要 test 乜嘢？佢個 general quality of water，係咪呀？

王先生：係，general quality of water，係。

主席：都話冇爭議囉，呢樣嘢。

答：冇爭議。但係如果我有記錯呢，大律師，我如果有記錯呢，日本嗰個就係你先 flush，然後再 stagnate 即係三十分鐘到一個鐘頭，然後再...

問：唔，呢個冇爭議嘞，呢個冇爭議。

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答：...--再一個 litre 㗎嘛。

問：噏，因為其實陳健民嗰度有一個圖添，係咪呀？

答：係，係。

問：個圖就係日本係先 flush 五分鐘先，...

答：係，係，係。

問：...然後先至 stagnate，然後再有其他程序做㗎。

答：噏，即係咁--咁呢個就係 exactly 我哋 sampling 就係咁做喇，就係咁做。

問：噏，咁但係就日本嗰個例子，日本就好明顯就唔係擺 first draw 喇，係咪？

答：佢係咩嘢意思？佢係 stagnate 咗之後就再--再擺㗎嘛。

問：佢先 flush 咗五分鐘之後，再 stagnate 㗎嘛。咁所以佢就唔係先擺 first draw 喇。

答：嗰個 stagnation period 唔同咋嘛，即係你--譬如我哋個 sampling 你都可以話我八個鐘頭前 flush 五分鐘，八個鐘頭後我哋擺囉，咁樣我哋叫 first draw, first draw in the morning, so--因為我睇唔到個矛盾喺邊度。

問：噏，呢個 minor point 啫，因為你個 first preliminary report 呢就話日本係用 first draw 㗎，咁所以可能畀人有個印象，就係話...

答：係，係，係，有個一個籠統嘅--係，咁嘅意思。

問：好嘞，咁你個 preliminary report 度講到美國喇，咁但係美國 first draw 呢，其實佢擺 first draw 嘅目的呢，就唔係擺嗰個 general quality of water 㗎，啱唔啱，佢係擺 15 個即係 test 嗰個 action level 㗎，係...

答：Action level 㗎，係呀，action level。

問：咁你知道 action level 同埋嗰個 maximum acceptance

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concentration 嗰個 level 係唔同，唔同概念？

答：十五咁嘛，係，十五個...

問：嗰個唔同概念。

答：Action level 即係要有個 action 呀。

問：嘎，咁佢仲要話即係如果我攞完之後有超過 10 個 per cent...

答：就會係--係，明白。

問：...先至 action，如果係 9 個 per cent，9.9 個 per cent 我都唔 action 㗎嘞。

答：明白，係。

問：係咪？

答：係，明白。

問：好。好，咁呢我就仲有一個題目我想問一問你嘅，就係李教授，嗰個 sampling procedure 呢，係咪你 in charge 㗎？

答：我 in charge，我 in charge。

問：咁你有冇同你個 staff 呢，即係嗰啲 research team 呢，講話做 sample 嘅時候有啲咩嘢方法防止到 contamination？

答：我哋即係呢個就--我哋喺個 appendix--等陣先吓。喺個 appendix 4 呀，如果冇記錯。

問：係。

答：喺個 appendix 4 同 5，...

問：係。

答：...都講咗嘅，即係我哋係--即係我哋--因為我哋有一個--科大有個 Health, Safety and Environment Office，有個 Lab 嘅，accreditation Lab，咁所以就個 Lab 呢，即係個主管就 provide 個 training 嘅，所有啲 team 都 provide 一個 training，即係

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話--因為嗰啲做啲 sampling team 啲人呢，都有少少研究背景嘅，即係佢起碼 MPhil 呀，或者學生，即係唔係話隨便，即係佢係有啲 research sense 同埋 related 嘅經驗，咁就再加上呢個 HSEO 嘅 Lab 呢，就 provide 個 training 嘅，同埋試幾次 trial run 嘅，before 我哋 mount 呢個 programme。

問：明白。

答：所以就譬如 contamination，最緊要係 contamination，唔 contaminate。

問：唔 contaminate。

答：所以呢個好緊要嘅，所以呢個我哋就即係 emphasize 得好緊要。

問：Okay，李教授，你唔好介意吓，我有幾個問題想請教下你嘅，如果我哋去 V169 頁嗰三張圖片嗰度，V169 嗰三張圖片嗰度。

答：V，係，係。

問：唔，我哋睇 (a) 嗰張圖呢，我哋睇到嗰個取水辦嗰個人呢，就徒手呢就喺個 tee joint 位嗰度擺水，係咪？

答：係。

問：係咪，嗰個樽呢就好似係好接近嗰個水龍頭位，係咪？

答：係，即係呢個--咁你就咁擺水，就咁擺水。

問：呢個咁樣嘅距離，你覺得係咪安全呢？

答：即係安全 in the sense 就話即係唔會 contaminate，...

問：嘎，即係，嘎，...

答：...即係出面會 contaminate...

問：...咁 risk of contamination，咁呢個距離你覺得安唔安全呢？

答：呢個就即係我哋係咁擺個水辦，即係呢個就咁擺個水辦喇吓，即係你當然，即係話你完全--但係你如果就咁睇呢幅圖呢，就其實就你睇唔到佢係咪掂到，應該佢盡量唔掂嘅，應該我哋都諗過呢個 point 嘅。

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即係要唔好掂到...

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問：係嘞。

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答：...咁樣吓，都有--呢啲全部傾過晒嘅，即係盡量避免嘅。

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問：明白，okay，好嘞，我哋睇(b)嗰張圖。

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答：係。

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問：(b)嗰張圖。呢個就喺入屋嗰個位擺水喇，係咪？

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答：係。

I

問：咁你見到呢幅圖嘅中間位有一條電線㗎，見唔見到？有一條電線咁樣拉落去，earthing 一條電線拉落去個喉管嗰度，見唔見到？

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答：係。

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問：係，咁你見到咁樣嘅情況，有條電線拉落去嗰度，掂到個喉，你有咩嘢感覺，有咩嘢反應？

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答：呢個--唔好意思，因為呢個真係唔係咁清楚，喺我幅圖就唔係咁清楚，就--係。

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主席：呢個你哋水務署同佢安㗎嘛。

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王先生：唔係，呢個--唔係，即係嗰個--喺嗰...

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主席：喺電--喺水錶同埋喺個 entries 嗰度，係你哋水務署...

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答：係，係。

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主席：...話喺嗰度裝㗎。

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王先生：係。

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答：係，即係成個--即係我解釋下喇，律師。

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問：係，係。

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答：喺你...

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主席：唔係，即係你而家話番你自--你哋 advise 佢錯呀？

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王先生：唔係，唔係，唔係，我唔係咁嘅意思。

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答：嘎，唔係，即係解釋下，即係呢幾個空置嘅單位呢，其實就係同水務署同房署一齊睇過嘅，一齊睇過，咁我哋話要裝兩個錶，咁佢哋就好幫手就即係喺嗰個位裝咗個錶，咁呢啲全部咁我哋出去度㗎咋。

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問：嘎。

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答：咁所以你話--你想講咩嘢？即係你話唔安全，係咪？即係你唔咁咩嘢，咁都有陣時都係咁做㗎喇，即係你--即係佢畀得我哋個 flat，咁我哋就做㗎喇，即係唔可以樣樣都即係做得咁 perfect 呀，即係我就唔係好明你個 point，即係話即係當然--即係係咪 relevant to sampling 呢呢個？即係...

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問：或者咁吖，教授，我直接問你嘞。

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答：係。

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問：即係一個咁樣嘅規模做四十三條邨嗰個 sampling 呢，你係第幾次做呀？

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答：做啲咩嘢呀？

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問：即係 drinking water quality 嘅 sampling，做四十三條邨，你第幾時做？

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主席：冇四十三條邨囉。

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問：四十三個 buildings。

答：四十三個 buildings 呀？

問：係嘞，你第幾次做一個咁樣，咁規模嘅 water sampling？第幾次做？

答：第幾次做，第一次做，但係我 field sampling 就成世人都做緊㗎，我成世人，即係 all scale, any time of scale。

問：係，我知 field sampling 係，但係 drinking water sampling，你做過幾多個呀？

答：Drinking water per se 就未必係，但係你點為之--即係好似咁樣食水含鉛咁問...

問：係，食水，食水。

答：就第一次。

問：唔一定含鉛喇，淨係講食水，唔好講海水呀嗰啲。

答：食水嘅 sampling，食水，即係水質同食水有關嘅水質就--咁呀好多喇，譬如東江，我哋成條東江都睇過㗎。

問：係。

答：成個香港都睇過㗎，水塘都睇過㗎，魚排都睇過㗎。

問：唔。

答：so 即係你由佢科學嘅層面就唔係--即係當然呢個係新問題，對大家有一個新問題。

問：唔。

答：大家都係想處--即係想解決個問題，...

問：明白。

答：...想達到啲目的。所以喺呢個含鉛問題，對我嚟講係新。

問：係。

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答：但係好多嘢都係新嘍喇，有好多嘢都係新，研究...

問：Okay，面對呢個新問題，你就 devise 咗個新嘅 protocol 出嚟喇，即係面對一個新問題，你就 devise 一個新嘅 sampling protocol 出嚟。

答：係，係。

問：咁我想...

答：因為大律師，容許我 interrupt 就係，即係 devise 一個可以達到目標嘅 protocol。

問：明白。你嘅目標我哋清楚嘞，就係要 find out 個 maximum 個個 level。

答：係。

問：我想問呢個 devise 呢一個 sampling protocol 係你一個人 devise 咗，抑或一個團隊 devise，抑或你同 Prof Fawell 一齊 devise 呀咁樣樣？

答：主要就 Chief Architect 係我囉，但係我--好多人傾嚟嘛，我譬如同佢即係嗰個 commission 嘅 team 啲人又反映下啲 re--資源呀，啲 sampling interval 又同我哋啲 chemist 傾呀，又同我啲 immediate 啲 postdoc 呀，researchers，...（聽不清）officer，咁即係好多考慮個囉，譬如--即係好多人，成個--意思就即係成個 sampling protocol 個設計就係有好多 integration 嘅。

問：唔。

答：傾過好多次，做唔做到先，唔係我--都未必做到嚟。做唔做到先，有冇咁嘅 support 先，有冇咁嘅 quality 先。

問：唔。

答：冇 quality 咁不如唔好做，做嚟做乜。

問：唔。

答：咁然後亦都資源限制，係咪可以喺咁短嘅時候做到先，即係一個--兩、

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三個禮拜，...

問：明白。

答：...咁我哋其實 plan 咗成個月嘅。

問：唔。

答：咁亦都要同政府房署佢哋配合㗎嘛，做唔做到先得㗎。

問：唔。

答：咁呀有啲時候未必做到，有啲時候我哋譬如話想要呢個單位，咁佢哋唔肯，咁冇法㗎，即係人哋唔肯咁嘛，即係好多呢啲咁嘅嘢，所以回答你嘅問題就係，係亦都我咁講喇，即係嗰個成個構思係我係 Chief Architect，但係成個點樣 develop 個 protocol 就成個團隊。

問：明白，咁所以就解釋點解嗰個--你個 report，from 個 preliminary report 到到 final report 其實係用咗 2 個幾月時間...

主席：你嘅團隊呢，總共有幾多人呀其實？

答：主要就我諗咁講喇，主要即係我好--我啲 colleague 好 closely 就係三、四個喇，即係啲好--即係做咗好多年合作嘅夥伴呀，即係好有經驗嘅 researcher 呀，即係做過好多唔同問題，亦都有啲譬如 Dr David Choi (譯音) 呀，Dr ... (聽不清)，咁亦都我哋個 Lab 度，chemists，有各人支持喇，即係幾個，亦都有個--做呢個 sampling，最緊要有一個 field coordinator，有一個人 in charge of 成件事，咁我哋啱啱有一個 division environment 一個 Dr Lau，咁最緊要有人肯喎，有人肯 input 起身呀都唔係咁易呀。即係呢個今時今日，咁呀即係--咁就嗰啲就好慶幸呢有一批即係好多香港嘅學生都覺得...

主席：其實你講嗰啲學生，其實你嘅團隊裏面，我諗住都唔少過七、八個，個個都博士級嘅人㗎㗎，係咪㗎？

答：六、七個喇。

主席：六、七個，唔。

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問：好，呢個就係解釋咗點解即係你個 report 就其實用咗兩個幾月嘅時間，因為力求準確，所以用咗兩個月嘅時間先至出咗個 final report，係咪？

主席：呢個咩嘢問題嚟㗎？

答：即係唔係--唔係，唔係，咁我可以好準確，但係因為成個 survey 去到 12 到 22 㗎嘛。

問：係。

答：其實 12 月 22，我記得 24 號係做個報告畀即係有關嘅 commission 嗰度，咁然後仲有啲手尾跟，啲 Lab report 又要時間先度到㗎嘛，咁收齊資料都過年㗎喇，跟住然後都要啲時候準備個 report，即係咁嘅意思，大律師。

問：我明，唔該。最後呢，我想帶你睇一睇呢，嗰個--嗰啲數據呢，呢個係我最後一個 topic 嚟嘅，就 17.1 嗰啲數據。咁我如果想請你睇呢，十--173.2，173.2。

答：係，係邊個？

問：173.2。

答：係。

問：清河邨呢，...

答：係。

問：...清興（顯？）2202 嗰度呢，2202。

答：清河...

問：清興（顯？）

B

B

C

答：...2202，係。

C

D

問：2202。

D

E

答：係。

E

F

問：就有個 flow rate 306 喇，係咪？個 flow rate 306。

F

G

答：係。

G

H

問：咁呢就 T 喺 0 second 嘅時候就 0.002。

H

I

答：係。

I

J

問：去到第二啖呢就 0 嘞。

J

K

答：係。

K

L

問：第三啖呢就 0.082。

L

M

答：係。

M

N

問：咁呢第四啖 0.003。

N

O

答：唔。

O

P

問：咁呀第五啖呢就 0 嘞，咁個 flat concentration 就超標嘞，0.011。

P

Q

答：係。

Q

R

問：咁其實你呢個呢就要去到第三啖呢先至可以 spot 到嗰個 lead concentration，呢個係其中一個 example，啱唔啱？

R

S

問：好嘞，咁如果我哋頭先嗰個 Yuen (Yan?) Chung 嗰度我哋睇咗喇，all right，咁如果我哋睇 Yuen (Yan?) Yuet 樓嗰度呢，269 嗰度呢，即係個 flow rate 就 902--920 嗰度呢，嗰個 flow rate 就 269 喇。

S

T

答：唔好意思，源...

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U

問：源逸（欣悅？）。

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答：源逸（欣悅？）。

問：仁--欣逸--欣悅，欣悅。

主席：邊一度呀？

王先生：欣悅，920。

答：欣悅，係，欣悅，係，920，係。

問：欣悅，920。

答：係。

主席：係呀。

問：All right, flow rate 269 喇，咁就去到第四啖水嘅時候就 0.027 嘞。

答：係。

問：All right, 咁但係你睇個 flat concentration 係合格個喎。

答：係。

問：All right, 咁個原因係咪就係因為其實去到第四啖水嘅時候呢，第四啖水個 weight 呢，係相對地低，compare with 第一啖水，所以呢，雖然佢去到第四啖嘅時候呢，係出現咗一個肥佬，而且個--個個數都幾高，但係 overall 個 flat concentration 其實合格喎。

答：係，可以咁講，可以咁講。

問：Okay, 咁呢，好嘞，你下一版，173.3。

答：係。

B

B

C

問：我哋睇下牛頭角下邨嗰度。

C

D

答：係。

D

E

問：Kwai Yuet，即係第一個嗰度，譬如--你呢度就淨係擺--有陣時擺兩個辦，有時擺三個辦喇。

E

F

答：係。

F

G

問：咁你同我哋解釋過，可能係資源嘅限制喇，時間喇，咁所以就冇擺五個辦，擺兩、三個辦咁嘛。

G

H

答：係。

H

I

問：好嘞，咁我哋睇下 1718，Kwai Yuet，1718。

I

J

答：係。

J

K

問：個 flow rate 就 222 喇，222 喇，佢第一個辦呢，頭啖水呢，係好正個喎，即係 0.007。

K

L

答：係。

L

M

問：All right，你擺第二啖水呢就喺 T 等如 40 秒嘞。

M

N

答：係。

N

O

問：All right，T 等如 40 秒嘅時候呢，就變咗 0.013 嘞，咁呀過--超標個喎呢個。

O

P

答：係。

P

Q

問：All right，好嘞，但係你睇下個 flat concentration 其實合格個喎。

Q

R

答：係。

R

S

問：咁呢個就係因為個 weight 嘅問題，係咪？

S

T

答：係，係。

T

U

問：All right，咁同樣嘞，如果我哋落去啟慎（貴新？），啟新（貴新？）嗰度，2720，2720，2720。

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答：係。

問：咁個 flow rate 呢就大少少，336。咁呢個第一啖水又係好乾淨嘅，0.003，第二啖水，T 等如 40 秒嘅時候就 0.014，all right，咁個--嗰個--呢個 flat 又係合格嘅，個 flat concentration，again，都係因為個 weight 嘅問題？

答：係，可以咁講。

問：其實呢啲例子我唔逐個講嘞，其實呢個例子係好多嘅，呢個表入面，係咪？

答：係，大律師，我想咁補充一句呀，大律師，就咁呀，就呢啲 sample 呢其實仲喺度嘅，隨時提供。

問：係。

答：即係未分析啫，因為時間限制。

問：係。

答：所以有八十六個 sample 呢，就好簡單，一個禮拜內就有數據，咁可以即係提供補充啲數據，就比較一致咁去睇呢個問題，所以呢個--因為我多謝你嘅即係呢個提點，即係呢個係啱嘅，即係我完全同意你，咁但係你五個 sample 你會全面啲囉。

問：唔。

答：咁但係而家我哋因為講過，所以即係做到嘅，即係補充呢啲數據，咁一齊再睇過。

問：唔，好嘞，另外最後一個，由於時間關係，我都唔 go through 每一條數嘞，雖然我粒粒都 go through 過。其實呢有好多係第一啖水係好乾淨嘅，即係冇--唔超標嘅，第二啖水都唔超標嘅，係去到第三、第四或者第五先超標嘅，啱唔啱？

答：係，對，對。

問：好。主席，冇其他問題。

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主席：唔該。李大律師，你有冇問題？

李柱銘先生：我有呀，我想扞扞至問。

主席：乜嘢話？

李柱銘先生：我想扞扞至問。

主席：可能最扞個囉嗚，仲有冇人有問題呀？哦，有，好多人有問題。屋署先喇，好唔好呀？

殷先生：幾個問題澄清嘅。

主席：好呀，好呀。

殷先生盤問

問：李教授，我代表房委會嘅。我想你澄清少少嘢嘅啫，關於你個報告。

答：係，係，係，係。

問：你知道我哋呢個鉛水調查委員會呢，主要嘅目標呢就係去調查關於有十一條屋邨係受呢個含鉛焊料嘅污染嘅，你知嗎？

答：係。

問：咁嗰十一條邨呢，就你都建基喺一啲水務署嘅資料，即係佢哋個 task force 嗰陣時呢，係做過一啲 isotopic analysis 同埋去割過一啲喉嚟睇，就好肯定到呢，嗰個鉛嘅來源係啲焊料嗰度嘅，你同意嗎？

答：即係基於佢哋嘅數據，係好有用。

問：但你自己做嗰個測試呢，攞水辦去測試呢，就淨係睇嗰個水喺乜嘢時段，即係開咗水喉，第一浸，跟住二十秒後，四十秒後，六十秒後，八十秒後，喺唔同嘅時間，攞個水辦，測試入面個含鉛嘅數量嘅啫，係咁多嘅啫，啱唔啱？

主席：唔係咁多，仲有嗰個 computational dynamic...

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答：係，仲有個 CFD 嘅。

問：係，有個 comp--但係即係我想講...

主席：Fluid dynamic 咁嘛。

問：...就係擺唔--唔知道嗰個鉛嘅來源嘅，你做嗰個，嗰個 experiment 本身個實驗。

答：唔係，就係 exactly 要搵個來源，因為即係我簡單講個情況呢，即係因為嗰個 scale，即係我 report 都講，因為個--呢個問題牽涉嘅範圍好複雜，好大，好大，咁多個屋邨，百幾個 building，咁所以呢，但係呢就算係以前水務署擺咗咁多水樣呢，都係得 4 個 per cent，即係其實係一個好 small sector of the whole thing，咁第一。第二，即係喺短短時間，7 月、8 月呢就因為個 task force 呢就將三個代表性嘅單位，嘅供水鏈呢啲配件，啲單元，就係拆咗，就分析佢啲 lead 嘅鉛分，即係成分啲啲咁。

咁呢個都係三個單位咋嘛，三個代表性單位，咁其實就即係--我哋即係起碼我係一個 independent 嘅 expert，咁就覺得其實就--即係其實好多 uncertainty，咁你呢三個點解唔代表性，可能三倍咁強都得㗎，即係好多好多，即係根本就一個好大 scale 嘅問題。所以我哋做呢，喺有限嘅時間上做到想做啲嘢就話，第一個比較有目標嘅 sample，因為你求其去 sample，唔會--我成世人我都係 analyze data，亦都 analyze 好多 field data，field data 一定好複雜，咁你有 target 其實你就好難有咩嘢結論嘅，即係咁，咁點為之有 target 呢，有一個 theory，因為房署啲啲 measurement 就好有用，但係呢始終你唔反映到個 tap concentration，即係你--咁好呀，你有個 elbow，咁多 milligrams，咁多 microgram per second，咁又點呢，係咪對我有毒呢，對我有毒呢，答唔到呢個問題嘅。

所以我哋個 CFD model 點--嘅用途呢就係話，喺個 tech--用呢個 tool，呢個工具，就話喺咁嘅度出嚟嘅釋放量嘅範圍，喺咁嘅流體，一般嘅情形，會唔會反映到我喺度開水喉嗰個含鉛量，就係我

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度到嘅呢，咁如果度到呢，咁起碼你喺科學上呢就有個一致性，同埋一個叫 *influenced by scientific influence*，即係唔一定可以，咁我諗我哋有可能每個割開嚟㗎嘛，咁呢個我哋覺得係即係主要呢個目的係咁，所以個 CFD 其實就嗰咗好多 *effort*，因為如果唔係我哋唔會去...

問：我明白嘅，李教授。

答：係，咁所以即係呢個 *work* 就喺--因為我哋始終覺得就算我去再割開幾多件都有乜意思嘞，即係。

問：明白嘅，李教授，或者我--你聽聽我講先，可能我個問題代表到唔到嗰個要點，其實呢因為我睇你嗰個報告呢，你係總共做咗測試嘅水辦呢，就唔係淨係嗰肇事嗰十一條邨嘅，仲做多咗六條邨添嘅。

答：係。

問：我哋知道嗰十一條邨呢，建基喺水務署做過嘅測試呢，*the isotopic analysis* 同埋嗰啲割開啲喉呢，即係我哋知道嗰個鉛嘅污染呢，嘅來源係焊料嘅。

答：係。

問：我就想問下你，另外嗰六條邨呀，你做另外唔係肇事嗰六--十一條呀，另外嗰六條邨呀，有冇你嘅實驗嘅範圍之內，有冇話畀你聽究竟嗰個鉛--有--我哋知道有幾個水辦係驗到鉛㗎嘛，我哋一陣間先睇嗰個數據㗎。

答：係。

問：你嘅實驗嘅方法入面有冇畀畀到你知知道嗰個鉛嘅來源係焊料㗎，抑或係其他嘅部件度出嚟嘅呢？

答：係，即係我哋因為點解都做少少嗰啲所謂 *unaffected estate* 呢，就因為睇到啲數據，咁覺得咦，有啲超標，雖然係 *isolated*，譬如十一--咁尋日都 *go through* 過，咁我哋覺得因為我哋 *purpose* 係 *associate* 嘅，即係其實都想睇個 *extent of* 個問題呀，咁所以就抽樣咁做下，即係其實我哋都知道大體上嘅問題，相對嚟講係有咁咩嘢嘅，嚴重嘅，咁所以就抽咗嗰六個--六條邨囉，六條邨應該係幾多 *building* 咁喇，咁就你睇到--其實你睇到喺嗰個尋日啲數據度睇到嗰四條邨，我尋日都講咗，四條邨個 *extent of the risk* 呢，就係

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細嘅。

問：我明嘍，教授，我係問一個好簡單嘅問題，或者我解畀你聽點解喇，因為你嗰個數據個表達嗰度呢，你就就咁分為三個 class, class 1, class 2, class 3。

答：係。

問：咁你就將六加十一，十七條邨呢，擺埋一齊嘅，你明唔明我意思？即係似乎畀人嘅印象係可以一概而論嘅，嗰十七條邨，當然，你有啲邨係驗到有咁高，有啲邨驗到高啲，但係畀人嘅印象就好似話十七條邨呢，都係受同樣嘅污染嘅。

答：呢個就唔係咁嘅意圖，唔係咁嘅意圖，因為譬如舉例，我估即係通過呢個調查呢，其實好清楚就有啲 building 其實就好好，譬如話彩德呀，秀茂坪嗰啲，即係起碼由數據睇就個 risk 相對嚟講係低嘅，咁亦都怡明其實都係低嘅，譬如話有好多，即係尋日講咗，不過就係一個...

主席：佢--佢嘅問題呢，其實就係話呢，嗰六條 unaffected 嘅 estates 呢，可能呢係純粹只係受到啲部件裏面含鉛嘅影響嘅啫。

問：係，你可唔可以解釋呢一點啫，澄清呢一點。

答：呢個就即係因為我哋--係，即係呢個要再有待再調查囉，即係去再待調查，因為而家你--我哋真係有 direct measurement 嘅，都係嗰三個 flat 咋嘛，嗰三個 flat，咁當然有其他房署...

問：而你 measure 到出嚟嘅嘢，只係話畀你聽啲水度有鉛咋嘛。

答：有鉛，係，係。

問：話唔到畀你聽啲鉛喺邊度嚟喇嘛？嗰幾個水辦？

答：係，係。

問：嘎，係咁...

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答：可以--可以咁講，可以咁講，係。

問：咁仲有想你睇睇嗰啲數據同埋個表嘅。怡明先喇睇睇，就喺 173.4 個頁嗰度。尋日石大狀都同你睇過嘅。怡明嗰度呢，其實你而家--你尋日都同我哋講，怡明好特別嘅，因為你見呢，你做過三個嘅單位嘅水辦，三個單位入面，兩個單位呢，冚嚟都係 0 嘅，嗰個...

答：即係 below detection 呀，below detection。

問：係，可以話係 below detection 喇。而其中一個單位呢，就只有一個數據就係 60 秒嗰度呢彈出嚟，唔知點解就有個好高下嘅數嘅。

答：係，係。

問：咁就係咁多嘞。其實從咁樣嘅 pattern 嚟講呀，即係從一個統計學嘅角度去睇，可唔可以話呢一個係一個異數嚟嘅呢，見到一個單一嘅咁樣嘅。

答：係，即係我哋都講咗 singularity，即係我哋都覺得有 singularity，但係因為我哋即係唔可以掉以輕心喇，即係有陣時呢個。

問：明白。

答：咁所以我哋亦都琴日講咗就話，反複其實同我哋啲 chemist，亦都同 Government Lab 同我哋嘅 Lab，即係話咗咁亦都考慮過再重做嘅，但係因為種種原因就有覺得咁呢個即係--因為其實你睇文獻呢，含鉛，即係供水系統嘅含鉛量嘅變化呢，其實就唔同國家都知嘅，就係好複雜嘅，即係香--即係因為有 chemistry，有好多其他影響，咁所以你話內試一個 sample 咁，咁但係--即係如果我哋話信呢個數據，咁有... (聽不清) 喇，咁即係話有鉛喇，有鉛喇，咁應該有鉛嘅話，咁你可以配件又好似你講，亦都可以信--即係好多源頭嘅可能，咁但係都--我哋都應該--即係我哋而家就 present the data as it is，即係--咁呀希望有用喇。

問：但係我想帶出就係如果你比較起嗰啲涉事嘅屋邨，譬如葵聯呀，我哋睇得到...

答：係，係睇好遠，睇好遠。

問：嗰啲係一個 range 咁。

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答：係，係。

問：即係度度都--個水辦都有啲鉛嘅，不過係多少嘅問題嘅啫。

答：係，係。

問：但係呢個就特別嘅，係單一性嘅，你同意嗎？即係嗰個性質上，兩者唔可以相提並論嘅。

答：係，係。即係譬如我哋睇葵涌。

問：係嘞，我都想你睇睇葵涌呢，又係咁樣個喎。

答：係一個，一個，咁但係因為個個--因為我哋有一個系統喇，咁個個呢就你 lead concentration 又好，你 intake 又好，都係即係好低嘅，咁所以...

問：即係你喺葵涌，173.2 個度呢...

答：係。

問：...又係得單一個數據。

答：係，單一個數，係，係。

問：你睇番 173.1 呢，其實你睇番秀茂坪呀，水泉澳呀，元州五期呢，都係咁嘅情況個喎，單一個數據個囉喎。

答：係，係，係，係。

問：即係從個 pattern 個角度呢，嗰六條冇涉事嘅邨同埋嗰十一條我哋知道...

答：係好唔同嘅。

問：係好唔同嘅。

答：好唔同，好唔同。係好唔同，即係呢個同意，所以我哋結論都話我哋嘅 sampling 係 largely confirm 嗰個，即係係有事同冇事個 category 先 confirm 到。

問：同埋我想即係再睇睇呢，琴日都睇過，C19.1 個度，9889 頁。你見

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B

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到呢...

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答：係。

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E

問：...其實如果睇嗰個表嗰度講嗰啲閥門呀應該叫做，valves 嘅，嗰一個 copper alloy 呢，如果我哋係浸二十四個鐘頭嘅話呢，如果 stagnation period 係二十四個鐘頭嘅呢，其實係可以超過呢個 10 microgram 呢個數值個嗰，受到個污染，鉛嘅污染。

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G

答：但係呢個數呢，我想澄清，呢個數就係廿四個鐘頭內，釋放幾多嘅 microgram。

G

H

問：係。

H

I

答：呢個就唔代表你 water tap 個 microgram per litre，完全另外一回事。

I

J

問：另外一回事，係。

J

K

答：完全另外一回事。

K

L

問：我想澄清一點，就係其實即係呢個係如果你--當然我哋而家唔知喇，我哋所得嘅數據唔足以我哋作任何嘅推斷，但係其實我哋喺嗰六條冇涉事嘅邨度搵到呢啲異數呢，可能係有啲鉛嘅成分，係喺一啲完全合規格嘅材料嗰度，唔知點樣樣喇，可能個 stagnation period 特別長，抑或點樣樣，或者佢用咗呢一個 particle 出嚟，抑或咩嘢，可能係啲咁嘅情況，令到有一個咁樣嘅單一嘅數據出現，你同唔同意呢？有可能啫，我哋推斷...

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答：呢個因為都要睇睇，但係就因為譬如怡明個成 0.150，即係唔係一個細嘅數目。

P

Q

問：嗰個高喇，嗰個特別高喇。

Q

R

答：好高，所以就比較--即係你如果純粹 copper alloy，基於嗰啲數字呢，我諗嗰個報告都有，就比較難會咁高囉，好細嘍，即係你計出嚟會好細囉，所以即係我明你嘅意思，但係好--即係我諗好難咁，我未必會同意你嘅講法。即係因為頭先我係 microgram，microgram...

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問：你同唔同意我咁講呢，我哋見到只係呢六條邨係有啲單一嘅數字吖，每條邨都係。

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答：係。

問：你同唔同意我咁講，如果係好似嗰啲我哋知道受焊料污染嘅情況咁樣，喺啲水喉駁口個位度用咗有鉛焊料，而即係通處都係嚟喇，啲--如果係咁呢，冇可能話 first draw sample 又冇，乜嘢都冇，即係嗰個污染個源頭肯定個性質上係好唔同嚟嘞，你同唔同意呢？

答：即係所以我哋即係幾個 class，你睇我哋報告咗幾個 class of building，一個即係 pre-2005 講咗喇，一個就 after 2005，咁就 unaffected，咁 affected 嗰啲個別我哋都睇過，亦都好似你講就係似乎風險都係相對低嘅，所以即係有唔同嘅大類型係我同意嘅，我同意嘅。

林小姐盤問

問：Professor, we will be asking you a few questions in English. I am guessing that you probably won't require translation, but if you require it, please do put on the headphones.

答：That is okay.

主席：我諗你要講大聲啲，同埋你係代表？

林小姐：I represent China State, one of the four main contractors.

答：Yes, sure.

問：I would like to ask you a few questions about the first-draw sample that I think was touched upon yesterday in some of the questioning from Mr Wong. We established yesterday that the first-draw sample volume is 250 millilitres.

That we can see from page V/149, figure 1, which

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we have referred to quite a number of times. Figure 1, first-draw sample, 250 millilitres, and that was after a stagnation period of about six to 12 hours.

答：Yes.

問：If I may then ask you to go to the task force report at page 745, you see this is a table of the leaching test results from Hong Ching House of Kai Ching Estate.

答：Yes.

問：If you go to items H33 and H33A, you see there's a description, "Tap at kitchen (mixer) (copper alloy)" and "Tap at kitchen_part 2 (swan neck (copper alloy)". I understand that the kitchen tap consists of two components, ie the mixer and swan neck?

答：Yes.

問：If you go across the table, you see the immersion water volume for these two items are 31 millilitres and 89 millilitres. Do you see that?

答：Yes. It's 31, yes.

問：31 and 89. In other words, the combined total immersion volume for the kitchen tap at Hong Ching House is 120 millilitres; do you see that?

答：Yes.

問：31 plus 89.

答：Yes.

問：If I could just quickly take you to another one, which is Hung Hei House, at page 772.

答：772, yes.

問：If we go to items F31 and F31A, again, these are items

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for the "Kitchen tap (mixer)" and "Kitchen tap (swan neck)", and if you go across the table, you see the immersion water volume, they are 92 and 70. In other words, the total of combined immersion water volume is 162 millilitres; do you see that?

答：Yes.

問：You can take it from me that I have done the same exercise for the other two estates, Yuet Ching and Luen Yat, and the total immersion water volume for those estates is 151 and 127 millilitres. In other words, the total tap volume of kitchen taps ranges from between 120 millilitres to 162 millilitres. Do you follow?

答：Not quite, actually. In other words, there's a tap --

問：Yes, the immersion water volume.

答：Yes. But I think what they are referring to here is they are trying to measure the possible lead leached from the tap, the component itself.

問：Correct.

答：And hence there's an immersion volume, it that applies. The tap -- of course it comes in different forms -- but you see, when you turn on a tap, it goes into this swan shape (demonstrating), so suddenly the water is before this swan shape. So I don't really see the point. I think the purpose is slightly different for this test, because they want to measure the amount of lead leached from the tap.

問：Correct. Perhaps we can get a clearer picture if we then turn to page 663, where they have a diagram illustrating how they have done the leaching test.

答：663.

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問：So this not exactly the same component, but we can see, basically, what they have done for the leaching test, for the component, the way that they immerse it in water is by the internal volume, so they have put water inside the component, not outside. It's inside the component.

答：Yes.

問：What I am getting at is that -- so the total water volume that is contained within a tap, we can see from these results, ranges from between 120 millilitres to 162 millilitres?

答：Yes.

問：My question for you is, that's roughly around half to two-thirds of the first-draw sample volume of 250 millilitres, so bearing in mind the internal kitchen tap volume, would it be fair to say, in cases where the highest concentration of lead was found in the first-draw sample, that a major or at least a significant source of lead was likely the copper alloy tap?

答：Actually, I don't quite understand the question, because -- you see, this, from the picture, from the swan tap, this swan part (demonstrating) is after the valve. So once you turn on the tap, then the water flows out.

問：Yes.

答：But the water we are interested in is the water that has been stagnant in the system.

問：Yes.

答：Which is before the valve. So, in other words, although the water passes through the swan neck, but it is not -- the effect of the swan neck during that five to ten

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seconds is probably minimal. You see the physical picture. You see, this is the stagnant water (indicating water jug), this is the swan, this is the valve.

問：Yes.

答：So yes, there is some possible leach, but once you turn on the tap, then this water has been standing for eight to 12 hours.

問：Yes.

答：So it starts to flow out. The time it takes to flow is probably very small. So I don't quite see this. That's the first point. The other point is that even from the WSD report, they also concluded the contribution of alloys is very small, and if you look at one of the figures in my report, which is figure 7, if I remember correctly -- I think it's figure 7.

Yes, figure 7, the amount of lead deposits they found in these fittings is very small. I think there is some tap, but comparatively it is very, very small.

So, in other words, holistically, based on the data available, the amount of lead that can be leached from these copper/lead alloy taps probably, I would think, would be very minimal.

問：Yes, but at least the first-draw sample would reflect the concentration of lead in the components around the vicinity of the tap; would you not agree?

答：Yes, it would be, and that's precisely what the CFD model can do, because what it is, is really just a tool, so you think of it as a linear line, and at different points in the line you impose different sources, lead sources, and the lead sources can be an elbow, can be a valve, can be a tap.

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Now, I would suggest that if you impose the lead sources corresponding to what you measure for these taps and you go through the calculation, it will give you very, very minimal differences.

I think, in fact, if I understand your question correctly, I think -- it has a contribution, certainly, but it would be relatively small, I think, from all indications.

問：We know that from at least out of the 250 millilitres, at least around 120 to 160 millilitres of that came from water contained in the tap.

答：You see, once you -- I am just trying to figure out -- maybe -- my understanding of the tap is very simple, just a tap and then a swan (demonstrating). A tap is a tap; right?

問：Yes.

答：So, when you turn off the valve the night before, which we asked the residents to do, then this portion is not in contact with water, this swan (demonstrating) is not in contact with water.

So, in a way, it doesn't quite factor into the stagnation sample of first-draw, because that portion is not in contact with water, until the moment you turn it on.

問：Right.

答：Right? I mean, this is the tap; right? It's not psycho, this is physical.

So this (indicating water jug) is the stagnant water. I turn on the tap. Before I turn on the tap, there is no water in this swan; right?

問：Yes.

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答：So the only way lead can leach into the water is during that five seconds.

問：Yes.

答：Anyway, that will come out of the calculation, but basically, if you think about it, it's probably very, very minimal.

問：Just one more question -- but the water, there would be water inside the mixer, though, would there not?

答：Yes, there would be.

問：In fact, if we go back to page 745, we see that in fact it is the mixer which has a much higher concentration of lead compared to the swan neck. For example, if you go back to page 745, at item H33, we see that the mixer, for the mixer, the amount of lead leached is 133, as compared to the swan neck which is at 23.9. So the amount of lead contained leached from the mixer is actually a lot more in a swan neck.

答：Yes. It's only 31 millilitres. From this page, 745, the volume of the mixer in the tap is about 31 millilitres; right?

問：Yes.

答：So that's about 10 per cent, let's say, 50 per cent of the volume.

問：Yes.

答：I agree with you. But on the other hand -- mind you, this is a static test. So I agree with you.

問：So it would be a contributing factor?

答：Yes, definitely. Definitely.

問：Now, if we go to page 173.3 -- I just wanted to quickly

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have a look at the figures. In Hung Hom, at the top, you see, for Hung Yan House, flat 1715, the first-draw was 0.021, and then for the next four samples it tapered out. Do you see that?

答：For Hung Hom?

問：Yes.

答：For Hung Yat?

問：Hung Yan, 1715.

答：Hung Yan, 1715, okay.

問：First-draw was 0.021, and then for the other four samples, it tapered off. So this is one of the examples that you mentioned where the peak lead concentration in the first-draw sample; right?

答：Yes.

問：The same applies for flat 107, two rows down, we see the first-draw is 0.048, and then it tapered off, and the same applies for Hung Yat, flat 3811, first-draw, 0.037, and then it tapered off. The same applies for Hung Yiu, flat 1917, and the first draw, 0.013.

So you see that for Hung Hom, four out of nine flats had the highest concentration in the first-draw sample.

答：Yes.

問：I'm not going to go into details, but if we switch through, 173.5, we see Kai Ching, at the bottom.

答：Yes.

問：Again, we see various samples where again the highest concentration of lead was in the first draw, and that includes, for example, flat 3113 for Hong Ching, the

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first draw, 0.110; flat 2402, first-draw 0.028; Lok Ching, flat 421 and Lok Ching, flat 1806, and so on and so forth.

So this scenario -- do you see that, Professor?

答: Yes, Lok Ching and Hong Ching, I am with you.

問: So you see the scenario where the key lead concentration is in the first-draw sample --

答: Yes.

問: -- that scenario is not necessarily confined to estates completed before 2010, because we know that Kai Ching was completed in 2013 and Hung Hom was completed in 2011.

答: Yes.

問: Do you agree with that? It's not necessarily confined to estates completed before 2010.?

答: Yes, it's not absolute. It's just on the whole it's a general comment. It's not a theorem by many means, it's not an absolute.

問: Not a cut-off?

答: Not an absolute cut-off.

問: Just very quickly, if you go back to page 173.1, you see we have two estates, Shui Chuen O and Un Chau Phase 5. These are both China State estates. Can you confirm that basically none of the samples taken were found to have exceeded the WHO value?

答: Yes.

林小姐: Thank you very much.

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主席：或者我哋 take 個 break 先喇，好唔好呀？二十分鐘喇。

上午 11 時 23 分聆訊押後

上午 11 時 48 分恢復聆訊

出席人士如前。

主席：係，Mr Chan。

陳宇文先生：Sir, thank you.

食水含鉛超標調查委員會的專家證人第一證人：李行偉教授（香港科技大學土木及環境工程學系講座教授、香港科技大學副校長（研發及研究生教育））宣誓繼續作供

陳宇文先生盤問

問：李教授你好，我姓陳嘅，我代表瑞安，okay，瑞安建築。

答：瑞安。

問：我可唔可以麻煩你翻查去你嘅 report 第 169 頁呀？

答：係。

問：係嘞，嗰度有三幅圖片喇，咁呢我就知道呢就係最頂嗰兩幅呢，嗰度就有個“installed tap in meter position and tap at the water supply pipe entry to flat”，okay，即係代表原本就有一個水龍頭嘅，係後來呢為咗要抽水辦喇，要做一個水辦，就安裝咗個水龍頭，係咪呀？

答：呢個其實呢就係水務署其實拆咗個錶，即係其實喺個錶呢，就拆咗個 water meter，就裝咗個 tap 嘅。

問：裝咗個 tap 嘅？

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答：嘅。

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問：Okay，得。我想問問，我哋知唔知裝咗個 tap，嗰啲嘅配件係用啲乜嘢 spec. 嘅配件㗎？

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答：呢個就係佢哋裝嘅，就咁一個 water meter，咁我哋冇度過嗰個 meter，冇度個 meter。

E

F

問：唔係，嗰個--即係我意思係嗰個水龍頭係用咩嘢 spec. 嘅配件，係普通配件㗎，定話係啲...

F

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答：係一個...

H

I

問：...水務署核--即係認可用嘅配件㗎，你--我哋知唔知？

I

J

答：係水務署裝嘅，個 water meter，我假設就一定係合規格㗎喇，即係我哋...

J

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L

王先生：我相信都合規格，唔知係陳律師係咪想話水務署安裝呢兩個唔合規格？

L

M

陳宇文先生：唔係，我就係想知係咪係合規格，係啲 compliance 嘅 material。因為點解呢？而家我哋所知嘅呢，有啲配件呢，係入面都有含鉛嘅，我想睇下入面有冇含鉛量咁解啫，呢方面啲嘢，okay，同呢個 leaching test 可能會係有啲關係嘅，okay。

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答：係。

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問：即係我簡單嚟講，我想--會想諗下，喂，你喺呢度抽水辦，咁你有個 period stagnation 喇，係咪？咁嗰個水龍頭 itself 都可能係一個混合金嚟嘅，咁入面--可能入面啲係有含鉛嘅，咁會唔會喺嗰度--喺個呢--即係喺個 stagnation 嘅 period，呢個咁嘅水龍頭亦都可能亦都會係一個佢入面嘅鉛分呢，都可能係 contribute to 即係嗰個水入面會唔會佢含鉛量呀，諸如此類，咁就呢方面可唔可以同我--即係同我哋分享一下？

Q

R

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S

答：係，係，係，即係其實就即係正如我就--我講呢就其實就--即係我哋其實就想睇喺錶房入面嗰個 supply chain stagnation 之後有幾

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多鉛，咁就唔係話個錶本身嘅，因為...

問：唔係講個錶呀，係講個水龍頭呀，actually 而家用呢個水龍頭。

答：係水龍頭呀，因為你喺個錶位呢，我哋裝咗個 tap，咁我假設呢個係一定符合標準㗎喇，因為水務署做，咁你開咗個 tap 呢，其實我哋想 draw 個--因為 250 mL 咁嘛，呢 250 mL 呢其實就係上游，上游個部分㗎，咁即係可以睇番 figure 1 大約幾多喇，即係咁所以就係上游嘅水體...

問：我同你係冇異議嘅，關於上游，我淨係純粹--嘎。

主席：即係你嘅意思由呢一度就去到個人屋個位，就少咗個水錶嘅 contribution，係咪咁呀？

陳宇文先生：唔係，唔係呀，我個 contribution 就係純粹係呢個水龍頭，入面都係一個混合金㗎嘅。

主席：係呀。

陳宇文先生：咁個混合金，咁你啲水養住喺嗰度，養住喺呢個水龍頭嘅時候，會唔會有一個 contribution 去嗰個 lead，咁而家就係？

主席：咁呢啲 common sense 喇，不過至於 leach 幾多，咁呀另外一件事喇，係咪先？

陳宇文先生：我就係純粹即係想畀你同我哋分享下。

主席：有機會㗎。

答：嘎，即係如果係符合--即係符合個標準嘅應該就 leach 嘅 lead 就好少嘅，好少，如果符合標準，即係呢個 WSD 個 Task Force report 亦都有提過，我哋亦都由個 leach amount 嚟睇，亦都睇到嘅。即係佢而家你睇一個報告佢哋度出嚟係 significant 嘅 lead...(聽不清) leach 嘅呢就其實係唔合標嘅喇。

問：唔，okay。

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答：即係呢個我諗正話都--都同正話個問題有少少關係。

問：係，我有嘢需要再問你，我問呢個 point 得嘞。如果你可唔可以轉去第 173.17 頁。

答：係。

問：嗰度呢提到呢你哋就自己亦都喺例如第一行，葵聯邨二期呢，就喺嗰度呢，擺咗六個水--擺--去咗六個 sample flat 嗰度，嗰度擺咗啲 first draw 嘅，係咪？第一行。

答：第一...

問：Kwai Luen Estate Phase 2，HKUST，見唔見到？喺右手邊。

答：係，係。

問：係咪呀？Okay。你去之前，有冇話確認過呢六個 sample flat 入面，嗰啲焊料係有含鉛吖，定冇含鉛吖？

答：冇確認，冇，冇。

問：冇確認？

答：Random 呀，呢個其實我哋補充一下就其實我哋都唔知去邊個 flat 㗎。

問：Okay。

答：就係房署 random，係我哋去到呢，就同房署嘅職員聯絡，然後佢帶我哋啲 sampling team 去入去嘅。

問：Okay。

答：即係咁嘅，所以佢哋嘅 random sampling 佢哋...

問：Okay，咁我就想問你，頭先--尋日呢，委員黎先生亦都講過，喺我哋呢度，我哋聽到嘅證供呢就係有用有鉛焊枝，亦都有無鉛焊枝都有用嘅，okay？咁就住頭--我提葵聯二期咁喇，嚟講喇，如--我唔--我哋又有 check 到，嗰啲焊接位係咪用有鉛焊枝，或者用無鉛焊枝，咁如果係咁，特別超標嘅話，okay，我可唔可以就咁因為發覺有嗰個--佢個 lead content 係高咗，而推斷係，嗰啲係因為有鉛焊枝，

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或者無鉛焊枝，咁應該理論上係睇唔--判斷唔到個囉，啱唔啱呢？

主席：我唔明你嘅問題，你再問多次。我哋知道...

陳宇文先生：我入--我哋入個呢--揀呢六個...

主席：唔係，葵聯邨我哋知道係超標㗎喇，係咪？

陳宇文先生：但係葵聯邨我哋都知道有用好似黎先生...

主席：係，有用有鉛，有用無鉛喇。

陳宇文先生：又係無鉛，係吖，咁 Professor Lee 就話呢，佢入到呢個 flat 係 random 嘅，之前亦都有去 check，嗰啲焊枝呢，嗰啲水喉位呢，係用咗有鉛，或者無鉛焊接，唔係搵支好似我哋所謂支死光槍咁樣去照一照喇。

主席：係吖。

陳宇文先生：Okay，咁出咗嚟有個 result，就而家好似佢呢度咁講嘞，六個 sample 有六個都有 excess lead。

主席：係吖。

陳宇文先生：Okay，咁呢個未必係可以--只要證明係有 excess lead，唔係證明到嗰啲係因為有鉛焊枝嚟 contribute 到，或者無鉛焊枝嚟 contribute...

主席：應該可以證明到，因為嗰啲部件個 leach rate 係好低㗎咋嘛，如果你嗰個超標個數據係大嘅話，咁咪即係冇其他原因㗎喇。

陳宇文先生：咁如果，但係如果你睇番從一個角度，大家假定一下，如果其中一個 flat 係用無鉛焊枝嘅話，而有出現一樣有 excess lead 嘅時候，咁就會係算係一個 abnormally 喇，okay，我就係諗緊，你點樣去排除，呢啲肯定唔係無鉛焊枝嘅問題，或者如果係其中有一 flat 係真係無鉛焊枝嘅話，而超標嘅，咁你就發覺到係邊個超標呢，喺嗰個 causes，個因由。

答：係。

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問：呢樣嘢我就唔係好清楚，所以就想同你探討一下。

答：係，係，係。呢個就係--點解我哋要做個 CFD model，因為正如我所講，你哋而家度咁多嘢呢，就始終係 translate 唔到去個 water tap concentration。咁但係我哋--答你嘅問題，就係我哋譬如用個 model，基於你焊料，譬如 solder joints，嗰啲釋放率，同埋你啲 copper alloy 嘅釋放率，咁可以做對比，即係話--如果你淨係--譬如冇咗啲焊料，咁你淨係 copper alloy，即係如果符合標，即係合標嘅，所引起嗰個 water tap concentration 就會係好細囉，會係好細、好細。即係換句話講，你基於你度出嚟，焊料--即係個 copper alloy 嗰啲釋放率，嗰啲 leaching rate，就達唔到你--冇可能達到你而家我哋 observe 緊嘅，你譬如聯逸啲，0.286，即係驚人嘅就係 350，即係冇可能達到呢啲囉。即係 scientifically is not consistent。Scientifically you just can't do it. It's not -- even the order of magnitude is not consistent.

問：Well, the problem --但係 it was not a problem. I don't have a problem with that. It's like what I'm trying to...

主席：用中文吖，唔該。

答：嘅，唔好意思，唔好意思。

主席：係。

陳宇文先生：唔係...

答：唔好意思。因為即係科學上唔係好一致。

陳宇文先生：唔係，因為 Professor Lee 用英文，所以我用英文答佢啫。

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答：唔好意思。

問：唔緊要。我點解咁樣講呢，就因為而家事實上係有啲--喺葵聯嚟講，係有用無鉛焊枝，亦都有有鉛焊枝，okay。你係咪即係想同我哋講話，因為即係超標得咁犀利，就算係無鉛焊枝，冇乜可能係 leaching？

主席：冇...

問：我完全唔係--我睇唔到。即係因為如果你之前冇去 check 一 check 啲啲喉管係咪用有鉛焊枝，你應該唔知㗎嘛，你話 random 入到去，咁你發覺，啊，嘩吓，葵聯二期，啲六個 sample, first draw, 嘩，超標，咁先至算喇，okay。如果係無鉛焊枝嘅話，咁即係代表唔應該係焊枝係一個 contributing factor 喇，應該係第二樣嘢係一個 factor，令到佢啲個含鉛指數咁高，咁你就要去搵--係咪應該要去搵下其實啲個 cause 喺邊度呢？能唔能夠搵到呢？就係咁解嘞。

答：係呀，只可以咁--大律師，即係咁講喇，就話你譬如呢幾個單位度出嚟係好高喇，因為含鉛量好高喇，相對嚟講好高喇，咁就--咁除非你話呢幾個單位完全係冇 solder joint，咁我哋唔知㗎嘛，但係即係似乎係--我諗唔到第二啲原因喇，即係你如果--基於啲幾種我哋知道嘅--嘅...

問：咁係咪或者係去核實，其實...

主席：唔係，唔係，呢個係 theoretical questions 嚟嘅之嘛，係咪？葵聯邨已經 confirm 咗，...

答：係。

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主席：...水務署已經 confirm 咗係喇嘛，solder joints 咁嘛。咁你問呢啲嘢，全部都係...

陳宇文先生：咁又唔係喎，房署就。

主席：...--全部都係...

問：或者我可唔可以咁講，因為我哋而家係事實上有啲證供，例如俊景，嗰啲焊枝送去地盤嘅，好似黎先生咁講，又有有鉛嘅，亦都有無鉛嘅。

主席：咁又點呢？

問：Okay。咁即係代表安裝水喉嗰個過程之中，有啲係有用有鉛，有啲就肯定係無鉛喇。

主席：係吖，啱吖，係吖。

問：咁我哋點知話呢六個 flat 去整出嚟嘅，去測試嘅，係有鉛嘅定係冇鉛嘅呢？咁樣我哋點樣去剔除嗰個 factor 呢？

主席：對唔住，我哋唔需要睇到咁 individual 嘅 flat 究竟係點樣樣吖嘛，啱唔啱先？即係你係瑞安，咁我唔理你喇。因為--譬如好簡單，何標記，係你個水喉匠。何標記 supply 焊料，亦都 supply 埋啲部件，亦都 supply 埋所有嗰啲水喉。根本對於我哋嚟講有啲咩嘢分別呢？究竟係嗰個水喉 leach 吖，究竟係嗰個焊料 leach 吖，抑或係個水龍頭 leach，對於我哋嚟講有啲咩嘢分別？冇分別。

石先生：我諗陳律師佢就係 postulate 緊一個可能，就係話 for 某條邨，如果嗰個 plumbing contractor 送去嘅焊料有啲係有鉛、有啲係無鉛，咁你點知道測到有鉛嗰個單位，去佢個單位嗰條管，經過嗰啲

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焊接位，咁啱嗰日開工嗰個工人，手嗰度擺嗰條嘢究竟係有鉛定無鉛呢，咁樣；咁刁鑽嘅，可能除非你 call 番嗰個工人嘅啫，否則冇人會知嘅。

主席：我知呀。

石先生：或者就話真係擺番嗰個單位側邊嘅管，就走去 check 下究竟嗰度有冇 solder 嘅啫。

主席：係吖。

石先生：除非佢嘅即係問題會係咁樣，就話有冇測試過某個...

主席：唔係，呢個咪我--係喇，啱吖。即係呢個係一個好 theoretical、好 academic 嘅 question，個 issue 嚟之嘛。

石先生：即係除非佢就係諗住問李教授，就話「你驗到 1246 個」--即係你話問到 Room 1246，「你有冇 check 過 Room 1246 四周左近嗰啲焊接位，嘍過下係咪有鉛呢？」

答：嘍。

主席：係呀，冇呀。

石先生：除非佢係諗住咁樣問喇。

主席：你係咪打算咁樣問吖？

陳宇文先生：其實石大狀已經幫我問咗個問題喇。

主席：係，咁我唔批准你問。下一個問題。

陳宇文先生：咁...

主席：係吖。

陳宇文先生：Okay。咁我有問...

主席：得，請坐，唔該。

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陳宇文先生：Okay。

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主席：好。

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李柱銘先生盤問

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問：李生，我係代表食水苦主大聯盟嘅。就其實我哋係好開心你能夠幫呢個委員會畀你嘅專家嘅證供嘅。有啲嘢，有啲問題，我希望你能夠澄清嘅。

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就而家其實係咪--香港我哋啲水質係非常好嘅，即係喺街喉嗰度，直至到佢入啲樓宇裏面，個 connection point，去到嗰度，係咪啲食水係非常好嘅？喺鉛嗰個方面嚟講。

J

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答：應該由啲數據睇係應該係可以咁講。

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問：可唔可以話係即係唔到有譬如話--我哋頭先睇到好多數據喇，0.010就係世衛喇，0.000 喎，有啲，係咪？好多係 0.000 個喎。你就話 undetectable。

M

M

答：Undetectable，係。其實就--可能補充下。即係 undetectable 就即係 2 同 2.5 嘅。即係呢度有少少--即係我唔希望有咩嘢誤導，即係通常個 Government Lab 係應該係 2 嘅。即係佢 below...

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問：即係.002？

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答：嘎，0.002，佢就係 undetectable 嘅，通常係咁嘅。譬如我哋個-- HESO 就係 2.5 嘅，0.0025 嘅，咁譬如。即係佢--即係呢個“0.00”嘅意思就係 undetectable。

Q

Q

問：Okay。

R

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答：Undetectable。

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問：我哋可唔可以咁樣講呢，你係假設係喺個街喉嗰度，去到個 connection point 嗰度，同埋當我哋呢--證據，.000 呢，即係 undetectable 呢，你當佢都係一樣嘍，係咪？即係去到 connection point，同埋入到去水喉度開出嚟，但係係你哋 undetectable 嘅，咁你當佢都有含鉛嘍，係咪？就算係，都係 undetectable 嘍？

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答：係，係，係。

問：Okay。咁所以如果水務署畀我哋啲水係咁好嘅，即係鉛嗰方面嚟講喇，但係入到去公屋裏面開水喉，係變咗唔係 0.0025，係變咗 0.003，咁咪即係變咗入咗屋，嗰啲水喉有啲問題個囉嗱，係咪，已經？即係加咗少少啲嘢都有問題㗎喇，梗係啲水喉，裏面啲屋水喉嘅問題喇，唔關出面啲水，原本嘅水嘅問題㗎嘛，係咪？

主席：假設有外來嘅因素先喇。

李柱銘先生：係嘞，係，咁，嘎。

主席：假設有外來嘅因素。

答：係，係，係。係，即係 inside services，係。

問：咁而家個問題就係，好嘞，去到邊度嘞？如果你話 0.003、4、5、6、7、8、9 去到 10 都合標嘅，係咪？去到 10 都合標，過咗就唔得，係咪？定係去到 10 已經唔得嘞？

答：即係呢個，即係我個人睇，就係一個 provisional guideline 啫，一個 guideline 啫。咁譬如你 -- 世衛就係 10。咁對於我，provisional guideline value，佢 stress 喺“guideline”。

問：咁去到 10 都仲係合格嘅，係咪？即係超過 10 至係唔合格？定係 10 已經唔合格嘞？即係我呢度搞唔清楚。

答：即係佢呢個，正如我所講，係唔係話你 9 就 -- 即係我諗係一個相對一個 reference point，即係唔係話 9 就得，即係因為我諗係對我嚟講係一個 measure of lead risk 嘅。

問：Okay, okay。咁但係如果係開咗水喉，沖咗兩分鐘嘅，但係仍然有 0.009，咁對你嚟講係相當有問題個囉嗱，因為佢唔係 -- 佢 first draw 完全冇 test 咁嘛；係咪？

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答：有個 lead 嘅存在囉，係有個...

問：係喇，係喇，同埋相當多個囉喎。同埋諗住如果真係係用頭啖水呢，如果你擺去化驗呢，係應該過世衛個標準個囉喎，因為你開咗水喉兩分鐘都仲有 0.009 吖嘛，係咪？即係可唔可以做一個咁嘅推論呢？

答：即係呢個即係--某一個程度上就即係我哋啲數據都反映呢樣嘢喇，即係譬如話我哋--即係亦都係因為我哋點解設計我哋嘅 sampling 係咁喇。即係你總體，除咗彩德、彩福係一個好特別嘅情況，其他都反映呢樣嘢。

問：Okay。仲有一度嘞，香港嘅我哋啲而家啲公屋，其實同外國係完全唔同嘅。

答：係。

問：喺英國就我諗佢如果見到一大咁座--大座一座，嚇到佢咁暈咗喺度嘅，咁犀利嘅。

答：係，係，係。

問：係咪？咁所以喺英國如果佢係想驗係街度嗰啲水嘅水質，其實佢打開個水喉兩分鐘，一定去到街外水嚟嘞，即係獨立樓宇，係咪？啱唔啱？

答：應該可以咁講。

問：但係香港未有耐吖嘛。如果你住喺公屋裏面，你開咗兩分鐘、三分鐘、一個鐘頭都未必得，因為佢仲要上去個大水箱，係咪？做唔到㗎。你都要開一個水喉，而透過過水喉放出嚟嘅水，而知道街嗰個水嘅質素，我諗係真係做唔到嘅，因為佢個水箱大到離譜。一座公屋平均我諗都有八百個單位嘅。

答：係。

問：咁嗰個水箱係巨到離譜嘅。

答：大律師，喺呢個情形下就有少少唔同。因為呢個情形下有獨立嘅數據，就直接喺個 sump tank...

問：係嘞。

答：...同埋 roof tank 度到係冇嘅。

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問：係嘞，係嘞。所以就...

答：佢即係佢要佢--即係有，有。

問：所以根本係唔同嘅。其他國家，若果都係--多數都係一間屋、一間屋咁嘅呢，就開水喉兩分鐘就擺到街外嘞嘞。

答：係。

問：係咪？

答：係。

問：咁同埋我哋香港，因為呢個，你自己嘅報告，都係 unique，即係...

答：好 unique，好 unique。

問：咁即係完全唔同嘅，同其他啲啲。咁我哋就要香港就要用另外嘅方--我哋自己嘅方法嘞，要，係咪？世衛係有畀任何一個方法話「你一定要跟我哋真係個方法抽水去驗吓嘛」，冇嘍嘛。

答：係。

問：好嘞，每一座公屋裏面，若果你計，譬如計個 corridor，對個 corridor 喇，出面個走廊喇，係有好多個單位嘍嘛，一路咁去，去，去到尾嘍嘛啲，係咪？可能幾十個嘞。

答：二十個單位，有啲。

問：二十個單位，係嘞。

答：...（聽不清）

問：咁當然對面又有二十個咁喇，係咪？咁如果你--係咪去到最尾個單位個中招個機會係咪最大嘅呢？啲鉛呀。

答：就一般嘅情況就係--即係我嘅理解喇，就即係睇過，就一般一層樓就有四個錶房嘅，即係我同啲 Housing 啲人理解喇，咁所以即係換句話嚟講，一個錶房就負責五、六個單位嘅，負責五、六個單位。咁呢啲五...

問：有五、六個單位咋嘢，一個錶房？

B

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答：係呀，因為一般有四個單位--四個錶房。

C

D

問：譬如--但係如果以一個 block 咁喇，一個 block 咁喇，可能佢呢面又有一條走廊，呢面有條走廊，中間就係 lift 或者係樓梯，甚至可能仲多幾個都有嘅。

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答：係，可能係，可能。但係即係唔係一個錶房，即係幾個錶房。我理解係幾個錶房。

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問：咁你畀水費點畀呢？若果一個錶房幾戶個喎。咁我慳咗水，隔離個亂用水。

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主席：唔係，一錶房裏面有四、五個水錶嘅。

I

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李柱銘先生：哦，另外嘅，okay, okay。

J

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主席：係，係。

K

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答：係。即係佢就每一個錶房就好多個水錶嘅。

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問：係，okay。好嘞，咁譬如我哋...

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黎先生：大狀，未去過公屋，係咪？

O

P

李柱銘先生：唔係，...

P

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石先生：我哋有張相，你可以...

Q

R

李柱銘先生：好耐冇去。家訪嗰陣時有去。

R

S

石先生：105 有張相嘅。

S

T

李柱銘先生：家訪嗰陣時，我見到咁大座，我想喊呀，未去。

T

U

問：咁所以如果你抽水嘅時候，開水喉，幾分鐘咁喇，如果你嗰個單位係

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啱啱近住落嚟個 down pipe，咁又唔同話去到最尾個單位個囉
嗶；你明我意思嘛？你諗住...

答：即係因為唔...

問：...有個 down pipe --係嘞。

答：係，係，係。

問：個 down pipe 嚟到呢度嘞，一路咁過去嚟嘛，你話二十個單位咁，
係咪？咁係頭一個同尾個係唔同個囉嗶，係咪？咁而家你哋要睇
政府、水務署或者你哋自己有冇寫--你係睇唔到個單位係近個
down pipe 一定係離到好遠，睇唔到，冇呢個數據嘅，係咪？

答：唔係，我哋--就麻煩你係睇山報告嘅 173 頁，嘎，。

問：好呀。

答：173 頁。即係個 Table VI-1，Roman VI-1。

問：唔，唔。

答：即係睇到就算我哋--即係我哋都係有三個 vacant flat 嘅，咁就喺
呢三個 vacant flat 睇到就係即係有啲單位就特別長嘅 pipe 嘅。
譬如啟晴係 29 個 metre，元洲嗰度就啱啱喺個 meter room 隔離嘅，
14 個 metre。所以即係--咁亦都睇到啟晴嗰個 flat 啱啱好就係好
多 bends，好多 elbow 嘅。即係變咗就--你講得啱，即係唔同嘅單
位，就就算同一層樓，都會有唔同嘅長度，唔同嘅彎彎曲曲嘅啲彎
位，亦都話即係意味住有可能唔同嘅鉛嘅源頭，都有可能。

問：咁譬如一個單位--而家唔好講佢離個 down pipe 有幾遠先喇，或
者係離個錶房幾遠先喇。如果一個單位開水喉，開到大嘅，開二十秒，
咁你啲水去到邊度呢，去到錶房未呢？

答：去到嚟喇，應該去到。即係我哋睇，如果我哋睇即係 Figure 1，即
係去到。即係去二十--二十秒就--我哋有一個--等等先。我睇 149。

問：唔該。

答：149。就睇個單位。即係你譬如二十秒，即係如果我哋有一個--呢個
就係平均嘅流量喇，就去到十零米。咁如果單位，喺正隔離，咪到囉，
即係唔--如果係長啲嘅，就未到。

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問：咁所以當你畀咗啲資料我哋，你話其實係頭啖水唔係最多鉛個喎，平均嚟講，係第二個樣本仲多個喎，係咪？

答：有啲樣本係，有超...

問：六十幾個 per cent 喎。

答：六十幾個 per cent 係，係。

問：仲多過頭啖喎。

答：仲多過頭啖，係，係。

問：係嘞，係。咁係咪其實就可能已經係去到個錶房，take up 埋啲啲呢？

答：係嘞，應該就係。即係如果譬如舉例，如果係錶房係多鉛嘅，譬如錶房啲浸水，咁你咪可能到二十個 second 先見到囉。即係咁樣之嘛。咁係咁樣。

問：好。其實我係好感激你咁多圖、咁多盛，因為我呢就--雖然我讀啲間中學係教 science 嘅，但係我就讀 art 嘅，所以就好唔掂呀，係，即係應該，好彩你咁多圖。

答：唔，唔係，唔係，唔係，係

問：好嘞。咁仲有一度嘞，我哋而家知道係因為鉛喺水裏面或者水有鉛，呢，就係好大、好大嘅因素就係啲啲焊料啲度有鉛，係咪？

答：唔。

問：但係係咪完全就一個理由呢？會唔會係啲啲 fittings 都會有鉛呢？

答：Fittings 都會有鉛。即係正如即係啲資料都顯示，即係 fittings 都有鉛，但係個相對嘅量就比較少嘅。

問：即係你哋亦有做過任何嘢可以證明如果有晒鉛，淨係啲 fittings 裏面，會有幾多嘅含鉛呢，啲水度；有冇做過呢個？

答：即係我哋有分析過，即係相對個含量。咁如果由相對嘅含量嚟計呢，就如果你--就算譬如你話有晒啲焊料，淨係啲 fittings，咁應該就唔--應該達標嘅。

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問：應該達標？

答：即係我--應該達標。

問：咁大概幾多嘍呢？個 range 係幾多嘍呢？

答：呢個應該係細嘍嘞。即係 WSD 嘅 task force report，佢本身做咗個計算喇，就即係佢證明咗好低，咁但係...

問：明白。

答：即係我哋呢個，因為我哋主要係想顯示即係個校準，個 calibration，同埋個 prediction，所以就可以做。我哋--但係我哋估計--即係由我哋做嘅估計就應該就好細，應該好細。

問：大概呢？我想知道。

答：我答唔到你，我諗幾--即係--我答唔到你，因為都會睇--即係簡單嚟講，大律師，就因為喺個供水系統，你究竟有幾多鉛呢，其實就好多 uncertainty。即係我只可以話一個範圍。

問：可唔可以話去到微不足道呢？又有咁低，係咪？

答：要睇情況，因為--因為點--點講呢？因為你亦都有啲化學作用，即係有啲 organic corrosion 嗰啲就，變咗就你真係好視乎嗰啲 sources，但係總體嚟講係低嘅。

問：低。但係亦唔可以唔理佢嘍，係咪？

答：但係如果啲 fittings 合規格，就會好低嘅，因為事實就應該好低。

問：但係我哋又唔知道啲 fittings 有冇唔合規格，我哋唔知嘍；你唔知喇，嘍。

答：嘍，即係唔--咁應該可以...

問：因為焊料含鉛同唔含鉛個結果就爭好遠吓嘛。

答：係。

問：咁如果啲 fittings 含鉛同唔含鉛嘅，係咪爭好遠呢，你知唔知呢？

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答：但係即係就算你係--應該就由水務署個 task force report 嚟睇，就算你--即係喺佢哋嗰三個單位出嚟都超標㗎嘛，有啲 alloys 嗰啲，嗰啲 fittings，都係係 minor 嘅，即係主要嘅。

問：Minor，okay。咁我或者問佢哋喇，okay。

答：即係唔係主要。

問：仲有一度嘞，如果佢真係用--駁啲水喉，或者啲 joint 嗰度嘞，如果佢係用含鉛嘅焊料，啲工人係用嗰啲嘅。咁如果一個技工，一個好熟手同埋一個做得唔好嘅，會唔會有唔同呢？即係 workmanship 嗰度會唔會有分別呢？

答：因為即係我哋就去--即係因為呢個 review 就去 Construction Industry Council，就安排嗰個 demo 畀我哋睇嘅，咁我哋亦都...

問：我都睇過，係...（聽不清）睇。

答：即係有。所以即係係似乎 workmanship 係可以影響到有冇鉛嘅度嘅，呢個要。

問：Okay。譬如啲水喉最長係幾多㗎，copper 啲？即係有時佢太長嘞，要駁埋㗎嘛，兩枝駁埋㗎嘛，就算打直都要駁嘅，係咪？

答：係，係，係，係，係。

問：若果轉彎就要有另外啲水喉做喇。

答：係，係，係。

問：咁最長一條知唔知呀，水喉幾長？

答：我諗都...

問：你唔知，唔緊要嘅。

答：你諗都五、六--因為我諗--喺 corridor 都見到，嚟到五、六--五米嘍都有喇，即係一條 one length 都有。

問：Okay。我見佢呢，佢就焊嗰陣時就擺啲焊料喺嗰個水喉出面，咁跟住燒咁樣，咁然後遲一步就兩條接埋咁樣㗎嘛，係咪？

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答：係，係，係，係，係。

問：咁點樣會走咗入啲水度呢？

答：唔係，即係佢啲啲 solder 係...

問：啲 solder，係喇，係喇。

答：即係佢個 solder 會--即係你會--譬如你用多咗，或者你駁嘅時候，你所有 coupling 都係，如果你 manual，都會有唔一-- exact alignment 啲嘛，都會有節，係有嘅會。即係你好似以前你駁口，你可能唔係用鉛，你用啲啲叫做 coupling 咁，咁你都會 sit 入去㗎，任何嘢你都。

問：即係睇個水喉裏面喇，佢裏面咁樣糝埋咗喇，咁啲水流過呢就一定都係--大家都知道，一定會 leaching 嘅，係咪？即係多少嘅問題嘅啫，如果你用咗含鉛嘅 soldering，係咪？

主席：都唔一定個喎。

答：係，唔一定嘅。

主席：唔一定。

答：係。

問：但係你頭先你話如果個手工唔好呢就會。

主席：就會嘞，係呀，啱。

答：應該係。

問：Okay。咁而家你今日你就--今朝早講嘅口供，係當房署嗰度個大律師問你嘅，你就話水務署嗰度係做百分之4嘅水辦嘅啫；你記唔記得？

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答：係。

問：咁就所以你就話唔能夠係反映到個含鉛幾多，係咪？

答：唔係，即係始終係一個--即係我嗰陣時係想解釋點解去做比較目標性嘅取樣，就因為你始終係因為細，喺個 sample，攞個 sample，咁樣。即係咁樣解釋。

問：好細咁樣。好嘞，咁你哋呢，你哋係要做咩，咁你哋係抽水辦呢，係百分幾嘍呢？人哋就百分之4喇。

答：好細嘍咋，我哋好細嘍咋，因為你一座樓，...

問：個時間問題。

答：...我三個 flat。我一座樓，你有八百個 flat。即係係我哋每一座樓都做，但係 random 做。

問：即係細過佢百分之4囉嗰，係咪？

答：咁你--係喇，即係你係...

問：Okay。

答：即係你...

問：但係我--我唔係批評你，因為你又要快，啲錢又唔係咁多。

答：係。但係因為我--我諗我想提出，因為我唔係 statistical 嘍嘛，我係 deterministic 嘍嘛。我係 plan，我 targeted，有 theory 嘍嘛。咁所以完全唔係話我哋走去街我隨便取樣。咁所以即係嗰個，我諗係唔可以一概而論，大筆師。

問：Okay。咁你就跟住個口供度講，都係答緊房署嘅大律師嘅時候，你話「是否對我有毒呢，係答唔到呢個問題。」我用中文寫住嘅；你記唔記得咁樣講？你話--即係啲水 check 出嚟，「是否對我有毒呢」，咁佢做啲水辦，即係...

主席：唔係，咩嘢 context 呀，Mr Lee？

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李柱銘先生：係，佢即係就係話嘞，就係講開...

問：房署嗰 4 個 per cent 嗰度，咁跟住你就話「是否對我有毒，答唔到呢個問題。」或者我 gen 個 context 畀你都得嘅。而家，而家，調查委員會就一路要研究呢個問題嘞，如喺公屋裏面住嘅居民嚟講，佢就好緊張個嗰--我唔理你咩嘢數，係咪？佢最緊就話「喂，阿 Sir，咁我而開水喉攞嚟煲水或者煮嘢食，有冇毒先？」咁點樣答呢，呢個題目？你答唔答到佢呢？

答：即係我唔敢答呢個題目。

問：係嘞，係。

答：但係即係我就會咁講，即係我覺得就係因為--即係通過呢個調查，都係一個有限嘅調查啫，即係可以反映相--即係相對嚟講反映個問題。首先，即係我哋話一致--即係總體嚟講同--其實 WSD 佢度出嚟，邊啲受影響，邊啲唔受影響，總體係有一致嘅。但係我諗我哋嘅 sampling 做到咩嘢呢，就係相對邊個緊要啲，邊個唔緊要啲呢，就比較可能準確咁可以睇到個 maximum 嘅 lead exposure，因為--即係我始終覺得你 maximum 唔知，你好難知個 mid，即係講話。

咁至於你話有冇事呢，咁我--即係有冇--譬如舉例，譬如舉例，咁你呢啲都係一個--一個參考啫，即係唔係話，因為好可能都係好少數嘅 sample。總體點做，即係都要咩嘢。咁但係你睇到有啲--相對嚟講有啲風險比較細嘅，我哋睇，即係呢個有啲，相對嚟講即係就風險--即係真係你點度都有乜嘢嘍嘛。

問：咁有啲...

答：咁即係我覺得呢啲就風險好細嘅。

問：但係如果係嗰啲頭啖水嗰啲又唔同嘞，同埋嗰啲 affected 嗰啲，而家有影響到嗰啲，啲啲屋邨裏面，咁一開個水喉就攞嚟飲呢，肯定唔穩陣喇，你唔會叫佢咁做喇，係咪？

答：但係呢個...

問：都可能個別冇事嘅。

答：係，係，係，係。但係即係呢個我諗我哋想喺呢度提出嘅，大律師，

就話即係如果你想量化呢樣嘢，即係我就琴日都其實想帶出呢個觀點，就話我哋而家就有一個即係相--有科學基礎嘅估計嘅 instant weekly intake，即係呢個。因為--咁你譬如--我琴日都講過，譬如話你當佢英國個啱，譬如咁講，得 14 個 per cent 人真係用呢啲水嚟飲用，okay。咁你譬如一個 adult 嚟講，譬如一個成人嚟講咁，咁我就--如果我會點睇呢啲 figures，就會話將呢啲 lead intake，我咪乘 0.14 囉，呢個係 average 嘅。即係對成人嚟講，呢個 intake。但係對 infant 嚟講就另外一個，因為我講 determine the user，決定是邊個用家，有少少唔同。咁所以如果譬如我住喺屋邨，而家假設我如果住喺屋邨，我會點？即係我覺得嗰個 average exposure to the adults 就會係 something like 0.14 乘 lead exposure。咁但係你睇 0.14 乘 lead exposure 都要--個別都會超標啫，咁就我覺得嗰啲就真係要重視囉。

即係都仍然一個好細 sample 之嘛。咁但係即係就算好細嘅 sample，我諗都反映到少少嘢，即係咁。即係我會咁睇個問題喇，大律師。即係我唔知有冇答到你個問題。即係變咗就話，即係嗰六個，我哋大家都知要正視呢個問題。咁點處理，咁即係有好多細節喇。但係即係 in terms of lead contamination，如果你話要有一個 reference point 呢，咁呢個數據係一個 reference point。

問：但係一個普通嘅居民嚟講，佢唔知㗎嘛。譬如你任何一條屋邨裏面，個居民，除非佢上網，睇到啲資料，知道佢嗰個 block line unaffected 嘅，咁係應該穩陣啫。但係應該穩陣啫，都唔係絕對㗎嘛？因為分分鐘佢嗰個 block 係有人驗過啲水嘅機會係好細個啫，比較起上嚟，係咪？任何一個 block 都係。

答：唔。但係我諗就基於啲資料，我相信吓，即係有個--基於啲資料，水務署同房署應該，應該，會掌握到個情況，即係應該做出適當嘅應對。

問：唔係，其實好簡單啫，你每一個 block 你都去做，做到相當足夠嘅水辦，咁啲居民就會安心好多囉。

答：即係呢個就--當然，即係譬如你喺第二啲國家，個職責，即係可能即係個 owner 或者點，即係唔同嘅人，邊個做喇。但係即係我想講，大律師，就係做呢啲水辦，始終你係一個 finite，...

問：梗係喇。

答：...small sample，同埋因為都--一個 reading 170 釐嘅。

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問：嘎。

答：係，咁你即係--即係如果你 commercial 做可能貴啲。

問：你講一個 reading，即係要幾多嘢喺度？

答：唔係，你度一個...

問：哦，度一個水辦。

答：170 釐啲。咁即係呢個仲係--唔知--我唔記得係咪 discounted rate，即係。但係我個意思就話係--因為為 chemical analysis 係好貴，亦都係 labour-intensive。

問：明白。

答：所以即係我就--嘎。咁但係我諗呢個應該可以答--即係回應到你嘅問題嘅，即係我覺得即係呢個。

問：當然我明白你講話係好貴嘅，咁但係就我哋個政府係相當多錢，好彩就。我想你睇一睇--我想你睇你個報告第 163 頁。

答：係，係。

問：係嘞，你睇到“APPENDIX IV”，“Sampling Protocol”嗰度。咁你睇下“Introduction”嗰度，咁你就話嘞--第三行，你就話點解你要做個 field sampling 呢，個目的就(i)就係--我就唔係特別睇。即係(ii)喇。(i)有喺度嘅，不過我唔讀嘞。

(ii) 就係話 “a basis for general health risk assessment.”

咁所以你就跟住自己話做咗幾多嘞，係咪？

答：係。

問：咁所以你係從個居民個健康個角度出發嘅，其中一個月的就，係咪？

答：係，係。

問：所以係因為咁呢，你亦講到個題目，今朝都有提出嚟，「係咪是否對我有毒？」呢個就正正就係健康嘅...

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主席：有害喇，唔好講有毒。

答：有害，有害。

主席：有害。

李柱銘先生：有害喇，係。

問：咁呢個就正正就係你要搵出個風險，係咪？

答：係。

問：係高或者低咁樣嘞。所以--咁而且--譬如你話 WHO，咁個個“H”都係 health 喇，都係睇全世界啲人嘅健康㗎？

答：係。

問：係咪？

答：係。

問：咁所以我哋喺呢個問題，因為我代表就係食水苦主呢班人，咁所以最重要嘅就係飲啲杯水，頭先你飲杯水，係咪安全嘅，係咪？以前有好多人話畀我聽係可以開水喉水就咁飲得㗎嘞，而家你覺得仲係咪一樣呢？仲係咪即係一開水喉水就擺去飲呢？

答：即係我都有--我通常咁多年都係煲水嘅。...（聽不清）習慣。

問：我聽到。

答：即係我有變到，其實習慣。

問：Okay。咁就因為微菌啲嘢，就煲就可以殺咗佢。但係如果係講到鉛，就有㗎嘛，係咪？你專家話畀我聽有用嘅。你用滾水就仲死。一開水喉啲滾，喺啲飲就仲大件事，係咪？

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答：係，通常開凍水就煲。

問：Okay。咁其實如果某一個人住喺公屋某一個單位，佢話畀你聽，「嘩，你係專家。我係住呢個單位嘅。咁我而家--因為我屋企嘅習慣呢就係朝頭早一起身呢就開個水喉，又或者係煲滾啲水，跟住用嚟嘞，成日都用啲啲水嚟嘞；或者煲粥呀啲啲，用嚟食嘅。」咁同另外一個人係完全唔同嘅。嗰個人根本就係有一排至開個水喉，甚至一開水喉佢就洗琴日啲啲碟，啲啲碗碟。如果你洗啲啲碟，然後攞嚟飲，就有問題喇，攞嚟食都有問題喇，係咪？咁其實你要知道呢個人咩嘢習慣，但係你唔可以話每個人度身同佢做一套嚟嘛。咁你哋就要睇大圍嘞。你個--其實你做呢個抽水辦都係咁樣嘅意思啫，係咪？

咁但係睇到你啲水據--或者我想你睇住嗰度喇。睇 21，21 段，第三行嗰度，你話話 "In about 37 per cent of the cases in which lead was detected, the maximum concentration is observed in the first draw sample ..."

咁呢度即係最高含鉛嘅係 first draw 嘅只係百分之 37 嘅啫，啱唔啱？

答：啱。

問：跟住 "... followed by a monotonic decrease in the subsequent samples (at ..." 二十個 seconds、四十，一路咁咁喇， "... In other cases (around 63 per cent), the maximum concentration is detected in the second sample at T equals 20 seconds, followed by a sharp decrease."

咁即係所以第二個水辦，即係由零至二十秒嘅，就反而又 63，百分之 63 咁高啫，係咪？就係頭先我哋講話可能就已經 pick up 咗啲 meter 嗰度嘅。

答：係呀，係。

問：喺 water meter 嗰度啲啲嘞。

答：係，係。

問：你要講係或者唔係嘅，因為唔係，個紀錄有啲嘅。

答：係。

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問：Okay。我要答我啲題目，唔該，okay。

答：係。

問：係。咁樣所以如果你個目的係想搵每一間屋裏面嗰個廚房嗰個水喉幾時係含鉛量係最高嘅，咁而家照睇就係應該由零至到四十或者至到三十九秒，加埋就好多㗎嘞，係咪？

答：嘎，嘎，嘎。

問：如果跟住嗰啲，譬如用第三次嗰啲，即係六十-- sorry，四十；四十、六十、八十嗰啲，嗰啲真係好低嘅，點都好低嘅，就算有鉛嘍水都好低嘅，啱唔啱？啱唔啱？

答：係，係，一--一般係可以咁講，一般，一般。

問：好嘞，咁但係有一度我就想你幫一幫我嘞。咁如果你--因為你去做呢個實驗，抽水辦嘅時候，有幾樣嘢你大致上你都知道㗎嘞，因為已經係發生咗好多嘢。水務署亦做咗好多調查嘞，個 task force 又出咗 report 嘞，係咪？啱唔啱？咁你知道起碼係政府嗰方面已經覺得係有啲公屋點解有鉛呢，係超標呢，就主要都係因為用咗嗰啲含鉛嘅焊料，啱唔啱？你知道，講--唔該你話...

答：啱，啱，啱。

問：係，唔該，okay。咁同埋就所以你睇嘅時候，嗰個範圍係窄咗㗎嘞，已經；唔係話一開頭都唔知喺邊度嚟咁樣嘅，係咪？

答：係。

問：係，好嘞。咁而家你做做吓你就知道囉嗰，T 等如零嘅時候，去到 T 等如十九，或者 T 等如二十，到到 T 等如--去到 T 等如三十九，已經係--如果你話鉛，含鉛最高，就應該擺到㗎嘞，係咪？如果我想搵 maximum 咁嘛，含鉛咁嘛，你咪擺兩個水辦已經擺到㗎嘞，啱唔啱？

答：唔係，我呢個唔可以答...

問：除咗有例外，除咗有例外。

答：...--唔可以答係抑或唔係，呢個問題，就因為--因為你可以話即係--即係你可以話係有啲--即係喺呢個數據就係有啲情況下就係第二個水辦，即係二十個 second，就係最高，即係濃度。咁但係呢個

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亦都決定於我取樣個 volume。即係唔係淨係時間。即係譬如舉例，我譬如話如果我 follow 你個諗法，咁我可以話我直情攞個大桶，一路二十個秒，我諗我呢個。咁但係你度出嚟個濃度都--即係可以咁喇。咁但係你度出個濃度就會係一個平均囉，即係可以咁講。但係--係我--即係你想--李生，你想.....

問：我想喇，如果...

主席：唔係，佢想--佢嘅意思即係話用你嘅方法，直情係用你嘅方法，咁樣樣去到零同埋二十，其實即係呢兩個數據已經 capture 到個 maximum 嘅 lead 嘅 concentration，係絕大部分嘞。

問：第一、第二，第一、第二個水辦。

答：係。係，係，可以--係，係，係。

問：當然另外一個做法就搵個大啲嘅，容量大啲嘅，去抽水嘅時候，就直情由零開始個水喉，一路開，開到三十九秒或者四十秒就停嘞咁樣，咁就包晒喇，啱唔啱？即係最高含鉛嘅水已經喺嗰度嘞，啱唔啱？你吸頭唔得嘅。唔該講一講。

答：唔係，我睇緊，我唔係，大律師。因為你就咁睇啲數據就有啲 T 等如四十都好高嘅，有啲 T 等如四十都好高嘅，亦都，所以...

問：唔係，有啲係因為有啲 particles 喺度喇，係咪，可能係？

答：嘅。

問：我一陣間啲我再問你。啲啲我當佢係特別嘅處理嘅要，okay。

答：係，係。

問：但係你淨係水啲啲你就--就啱喇，係咪？

答：係，你講得啱，係。

問：咁你會攞到幾大嘅容量呀？要幾多個 litres 至可以載到呀？第一同第二。

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答：因為你--你睇 figure 1，你譬如第二咁，你...（聽不清）都幾個，4、5個 litre 嘍，都4、5個 litre，五個幾 litre 嘍都。

問：哦，即係想第一、第二兩個加埋。

答：係，都，因為開好耐。

問：Okay, okay。咁我就想問你呢度嘞，跟住--第一、第二就已經--如果係含鉛嘅，啲水有。如果係冇鉛就點都有事嘅，係一、二、三、四、五都有事嘅？

答：唔。

問：啱唔啱？如果含鉛嘅時候，就一、二個水辦就已經差唔多可以話處理晒嘍嘞。剩番第三個水辦、第四個水辦、第五個水辦就真係好低嘍嘞，啱唔啱？同意吓嘛？

答：同意。

問：好嘞，咁如果你又目的就係想搵最高嘅含鉛分，點解你仲要第三、第四、第五呢？因為你用咗第三、第四、第五就拉低咗嗰個含鉛量個囉嗎。你加埋要除五吓嘛。

答：但係因為我哋做呢個 sampling 嘅時候唔知嘍嘛，唔知嘅，成個件事都唔知。同埋個個單位都有啲唔同嘅情況。所以一般嚟講，即係基於所有啲數據，譬如舉例，WSD 啲數據，都做幾分鐘嘍嘛。咁所以呢個係我哋即係計劃係係一個 part of --即係係一個 sampling protocol 嘅一部分嘅計劃，咁冇乜--但係就算我哋再做，都會可能都係咁做。即係唔話你--因為你有太多未知數。咁譬如你--同埋你一個做呢啲取樣，就頭先都講好貴、好 labour-intensive，所以你唔想 miss 咗，你唔想 miss 咗，所以個個嚟講對我嚟講仲緊要過，即係我--你譬如你兩個，咁兩個都 capture 唔到，咁你就睇咗成個計劃。所以...

問：係。唔係，我明呀。即係你早期，當你計劃，計劃呢個 protocol 嘅時候，你用一、二、三、四、五，我完全理解嘅。但係當你攞到呢啲數據，睇到嘞，嘩，原來一、二已經夠個囉嗎，再攞三、四、五，再加六、七、八，就仲更加拉低咗嗰個含鉛量吓嘛，啱唔啱？同意吓嘛？

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黎先生：李大律師，會唔會你睇李教授嗰個建議，第 142 頁，根本佢亦都係建議係“flushing time in the order of 0.5-1 minute appears to be adequate for guarding against risks of lead contamination.” 事實上李教授都有咁嘅建議個嘢。

李柱銘先生：係，係。

答：係。

黎先生：會唔會係即係你嘅想法，係咪？

李柱銘先生：唔係，我即係話如果佢個目的係想搵任何一個單個水嘅含鉛量係最高嘅，咁你一、二就夠嘞，就高嘅。如果你加多三、四、五呢...

黎先生：咁佢所以咪建議咪半分鐘至一分鐘囉，佢咪建議。

李柱銘先生：係嘞。呢個兩回事。對唔住，係兩回事。

問：如果你教啲居民，「喲，穩陣呀，你逢係擺水用嚟飲或者食嘅時候，任何單位，你穩陣呢，唔該你開一分至兩分鐘。」

黎先生：佢唔使，佢話半分至一分鐘都夠喇。

李柱銘先生：係，半分至一分鐘都可能夠嘍嘞，係。咁呢度一回--呢個我同意嘅。

主席：係。

李柱銘先生：呢個我同意嘅。可能...

主席：唔係，你嘅意思即係你除五就拉低咗個 flat concentration，或者個 building concentration 就會拉低咗。

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李柱銘先生：係嘞，係嘞。

主席：咁即係換句話嚟講，原本 affected 嘅就變咗 unaffected 嘞。

李柱銘先生：係，主席。

主席：即係你就係同水務署就各走一端嘞，啱唔啱？咁我哋教授就中肯。

問：但係教授，你明白我個講法吖嘛？

答：明白，明白。

問：即係有--所以我頭先係有一句我唔想接受嘅，就係你話如果你再做都係咁嘞。因為如果你如果係早發現到嘅時候，你個 protocol 可以轉下嚟，係咪？因為點解呢？當係--因為水辦嘅問題，而令到一座樓本來就係受影響嘅，就可能因為加咗三、四、五落去就拉低咗，就變咗唔受影響。咁嗰個後果就非常嚴重嘞，都，嗰個 block 裏面住嗰啲人嚟講，同埋埋啲細路仔嚟講；你明我意思嘛？當時你唔係有心嘅，okay，但係個後果就係咁樣。

答：李大律師，呢個就亦都我都唔係完全同意個後果係咁。因為我如果有五個數據，可以睇吖嘛。你有得睇吖嘛。咁你咪選擇喇。但係--即係通常就如果冇事嘅單位，就真係好清晰冇事，即係似乎嘅單位。咁所以除咗個別嘅單位之外，就我睇唔到即係你講嗰個現象就似乎--即係你嗰種危機似乎就唔存在，即係就咁睇啲數據，即係。

問：如果 affected 嗰啲就唔存在，因為佢已經 affected 喇嘛。但係嗰啲 unaffected 嗰啲呢？譬如...

答：Unaffected 都大部都係幾清晰嘅；即係就咁睇，就大部分都幾清晰嘅。

問：但係你都係驗好少之嘛，unaffected 嗰啲；你都係抽樣去驗。你睇到佢，而啲數據幾多嘞，佢 flush 完，然後至攞啲數據，都相當高，未去到世衛嗰個標準，即係未唔合格，但係都相當高嘞，咁你咪去查囉。咁若果查完之後，一、二之後，你又加多三、四、五，咁就可能影響到本來佢應該係 affected 嘅，而家變咗 unaffected 嘞嘞。我嘅意思就係咁呀。你明唔明白我個邏輯呀？

答：明，我明，但係你可唔可以舉個例子呢？

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C 問：例子，我有；但係我先問你個原則先。

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答：係。

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主席：有嘍，應該有機。

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李柱銘先生：有，有機會。

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答：係，有機會，係，有機會。

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主席：有咁嘅機會嘅

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答：有機會，但係少數。

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主席：不過個問題係咁嘅，李大律師，個問題係嘞--即係我完全明白你嘅睇法，我亦都明白佢嘅睇法。咁究竟實際上你要點樣樣界定“affected”抑或“unaffected”，...

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李柱銘先生：唔，呢度呢個問題...

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主席：...基本係一個 political decision 嚟嘅。

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李柱銘先生：係，係呀，係。

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主席：就唔關...

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答：係。

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主席：...--唔關教授點樣樣決定。

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李柱銘先生：唔關佢事。唔係，...

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主席：係呀。

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李柱銘先生：...但係當某人決定咗，做咗呢個政治嘅決定之後，...

主席：係呀。

李柱銘先生：...咁佢就--咁樣就算我跟番佢呢個決定，跟番佢嘅原則去做，咁已經有--應該入咗去 unaffected--已經做咗 affected 嘢啲，而家都變咗 unaffected 咁嘛，我跟番佢嘅標準。

主席：咁佢如果佢話「我係都唔改」，咁你都奈佢唔何嘅。

李柱銘先生：咁惟有上街囉。

主席：你明嘛？因為...

李柱銘先生：我明白，我明白。

主席：係囉。因為 scientifically 李教授就係咁樣做，咁你可能話「啊，我哋唔係好鍾意佢個 sampling protocol 或者咁嘅計法，因為咁樣出嚟有你嘅效果。」不過 on the same token 就係佢哋嘅計法，係咪？咁佢哋又唔鍾意你嘅計法。

李柱銘先生：唔係，但係呢個李教授根本係完全唔同意佢哋嘅計法㗎。

主席：諗...

李柱銘先生：佢做唔到咁嘛，佢話 first-draw 唔要咁嘛，佢嘅 report 好清楚。

主席：呢個我哋遲啲再討論喇，但係你想問嘅問題就係，你問李教授，其實李教授又答你唔到。李教授嘅意思就係話「我做咗五個--我做咗五個 samples 出嚟嘞，喺，呢啲就係啲 datas，你哋各取所需嘞，你哋鍾意點樣用，就係你哋。你用嘅方法又唔同，佢用嘅方法又唔同，不過客觀就有呢啲咁樣嘅 data 嘞。」

李柱銘先生：唔。

問：但係我就想加落去，所以而家我睇完你咁樣做，一、二、三、四、五，你亦同意咗我個邏輯，你明白我嘅邏輯，一同二其實就已經夠嘞。同理如果淨係用一同二呢，就唔會畀三、四、五嚟摳淡咗，咁就會影響到嗰個樓宇係 affected 定係 unaffected，你同意咗呢個邏輯。咁

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其實唔使你哋去做，任何人做，條數都計到出嚟㗎，淨係攞一、二、五咁咪得囉，係咪，睇住啲數據？啱唔啱？咁就跟住去做嗰個政治決定。唔需要你做嘅，大家都有數據，可以自己做㗎嘛，咪擱咗個三、四、五出嚟囉。你...

主席：但係而家佢水務署，佢直情係話「你一、二、三、四、五都唔啱咗嘛」，係咪？

李柱銘先生：係呀，係呀，係呀。咁...

主席：係呀。

李柱銘先生：所以咪有兩個專家話佢哋唔啱囉。

主席：唔係，即係唔好理佢先。即係譬如好簡單，我假設我聽日叫李教授，「你去全港屋邨做晒所有嘅 sampling，跟番而家個 protocol」，出咗嚟嘅 result，佢都唔承認個嘢，水務署？

李柱銘先生：未必，因為某君已經係退休咗嘞。

主席：唔係，唔係，佢都可以唔承認個嘢。

李柱銘先生：係，可以，可以。

主席：係咪？

答：唔。

主席：因為佢話你個 sampling method 錯咗嘛。所以其實個問題，就係究竟你點樣樣界定 -- 即係你個 "affected" 同埋 "unaffected" ...

李柱銘先生：係嘞。

主席：...究竟係點樣樣去界定咋嘛。

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李柱銘先生：我而家唔係想...

主席：唔係，站在--我同意，站在你嘅--即係譬如好簡單，黎生朝頭早起身煲水嘅，佢嗰個方法就絕對係--佢就一定係 affected 㗎嘞。如果我就 5 點鐘，晏晝先至起身嘅，咁我就一定係 unaffected 嘞，係咪？咁呢啲...

李柱銘先生：應該調--應該...

主席：...對於唔同嘅人嚟講，就會有唔同嘅結果。

李柱銘先生：係。不過應該調轉先啱，因為你係法官，唔可以 5 點鐘起身。係，不過我--不過我知道主席同埋委員你明白我個意思就得嘞。

主席：我明白你嘅意思。係呀，我明白。

李柱銘先生：嘎，嘎，嘎。

答：係。主席，可唔可以...

主席：係。

答：你頭先啱啱補充，其實我想...

問：係，好。

答：你有提出一個好好啟發性嘅問題，即係我想補充--一個補充。

問：好呀，唔該。

答：補充，我就用一個例子嚟補充，就係我哋去睇欣安樓--欣安邨，欣喜樓 206 室。

問：第幾個圖呀？定係啲...

答：即係我呢幅。

問：哦，你畀佢得㗎嘞。

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答：欣安--即係呢個表，欣安--欣安。173.2，欣安。係，173.2。173.2，就欣安邨，欣喜樓，中間嗰度。

問：係。

答：咁就 206 室。

問：206 係第一個？

答：係，206 室。即係我想用呢個例子嚟講一講嗰個--嗰件事，即係亦都反映你個嘢。譬如呢個例子，就頭啖水係四個單位，第二啖，十八，咁即係如果你--呢個就即係同今早王大律師講有啲關係。因為呢個就我意思唔係淨係--有個時間，亦都決取於你個 volume。

問：係吖。

答：如果簡單嚟講，就其實就係一個 first draw of 1 litre，可能就解決--即係你嘅提議就基本上就話，哦，最壞嘅情況就係 first draw of 1 litre，咁就 rather than 兩個 sample。因為你兩個 sample，亦都唔單只係時間，亦都取決於你嘅容量，你嘅 sample size。即係譬如你呢個，如果我假設，如果我 0 同 20 sample size 一樣，咁你除 2，咁就僅僅...

問：都過？

答：嘍，嘍，但係你個 flat 就唔過。即係證明你即係話--即係你頭先 make 個 point，即係我想講就係話，即係個 flat concentration 呢個唔過㗎嘛。但係一樣我想 make 個 point，就話你唔係淨係時間，你同個 volume 有啲關係。所以就唔係淨係話頭兩個辦就得，因為你要--始終係即係反映個 volume。

問：但係你個 volume 嗰度，因為你咁樣做法係反映唔到個 volume，係咪？

答：係。

問：係囉，咁我惟有跟住你呢度睇嘅啫。

答：係，即係我想即係補充一個，所謂。

問：係，明白。好，唔該。

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答：呢一條，即係。

問：你嘅口供同埋你嘅嗰個報告，都有講到有啲係單一嘅。

主席：唔係，我想問一問李教授，係咪即係咁嘅意思，如果用頭啖水，一開始就已經用 1 litre 嘅 sample size 嘅話，其實得出嚟嗰個 affected 嘅單位其實個數量係會仲多呢？

答：應該就會一致嘅，因為其實呢個表--即係其實呢個表嗰個... (聽不清) intake 就間接就係 first draw 1 litre 嘅。

主席：唔，唔。

答：間接就係 first draw 1 litre。如果我哋睇呢個表，最後個 column 同其實 flat concentration 都幾一致。因為我諗係會--唔會話睇好遠。

主席：唔會有分--唔會有好大嘅分別，得。

答：唔會㗎。即係唔覺嘅。

問：Okay。我而家就跟你個報告書嗰啲短嘅問題問你，okay？你睇下你個報告書，唔該。第 7 段個報告書，因為頭先我已經問咗你啲題目，所以呢度就好快就。

第 7 段，你個報告書。

"As this review progressed, it became clear that an independent field sampling of drinking water at the affected [public rental housing] estates would be necessary."

即係本來你開始嘅時候，你有諗住自己係 take sample 嘅，啱唔啱？一開始做嘅，即係做得...

答：開始冇乜成見。即係冇乜話想--冇乜特別嘅諗法，開始就。

問：就做做下，你覺得唔對路，要做嘞？

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答：可以咁講。

問：係。

答：係。

問：因為--係咪因為佢哋水務署嗰度係冇做 first draw 呢？主要係咪呢樣嘢？

答：都唔係完全，即係係因為你唔做--正如我所講，因為所--好多啲--你睇啲 guideline 都係...

問：要做嘅？

答：...tight to 你個 mean exposure 咁嘛，mean exposure 你點都有個全面啲嘅了解。

問：係，係。Exposure，其實就即係居民會受--唔係，受害，係咪？嘅可能性，嗰個角度睇？

答：即係 health 嘅 aspect，即係。

問：Health 咁樣嘅。

好，咁你跟住就“The lead concentration measured on the 1,325 drinking water samples in the 11 'affected estates' are all based on 'fully flushed samples' (ie for each flat, a 250 mL sample was taken after flushing the tap for 2-5 minutes). While this sampling method provides a measure of water quality of the bulk water supply, it does not reflect the actual and sometimes high lead concentrations to which the residents are exposed. Such data does not provide an estimate of the mean lead concentration used for drinking and cooking, nor an adequate basis for assessment of health risks.”

你呢句就其實即係話，如果你--水務署嗰度，連嗰個頭啖水都唔驗，就有呢個問題嘞，係咪？即係對 health 嗰度有問題，啱唔啱？

答：係，係。

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問：“This concern on the inadequacy of the sampling method adopted by the Water Supplies Department was expressed in the joint expert report ...”

可惜你哋嘅 joint expert report 出咗之後，佢哋仍然繼續堅持唔肯驗，所以到到而家頭啖水佢都未驗過。你知唔知呀，到而家為止佢都未驗？

答：呢個唔知。即係佢--水務署做啲嘢唔知，唔知佢做乜。

問：第 10 段，我想有一啲嘢問你嘅，唔該。我唔想睇時候，淨係睇尾尾個三行。呢一版，133 版尾尾個三行。而家你去做囉嗎，你做之前，就要去啲--話聲畀啲居民要準備。

“The sampling was carried out in the early morning (between 6.30-9.00 am); the resident was informed by HD staff to flush the kitchen and wash basin taps the night before the sampling for 5 minutes before going to bed, and not to use the kitchen tap afterwards before the sampling. The tap flow rate was also measured.”

呢度你就--譬如你聽日就去驗，你今晚就房署個度就有人去，就叫--教個個人，「你臨睡之後，就 flush 咗佢五分鐘添」？

答：嘍，五分鐘。

問：呢五分鐘即係係咩嘢意思？即係洗乾淨個水喉裏面個啲嘢，係咪？

答：嘍，嘍，嘍。

問：譬如佢有時有啲咩嘢，叫做 screening 個啲嘢，相對係咪要擺出嚟，通常？

答：佢哋會擺走嘅，佢哋會擺走，房署。

問：咁樣係好乾淨好多，即係準確好多，但係就唔係個個居民嘅習慣個囉嗎？佢平時唔會臨啱啡五分鐘水啲嘛，喺個廚房個度？

答：但係因為--點解我哋要咁做？因為要 make sure 個個供水鏈係即係冇乜唔正常嘅情況。

問：係，明白。

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答：係，即係咁。

問：即係你要為嗰個驗出嚟嗰個結果係準確啲，呢一步係值得做嘅，我同意嘅。

答：係。

問：但喺個居民嚟講，反而就攞唔到佢嘅真實嘅生活狀態，你明我意思嘛？佢唔會啡㗎嘛，如果積埋啲嘢喺度呢，第二日都會有啲嘢喺度？

答：但係因為如果正常嘅情況，係不斷用水㗎嘛，不斷用水，個水喉就不斷有水流。

問：係。

答：所以就你正常嘅情況就唔--即係佢會有一個自動嘅 flushing。

問：㗎。但係佢不停咁有水流，都係不停係冇經過任何一晚係開足個水喉五分鐘㗎嘛？

答：但係應該就即係不停--如果一個普通嘅 house，不停咁用，就應該係有一個 flushing 嘅作用嘅，因為你...

問：但係你而家就係想搵啲停咗落嚟嘅水要幾個鐘頭嘅，咁然後至搵到 first draw 個問題㗎嘛，係咪？

答：係，係。但係即係我哋而家呢個情況係最壞嘅情況，即係如果你不停咁樣用。正如你所講，係會有唔同嘅 stagnation period，但係我哋而家係 overnight 係最長嘅情況。

問：咁但係你...

答：即係一個比較...

問：係，但係你呢個唔係--你呢個已經唔係個--點解？平時普通一個家庭，佢煮完晚飯，洗埋碗，我諗 8 點、9 點之中可能已經係--夜晚吓，8 點、9 點可能已經係最後用嗰個廚房水喉嘅時間㗎喇。

答：係。

問：咁就由嗰個時候一路去到第二朝早，隔夜水就係咁喇。但係你而家唔係，叫佢臨訓就啡五分鐘㗎嘛，咁臨訓譬如 12 點鐘訓，咁已經遲咗幾

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個鐘頭個囉喎，你明我意思嘛？即係嗰度...

答：即係唔係--你意思唔係最壞嘅情況？

問：係，係，係。

答：嘎。

問：即係喺--對嗰個家庭嚟講唔係最壞嘅情況，呢個邏輯嚟嘅啫。

答：但係佢--即係我睇番啲表--填番啲表，咁有啲人就好早個喎，即係好早就--9點、10點就咩嘢，就做，所以睇個單位。

問：你嘅表--你個啲表，就係嗰啲房署最近嗰啲 question 問完個啲，係咪？

答：唔係，我哋嘅。

問：你自己？

答：嗰啲 question 係我哋嘅，我哋嘅。即係我問佢有冇開，咁都有小部分就即係唔記得咗咁都有嘅。

問：係呀，係呀。

答：但係冇乜影響個結果。

問：嘎。嗰啲係點嘅呢？即係你想講咩嘢呢？你想帶出一點咩嘢呢？

答：唔係，即係我話我哋有問佢，有問佢，即係一個 question，有咩嘢--「你前晚有冇問水喉？有冇？」即係有問嘅。

問：即係問佢琴晚？

答：嘎，嘎，同埋幾--即係大約有咩嘢唔正常即係需要知咁樣。

問：Okay，就係唔正常，我而家淨係問呢個問題。你叫佢夜晚臨瞓啡水喉就唔正常㗎喇，你明唔明呀？對佢嚟講。

答：係，係，係，但係呢個係一個特定嘅實驗嚟嘅。

問：Okay，我明白，我明白嘅。

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主席：或者我哋食完飯先至再繼續，好唔好呀？

李柱銘先生：好呀。

主席：好呀。

李柱銘先生：唔該。

主席：兩點半喇。

下午 1 時正聆訊押後

下午 2 時 29 分恢復聆訊

出席人士如前。

食水含鉛超標調查委員會的專家證人第一證人：李行偉教授（香港科技大學土木及環境工程學系講座教授、香港科技大學副校長（研發及研究生教育））宣誓繼續作供
李柱銘先生繼續盤問

問：返番去你個 report，唔該。你講過就係有時係好地地突然間“boom”一聲好高嘅，你記得咩，我唔畀啲例子你，你明嘅，係咪？

答：係。

問：照睇，Prof Fawell 就覺得可能係就係有啲 particle 出現，你記唔記得佢嗰段？

答：係，記得。

問：你又點樣睇法呢？突然間好地地，低低低低，“bup”一聲，跟住又低低低低，呢啲係咩嘢現象嚟嘅呢？

答：我琴日都講過，即係完全有可能一個 pick up of a particle。

問：如果 pick up 一個 particle，點解會咁樣嘅呢？係咪入咗去-- 嗰個 particle 入咗去個水辦度，然後係溶番落去，係咪咁呢，會唔

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會呢？

答：唔係，而係個水辦如果有--譬如個別有啲 particle，鉛嘅 particle，因為佢分析嘅過程就係用啲 acid 溶咗佢嚟嘛，所以你咪有鉛。

問：Okay，咁即係如果唔用啲--用啲咩嘢？加啲咩嘢？Sorry，你話？

答：Acid。

問：Acid，如果你唔加 acid，就會點呢？

答：（沒有可聽到的回答）

問：但係你驗親都要加 acid 嘅，係咪呀？

答：唔係，睇個 lab 嘅一般做法嘅，一般做法，但係我琴日都講到，就話似乎由而家嘅數據睇，就 both soluble 同 particle 都係高嘅，都係個鉛份都高。

問：我畀番你，頭先譬如低低，“bup”一聲好高，跟住又低低咁樣，係咪呀？

答：係。

問：呢個“bup”一聲呢個，你驗係咪全部都用啲 acid 去驗？

答：唔係，佢有一個過程，ICPMS 有一個過程嘅，有一個機器，有一個程序嘅。

問：係咪每一個，就譬如你五個 sample，一、二、三、四、五...

答：都係咁做嘅，都係咁做。

問：...都會 involve 啲 acid 嘅，係咪呀？

答：都會咁做，都會同一個程序咁做。

問：Okay，如果呢啲 particle，你知唔知如果食咗落個肚度會點呀？即係好多鉛嚟囉嗰，係咪呢？譬如攞去水嗰度，點樣好，或者食物，攞嚟煮飯食嘅時候，食咗落肚，變咗就好多鉛入咗去嘅囉嗰，比較上，係咪呀？

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答：我唔係醫生，李大律師，但係我就咁睇啲文憲，譬如 Prof Bellinger 嗰啲就佢總結就好多文憲都話係鉛就 accumulative，即係同 heavy metal，一般重金屬都 accumulative，所以你咪累積喺你人體嗰度。

問：都積埋入去，okay。

答：似乎佢個 effect 係 accumulative。

問：但係喺你哋做呢個咁嘅搜啲水辦，應唔應該點樣處理呢？譬如低低高、低低，你計唔計落去呢應該，定係撇咗佢唔理呢？

答：而家我哋就五個水辦都睇，所以點解我哋有一個所謂 flat concentration、building concentration，又 first draw，就係照顧到 first draw，亦都有一個總體嘅第二個指標嘅衡量，個原意係咁，即係...

問：即係你哋冇撇咗佢？你唔會撇咗佢？

答：冇，冇撇，冇撇到，冇撇到。

問：你認為撇又啱唔啱嘅呢？

答：因為你就算一個水辦都好，都代表有鉛喺度咁嘛，都代表有鉛喺度。

問：我個角度就係譬如如果有人食咗落肚，咁就「杰」㗎嘛，你如果撇咗佢，就好似冇咗呢件事嘅囉嗎？

答：係，係，係。

問：Okay。我想你睇 23 段，唔該你，呢度你係講開 flat concentration 嘅，睇唔睇到？

答：係。

問：第三行，okay，你跟住第五行嗰度就講--第四行開始嗰段，嗰句，“Based on the flat concentration”，53.2 嘅百分比同埋 58.2 個百分比“of the samples have excess lead (depending on 2 or 5 samples respectively) as compared to the 8.0% for the individual flushed sample”，點解有兩個 sample 同埋五個 sample？你應該五個㗎，但係你話你有啲紀錄，我睇到就有時又驗兩個嘅啫，係咪呀？

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答：唔係，琴日講過就係話有啲情形，尤其是因為成個 programme 嘅資源同時間嘅局限，大部分--你睇呢個表，大部分都係五個 sample 嘅，就有八十六個水樣就擺咗，但係就未分析嘅，所以因為擺咗未分析，我哋就--因為最緊要就係 0 同 40 嗰個，所以我哋起碼有兩個 sample 嘅，有啲水樣我哋得兩--即係有啲 flat，唔係水樣，有啲 flat 係得兩個水樣分析過嘅，我哋只有用兩個嘅 result，係一個目前嘅客觀情形下，我哋即係話 the best estimate，我哋可以擺到個 best estimate of flat concentration，即係...

問：但係你而家 23 段講嗰啲係咪全部都係 affected?

答：冇所謂，乜都係--即係主要係--即係所有啲 sample 都係，...

問：即係...

答：...即係有啲 unaffected，有啲 affected 嘅，...

問：即係擺咗譬如...

答：...應該譬如牛頭角下邨、元州，應該係分散嘅，我有記錯，佢應該，但係主要 affected 始終有五個 sample。

石先生：係講緊 173.17 嗰個 Table 5，即係 revise 咗個 Table 5。

答：係，係，係。

石先生：應該全部都係 affected。

答：Unaffected。

李柱銘先生：全部都 affected，okay。

石先生：十一個邨全部都係 affected，兩個、五個之分喺嗰粒星嗰度解咗，尋日我都問過。

問：如果係全部都 affected，咁就我就唔需要擔心，因為全部都已經 affected，你驗唔驗佢都 affected，okay，明白。唔該你去到 30 段。

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答：係。

問：睇睇嗰五行數上嚟，第 30 段。

答：30 段，係。

問：唔該。你就話“Given the mass of lead deposited in the components of the water supply chain it can be roughly estimated that it could take as long as 5-10 years for most of the lead mass to be leached into the water, especially for the pipe joints.”，呢個係...

石先生：Can I just correct a point of transcription, I said “all of them are affected”, not unaffected, for page 87 at line...

主席：應該係 affected 㗎嘛？

石先生：Affected。

答：Affected 嘅應該係。

問：呢度，呢個你話係會如果經五至十年，就會落--啲啲鉛就會入晒去啲水嗰度，係咪？你呢句咁講嘅。

答：係一個估計，因為喺個數據嘅基礎下嘅估計，係五至十年嘅。

問：你點樣估計到嘅？係你自己估計定人哋嘅估計？

答：呢個就係因為我哋就--呢個就有--就基於就佢 WSD 個 Task Force 有度過啲鉛嘅 deposit 嘅，唔同嘅配件有幾多鉛，亦都唔同嘅配件，佢哋有度過個 leaching rate 嘅，即係個 leaching rate 嘅，你譬如有--譬如舉例，10 個 milligram，咁應該 10 個 milligram 係鉛，你譬如話 200 個 microgram for 24 hours，即係如此類推，你有一個好粗略嘅估計，即係話喺任何佢 freely 釋放嘅情形下，都需要咁嘅時間，當然有好多化學作用冇考慮到，但係你都有一個--it's bounded, right, it's bound, 喺呢個情形下，似乎就五年至十年就係我哋嘅估計，roughly estimated, 呢個亦都我哋就

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講就好似--即係好似 2010 年之前嘅，相對嚟講，好似冇咁嚴重，即係似乎係吻合咁嘅意思。

問：我想你睇一睇 A2 915 版，第 915 頁。

答：915？

問：係，整上啲--再落啲，落到水泉澳 Phase 1 嗰度。

答：水...

李柱銘先生：主席，你介唔介意我坐低睇住嗰度？

主席：唔介意。

問：水泉澳即係第 4，上面數落嚟，係咪？第 4，第一行，水泉澳 Phase 1 嗰度，睇到喇嘛？

答：係，係。

問：即係嗰度“Ching Chuen House”嗰度，就有一個、兩個...

答：水泉澳。

問：四個 houses 嘅，你睇到喇嘛？

答：係，水泉澳，係。

問：有四個 houses 嘅，係咪？

答：係。

問：“Year of completion” 2015，跟住就“No. of flats”，嗰度 3,039，你呢度係呢個你驗咗幾多個，你知唔知？呢個就睇番你個報告嘅 159，你唔好--嗰度唔好放開佢住。

答：係，係，水泉澳...

問：你睇下你自己--睇 159 版，你自己嘅報告，後面。

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答：係。

問：最收靚嗰行係水泉澳，你睇唔睇到？

答：係。

問：你淨係驗咗喜泉咋喎，淨係一個 building，就三個樣本，啱唔啱？

答：係。

問：即係本來佢有四座樓嘅，但係你淨係驗咗一座，嗰座就等如其他都一樣嘅，上、中、下咁，係咪呀？

答：係。

問：點解冇驗埋其他嗰三座呢？

答：因為我哋總體嚟講就覺得啲 unaffected estate 都係個--即係我哋都係睇一睇嘅啫，總體嚟講，都係因為得十一個 sample，我哋又再衡量下成件事，咁就有七，因為可以 sample 多啲，但係我哋就係覺得足夠，即係主要係睇一睇，仍然係重點喺個 affected estate，unaffected estate，我哋覺得有理由相信如果有少少超標啲啲，亦都可能有其他原因，或者有某一個，有啲個別嘅 party 覺得呢個又有人事前可能抽過有事喎，我哋就會選擇性咁去 sample。

李大律師，因為我哋始終係成個 benefit/cost ratio，我哋選擇咗十一加六，即係七個 estate，咁樣每個 estate 就一、兩座樓咁樣。因為相對嚟講，我哋覺得 affected estate 係嗰個範圍係比較細，同埋相對嚟講，個 risk 係更加風險係低好多。

問：但係你哋驗，你揀啲 unaffected 啲啲就係因為睇到佢係都有鉛...

答：有，係，係有，有，有，但係因為 WSD 都好似有咩嘢，佢梗係可能有啲--我哋報告都話可能有啲唔同嘅理解，所以我哋就 more for confirmation，for 一個...

問：但係因為有唔同理解，咪更加應該細心驗？

答：又李大律師，可以容許我稍為唔同嘅意見，就係因為始終係睇數據，始終係睇數據，咁 massive 嘅數據，所以你譬如而家 unaffected estate，其實咁多咁多嘅數據，譬如我哋睇某一個 table，譬如

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Table 3, 第 3, 160 頁, 160 Table 3 咁譬如話, 就真係即係你成件事睇, 你其實超標嘅, 其實得 0.3 個 per cent, 即係其實總體嚟睇, 係唔同個數量級嘅, 即係我哋就咁睇數據, 就唔同個數量級嘅嚴重性, 所以我哋個工程嚟講, 就始終係覺得個 priority 就擠喺啲 affected estate, unaffected estate 就我哋會抽樣, 所以就嗰六、七個 estate, 然後幾個 building 咁樣抽樣嚟睇。

就如果舉例, 調轉嚟講, 如果我抽樣發覺真係有事, 即係有超標, 咁就個情況就唔同, 但係而家我哋抽樣見到就係似乎個 risk 都好低。

問: 唔係, 唔係, ...

答: 變咗我諗嗰個邏輯, 大律師, 因為邏輯就會咁諗, 即係...

問: 但係邏輯應該相反, 係咪呢? 因為已經 affected 啲啲, 你去唔去驗, 政府都當佢 affected 咁樣處理㗎喇, 從苦主個角度睇, 你明我意思嘛? 我就永遠都喺苦主個角度睇, ...

主席: 唔係, 呢個同我哋嘅--呢個 outside 我哋個 terms of reference, 你明唔明呀? 因為我哋個 terms of reference 就係話要去 find out 嗰個 causes of lead in 呢一啲咁嘅 estate。

李柱銘先生: 如果係咁, 就應該唔好驗添, unaffected 啲啲一個都唔驗添。

主席: 唔係, 咁我點知佢啲啲係真嘅啫?

李柱銘先生: 咁咪就係囉, 就所以...

主席: 唔係, 所以你明唔明呀? 當然我哋我哋唔係水務署, ...

李柱銘先生: 梗係喇。

主席: ...我哋亦都唔係房署, 你話我哋可唔可以做晒所有 unaffected 嘅, 可以, 不過可能唔係幾個月嘅時間, ...

李柱銘先生: 明白。

主席: ...亦都唔係咁嘅錢, 係咪?

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李柱銘先生：明白。

主席：所以有我哋嘅局限性，李教授嘅意思就即係話「我哋睇晒所有啲數據，unaffected 啲基本上都係差唔多啲嘅，所以我哋咪唔調咁多資源落去做 unaffected 嘅囉。」其實水泉澳邨，honestly speaking，點解我哋會去做水泉澳邨呢？我其實都可以話畀你知，因為當然第一，就係原本水務署出嚟啲係已經有啲見到係有超標，不過佢哋就話係一個 sieve 嗰度搵到啲 particles，係咪？所以我哋都決定係返去睇水泉澳邨。

第二，就係另外就係因為有一位議員交咗一啲資料畀我哋，於是我也都 make 一個 decision，就話不如我哋再去睇一睇水泉澳邨，但是個結果就係好多原本嘅居民就已經唔肯再做，即係唔肯再畀我哋入去再抽多次，你明唔明呀？因為其實都幾擾民嘅，咁所以喺咁嘅情況之下，就做咗一棟大廈嘅三個單位，高、中、低。

好有好多原因就李教授就有講出嚟，不過係有 constraint 嘅，因為你要 Housing，又要啲居民配合，有陣時佢哋一次就已經係覺得已經太擾民，所以個結果就係咁樣樣。

答：多謝主席。

李柱銘先生：但係，主席，我...

主席：唔係，我明白你嘅意思，既然有事，咁係咪應該四躉樓都高、中、低，甚至可能唔係高、中、低添，唔係三個單位添，你可能查十個單位諸如此類咁樣，啱，我同意係可以做，不過呢個唔係我哋嘅範圍，呢啲其實係應該個 executive branch 去做，係咪？即係我哋 present 咗啲數據，正如我頭先所講，「你睇咗我哋啲數據，你認為夠，你認為唔足夠嘅，by all means，executive branch of the government，你去做多啲喇。」係咪？

李柱銘先生：個...

主席：「如果你認為我哋好 comfortable with 啲咁嘅 data，乜都唔做。」fine，冇問題，「有啲咩嘢 political responsibilities，你咪承擔囉」。

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李柱銘先生：個問題就一點啫，即係變咗就有漏網之魚。

主席：啱，我同意，我哋冇話--因為我哋你見到都係十一加六之嘛，我哋唔係做晒全香港所有啲 unaffected 嘅 estates，所以你個睇法我唔會反對，如果你話「我要 put 所有啲公屋嘅住戶啲 mind，啲 resident 嘅 mind at ease」，理論上，理論上，就應該做過晒，不過呢個唔係我哋可以做嘅。

李柱銘先生：好，我問水務署啲人。

主席：係喇，你咪問水務署囉。

問：但係李教授，如果水泉澳呢度係你會--你覺得水務署應該點做法？點樣處理，你而家當佢有資源先，當佢有時間，有人手，有錢，你知道水泉澳有咩嘢問題喇，係咪？你哋個 team 淨係做一個 building 咁...

主席：水泉澳反而可能有問題啲，...

答：冇問題，水泉澳。

主席：如果你話葵涌邨咁多個單位就有問題喇，你揀葵涌邨就可能啱啲，老老實實。

李柱銘先生：我兩個都想揀。

主席：咁個兩個揀，係，好，好，好。

問：你會點樣？你覺得，即係你睇到係可能有問題，你一開頭已經覺得可能有問題，因為都有嘅，係有鉛嘅水度嘅，即係諗住錢咁啱唔緊要嘅，想又喺個居民個健康個角度出發，你覺得政府應該點做？

答：即係居民，由居民嘅健康嘅角度，就可以講話我會點做，譬如舉例呢個鉛事件，我查過我自己住嘅單位，即係我自己去查，咁有事，我查

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咩嘢呢？First draw、晏晝 12 點、夜晚 7 點。

問：即係食晏同埋食晚飯？

答：係，咁冇事，我咪安心，所以我每日去 check，我日日都可能有個 particle，但係 I mean that's --即係我係做咗呢樣嘢，你都係一個風險嘅評估啫，咁所以我覺得由個居民角度，如果做，絕對可以有做啲嘢嘅。

問：或者我咁問你，你講得好啱，好正確嘅，你做過你嗰個單位，你就放心喇，係咪？好喇，啲居民佢冇--居民就唔可以期待政府會逐層做晒㗎嘛，八百幾個單位一座樓，起碼佢都睇到，首先就話「我座樓如果一個單位都未試過」，佢有啲擔心，係咪呀？如果話「好喇，起碼我隔離條邨--即係我條邨裏面，我呢個 block 冇做啫，起碼我隔離啲啲有做咗。」要幾多至你覺得佢會--你同啲居民諗一諗，應該做幾多呢，政府嗰方面？唔能夠層層做，我同意。

答：呢個我諗就太多因素，我諗都好難我咁片面咁畀任何意見，因為亦都個個都有啲責任，你主要都係啲責任，亦都視乎每一個屋邨都有啲唔同嘅情況，所以我諗好難--大律師，好難答你呢個問題，唔係我唔想，我都明你嘅好意。

但係我諗我哋呢次呢個報告同埋啲資料就應該--啲持份者應該就可以大家尋求一個合理嘅解決辦法嚟即係應對你頭先講嘅嘢，我--大律師，我覺得一般嚟講，我諗總體成個數據，包括以前啲數據同埋呢個報告嘅數據，就畀咗一個框架，framework，即係大致上我哋知邊啲有可能高危，邊啲可能有咁危。至於喺呢個好一般嘅風險嘅評估下點做呢，我諗可以好多個唔同嘅演繹，好多唔同嘅演繹。

問：頭先你講到你做你自己嘅單位就朝頭早、中午同下午 7 點咁，你覺得咁嘅法其實係咪應該政府擺去參考嘅呢？

答：呢個我諗...

問：呢個好合邏輯㗎啫，你早午晚食嗰三餐㗎嘛。

答：都唔係咩嘢原因，即係係咁--即係我哋 spend over a day，冇乜特別原因，不過 first draw 就肯定嘅，即係 first draw 肯定嘅，覺得就擺啲咁多就，所以冇乜話好詳細，我都好直覺得就測--即係自己有啲好奇心走去試嘅啫，冇乜特別。

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問：譬如如果啲人有錢嘅，佢住私樓嘅，但係佢都去試咁驗，係咪都應該用你嘅方法，早午晚呢？First draw，或者早啲就 first draw，就早過你 7 點，朝頭早，係咪呀？

答：呢啲可以個別啲業主會考慮嘅，即係我...

問：即係根據佢自己嘅習慣，first draw 一定做，幾時食午飯，幾時開始煮午飯嗰個時間，同埋幾時煮晚飯，就係咪咁嘅時間呢？因為中間都已經積咗--啲水積咗啲時間喺度㗎喇，係咪呀？

答：但係應該就不斷有人用水嘅，一般正常嘅單位就不斷都有人用水嘅，即係譬如...

問：不過而家講緊廚房個水喉。

答：但係因為廚房同個 wash basin 都通㗎嘛，譬如你睇個報告，有啲就直接入廚房，有啲就經過個 wash room，再入廚房嘅，所以某一個程度上，佢哋係相通，所以你譬如開洗手間嘅，譬如洗面，咁亦都有流動咁嘅水，所以好難講，但係我只可以話通常英國做個調查，就係個 stagnation time，佢叫 inter-use time，就係三十分鐘，所以我諗大致上--係喇，即係咁樣。

問：我想你睇一睇你個報告 36 段。

答：一...

問：第 36 段第...

答：36，36？

問：係，36 段，你就話“Independent planned sampling and analysis of lead contamination of 43 buildings in 17 PRH estates have confirmed the main WSD findings. Regardless of the method of sampling, the ‘affected estates’ and the ‘unaffected estates’ are largely confirmed.”，呢度你個結論，即係話你哋做出嚟嘅結果同水務署做出嚟嘅結果大家係合乎嘅，係咪呀？吻合嘅？

答：即係總體邊啲屋邨係比較嚴重啲個問題，應該可以講係符合，即係嗰六個屋邨，即係睇到係好明顯嘅。

問：但係佢啲 confirm 啲啲就--啲啲 affected 啲啲就梗係有喇，佢

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話超標，你又超標，咁啲 unaffected 啲，因為你係抽樣同埋係
驗好少嘅咋喎，係咪呀？你好難 confirm 佢啲啲 finding 嘍喎？

答：因為佢啲嘅 finding 就係少咩嘛。

問：但係多過你咩嘛，係咪呀？佢啲 unaffected...

答：係，但係我意思係有啲 statistical 嘅因素，但係只可以話佢話少，
我哋就都係少，即係咁，就係咁。

問：但係佢啲係--起碼佢啲嘅 sample 係多過你啲啲 sample，係咪呀？

答：但係我哋係比較有計劃嘅，同埋我哋係有計劃去捕捉最壞嘅情形嘅。

問：但係--係，因為你 first draw 咩嘛。

答：係，係，係，同埋係有啲隨機性，變左兩者咁樣睇，都似乎好吻合咁
嘅意思。

問：你譬如好似水泉澳咁，你係一個 block 驗得三個，而嗰度有四個
block，譬如每個 block 有八百戶，咁就三千二百戶之中就驗左三個
flat 嘅咋喎，係咪呀？數字上係咁。

答：你如果純粹數目，係咁講，但係就算係以前啲數據都係，我哋正話講
過係 4 個 per cent 之嘛，百分之...

問：你呢個有 4 個 per cent。

答：我呢度有，即係我話以前水務署啲數據...

問：水務署啲 4 個 per cent。

答：...都係百分之四嘅，3.9。

問：係喇，所以你都覺得係少，係咪？

答：係，有講話絕對嘅，因為你點都係少喇，你唔可能--呢個問題，你
唔可能做到好大，因為個資源不得了。所以就話我只可以話...

問：但係講到健康嗰度，就資源不得了，但係都唔可以就咁就撥開，你同
唔同意？即係健康喎，啲啲細路仔成長嘅時候，好緊要。

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答：係，但係正如我哋今日講，即係話呢個琴日個表都有一個代表性咁去衡量相對嘅風險，即係咁嘅意思。當然，李大律師，最好當然每一個 building 都如果可以有一個衡量，但係實際上就係情況係咁。

問：你哋做嗰啲 unaffected 嘅，頭先你聽到主席講喇，因為其實可以話唔需要查嘅。

主席：我有--唔係...

李柱銘先生：因為唔係你嘅 terms of reference。

主席：唔係，唔係，唔係，我哋唔係咁嘅意思，我哋個 terms of reference，其中第一樣就係我哋要 find out 嗰個 cause，係咪？呢個雖然佢做咗，水務署做咗，但係我哋都要 independently 去 confirm，因為我哋個 terms of reference 同佢係唔同。

李柱銘先生：喺，係。

主席：好喇，你話全香港有咁多屋邨，有咁多棟大廈，咁多棟 buildings，係咪我哋個 commission 個 expert 可以代表查晒呢？

李柱銘先生：做唔到㗎。

主席：做唔到㗎嘛，係咪？所以我哋當時我相信就係 make 咗一個 consider 嘅 judgment，就係話我哋會去睇下嗰啲所謂 borderline 嘅屋邨有冇問題，除咗嗰啲所謂 borderline 嘅屋邨之外，譬如好似我頭先講到有位議員寫信入嚟，於是我哋咪又再去睇埋，因為其實嗰個水泉澳本身都係有啲問題㗎喇，於是咪我哋再去睇囉。

你話我哋係咪可以睇多啲呢？當然係可以睇多啲嘅，係咪？當然你要畀啲時間，畀 resources 諸如此類好多樣嘢，不過我哋--總之就係我哋當時個 consider 嘅 judgment 就係去睇下佢嗰啲所謂 unaffected 嗰啲 borderline case 係咪真係佢哋所講嘅 unaffected borderlines 呢？而家基本上 Prof Lee 嘅 conclusion 就係 by and large 都 confirm 嘅。你話有啲 odd one out，係有啲 odd one out 嘅。

你話係咪--個問題係咁樣樣，個問題就係你話可唔可以再返去再

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詳細查呢？可以，不過就應該唔係我哋做嘅，係咪？

李柱銘先生：我明白。

主席：佢哋個方法，水務署嘅方法，Prof Lee 同埋 Prof Fawell 就話有佢哋嘅唔好嘅地方，我哋個方法，我哋都有話-- Prof Lee 同埋 Prof Fawell 個方法都有話係一個 perfect 嘅方法嚟嘅，係咪？

好喇，究竟實際上，你話如果嗰啲 unaffected 嗰啲 estates，你要去查，得，冇問題，不過你就要嗰啲 stakeholders 坐低去 work out 一個大家都 acceptable 嘅 sampling protocols 同埋 sampling methods，係咪？你可能要啲居民、要水務署、要 Housing 大家喺度坐低，係一個好擾民嘅嘢，亦都係一個好 costly 嘅 exercise。咁做幾多，當然你可能又要搵 expert，你要--即係 Prof Lee 唔可以喺咁短嘅時間之內話畀你聽一個我哋如果要再查香港其他 unaffected estates 嘅 protocol 係點樣樣，你一定要搵啲識嘅人返嚟坐喺度去查。

所以我明白你個 concern，因為你問問題就係從一般嘅市民出發去問，我絕對明白，係咪？即係如果我同你係住喺公共屋邨，又有細路仔，又要餵奶嘅，當然你任何時間開個水喉，都唔應該有，唔好講咩嘢，係咪先？

同埋老老實實，喺公共屋邨一住，可能由個細就住到大嘅，係咪？住可能住十幾、二十年，直至到佢讀完書先至離開，出去做嘢，先至--即係講緊十幾、二十年嘅時間，個影響當然係可以好大。

不過個問題就係你再追問 Prof Lee 落去，佢又答唔到你嘅問題。呢啲咁嘅問題，就老老實實，你問我，就呢度就解決唔到嘅。

問：因為我有一個問題就好簡單嘅啫，就係因為水泉澳嗰度咁講，我頭先話應該有三千二單位，但係你哋就因為各方理由，好多理由，就淨係驗咗三個單位，好難 confirm 咩嘢，你同唔同意？

答：你話邊個屋邨？

問：水泉澳。

答：水泉澳，係。

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問：因為佢三千二個單位嘅，你哋就驗咗三個之嘛，我唔係話你錯，因為有好多因素嘅，我哋唔需要，我接受你只係驗咗三個，呢個係事實，但係你因為驗得咁少係好難會 confirm 其他人做嘅嘢喇喎，你同唔同意？

答：水泉澳，我一時唔知水泉澳佢原本都驗咗好多，等陣，睇下先。五十三個，係原本五十三個。

問：係，五十三個。

答：原本五十三個，即係睇番頭先個 table，915，佢原本就水泉澳 Phase 1，就佢三千個 flat，佢驗咗五十三個 sample，我哋又...

問：佢就少，你仲更少，問題就係，你同意嘅，係咪呀？

答：但係呢個係咪大小 sample 嘅--即係嗰個 issue 係咪 sample 嘅大小呢？即係我...

問：唔係，從個居民個健康嗰個角度出發點，三千二個單位驗咗五十三個都係少㗎？

答：都係少，係。

問：咁你哋三個更加三囉，呢個一定係㗎喇，邏輯上。

答：係，但係我正話講，因為我哋個性質唔同。

問：我明白，我明白，我唔係批評你，喺呢件事一定唔係批評你。

答：我唔係話批唔批評，我意思我哋嘅 sample 同呢個 sample 有少少唔同，呢個差唔多 random。

問：你係驗 first draw，你係驗 first draw。

答：係，我哋係好 targeted，如果我哋--即係我哋 sample 嘅原本就有一個好直覺嘅諗法嘅，就話我每一個 building 如果都驗，喺啲 affected estate，其實我因為資源有限，我哋譬如三個，如果初初嘅諗法就係話如果呢三個單位個 first draw 都有事，個有事嘅機會係相對細，即係原本咁諗嘅，但係你度出嚟當然又第二個，又唔係 first draw 都高喇。所以即係話基於咁嘅考慮，我哋係 first draw，即係個危機比較-- number of samples 就係細啲，但係個危機其實高啲，個 risk 高啲，即係 maximum exposure。

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問：喺 first draw 嗰個角度，梗係喇。

答：係，係，maximum exposure，如果咁都驗唔到，咁就有啲 significance 嘅。

問：我唔係話有 significance，不過好細，因為太少呀個 sample。

答：如果你一個 general 咁，當然驗多啲好啲嘅，但係我諗問題話需要幾多先足夠 prove 個 point 呢，李大律師，我諗個--我明你講乜，當然仲肯定啲，攞多啲 sample 仲肯定啲，就仲會完美啲，呢個我完全同意。

問：你譬如驗多三個 units，就已經 double 咗㗎囉，可以話，係咪呀？即係個 probability of getting it right 都係細，不過可以話 double 咗，比起三個。

答：但係呢個 doubling --問題呢個 doubling 有冇 significance？

問：好細，因為都係少。

答：所以需唔需要？我諗始終係歸番呢個問題。

問：但係你邏輯上，有可能三個、六個、九個啲，都係少得好緊要，你五十三個都話少喇。

黎先生：唔係，實際上你係驗好多嘅咋，係咪呢？

李柱銘先生：唔？

黎先生：三個係少，六個都係少，九個都係少嘅咋？

李柱銘先生：係呀，係呀。

黎先生：係囉，你話幾多先夠？

李柱銘先生：但係，呢度就梗係睇錢，又盛，好多樣嘢睇喇...

黎先生：唔係，你實際上你梗有一個限度，因為實際上，佢最初驗呢啲話係唔受影響嘅屋邨嗰陣時，最初嘅諗法就係如果佢話係水務署驗出嚟嘅水係嗰啲話屋邨係冇事，如果佢咁--李教授嘅調查都係驗水嗰陣時

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發覺到如果係抽頭啖水嚟到驗都係冇事，就可以證明係冇事嘅，但係如果既然而家驗咗出嚟之後，有一啲係少少問題出現，好似水泉澳嗰啲，呢啲嗰陣時當然個做法就係咩嘢呢？係繼續去，可以喺之後再研究係咪呢啲屋邨究竟有冇事呢咁，即係變咗唔係喺李教授嗰度可以做嘅工作嚟㗎喇。

李柱銘先生：咁都有...

黎先生：呢一個變咗係咩嘢呢？可能係政府部門，佢哋就會諗下究竟呢一啲咁嘅屋邨佢需唔需要再做一啲嘅調查，睇下究竟嗰個水嘅水質有冇問題咁樣樣，係咪呢？

李柱銘先生：係，okay。

問：但係水泉澳有一個叫做朗泉樓嘅，就朗泉樓就有人驗到嗰度有問題，你知唔知呢件事？

答：唔知，可能...

主席：唔係，我哋都話知咯，其實我哋知道係有...

答：哦，知，因為嗰個--係，即係嗰位議員，係。

主席：我哋知道係有問題，所以我哋咪決定返番去，原本水泉澳根本我哋都唔驗嘅。

李柱銘先生：但係朗泉樓驗到有咩嘛。

主席：唔只添呀，有幾棟樓委託一啲所謂 accredit 嘅 laboratories 去驗，係驗到佢哋超標，正如我頭先所講，我哋曾經試圖係想返番去做番嗰啲樓嘅，但係啲居民就話「你唔好再搞我喇。」

李柱銘先生：咁都有好多第二啲居民肯畀㗎。

主席：唔係，我哋唔可以逐家逐戶敲門去問，係咪？我哋有我哋嘅 limitations，我好相信，如果你問晒三千個，你可能會搵到三十

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個、六十個佢肯嘅，不過我哋冇可能。

李柱銘先生：唔係，嗰啲有細路仔嗰啲，我覺得佢分分鐘舉手...

主席：唔係，我唔想同你拗呢樣嘢，因為點解呢？我哋嗰啲曾經幫嗰啲議員畀議員入過去驗水嗰啲，跟住我哋返番去，有啲都唔肯畀我哋再驗，係咪？咁如果...

李柱銘先生：可能有咗個議員喺度，就係。

主席：如果佢都唔肯畀我哋去驗嘅，我哋有啲咩嘢--可以做啲咩嘢呢？我都話明白你嘅 concern，最好就每一家都驗一次添，因為每一條渠都唔同，係咪？啲 bends and tees 同埋佢哋嘅 meter room 都唔同，理論上就最好，係咪？如果你話房署要 put 佢哋嘅 residents 個 mind at ease 嘅，理論上，如果見到 Prof Lee 嗰啲咁嘅數據，佢哋 by all means 可以返去再做。

李柱銘先生：Okay。

問：如果你睇下 37 段...

主席：係囉，因為似乎而家咁樣樣問落去，就似乎係話「你哋個 commission 點解唔做嘢？做咁少嘢呀？」咁樣樣。

李柱銘先生：唔係，我明白，commission 已經做咗佢可以唔做嘅嘢，同埋可能話超越佢嘅 terms of reference 嘅嘢添。

主席：咪係囉，係，可能超越我嘅 terms of reference 添。

李柱銘先生：37 段--不過冇人擺 JR。

主席：好難講，你錯喇。你哋放入去你哋個 bundle 嗰度，已經有一個人 JR 咗，係咪？係咪呀？已經有人 JR 過，亦我都好相信唔會係第一個。

問：37 段，呢度我有一點問你嘅啫，第一句，“Lead contamination in the densely populated PRH estates seems to be dominated by lead solder deposits in the numerous joints of the water supply chain from the down pipe to the individual flats.”，你係咪覺得個 down pipe 都有問題呢？

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答：唔係，其實就意思就話打橫嗰截。

問：打橫嗰啲？

答：即係打橫嗰截。

問：哦，即係個 down pipe 去咗打橫嗰度？

答：係。

問：哦，okay，明白。好，多謝你，我有問題。

主席：冇人問題...

石先生：我有少少跟進嘅，其實就。

主席：係。

石先生補問

問：其實都係一啲好大方向嘅問題，因為就尋日同今日都有好多問題係針對咗一啲其實相對細節嘅一啲數目字上面，如果褪一褪改做幾十秒又會點，驗多幾個又會點呀咁樣，但係即係我就想同你用一個宏觀啲嘅方法去睇，我唔係科學家，係我就唔使企喺度，但係就曾經問過你，有個問題就係點解你採用五個 sample，0、20、40、60、80 咁嘅方法而唔去用 first-draw 1 litre 咁樣，有好多問題就係問過有冇文憲支持、什麼、什麼啲啲，我唔同你講有冇文憲支持，因為你會同意就係文憲就死嘅，實際需要就係活嘅，呢個你同意，係咪呀？

答：同意。

問：其實每一個實驗，你文憲就只不過係參考嘅啫，法例就一定要跟啫，但係文憲，你睇下今次嘅需要，你就會 design 一個係對今次最適用嘅 protocol，對嘛？

答：同意。

問：你用五個 sample，當然你就唔可以攞到第一浸嘅 1 litre，除非你

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第二日又去過，隔咗一晚之後再攞嘅啫，但係你會同意，就係如果我用五個 sample，0、20、40、60、80，我攞咗五個 sample，達到你嘅目的，知道嗰個 finer movement of 嗰個 concentration，同意嘛？

答：同意。

問：你亦都可以用 extrapolation 嘅方法得到 1 litre 嘅數值，雖然唔係直接度，係用 extrapolation，對嘛？

答：對。

問：相對會準確，你有信心係相對準確，對嘛？

答：對，係。

問：但係你如果相反地，你就話「我跟文憲。」或者一堆文憲...（聽不清），攞咗 first-draw 1 litre，我假設你淨係去一日啫，你唔係第二日再去攞過，即係你只能夠取捨 first-draw 1 litre 或者 five draws 0、20、40、60、80，你攞咗 first-draw 1 litre，你唔可以 plot 到你五個嘅 movement，同意嘛？

答：同意。

問：即係你攞五個 sample，你可以達到兩個目的，你淨係 draw 個 first-draw 1 litre，你就唔可以達到兩個目的，同意嘛？

答：同意。

問：即係呢個其實都可以話係攞五個 sample，折衷得嚟又可以一石二鳥嘅方法，對嘛？

答：同意。

問：好，第二，就係又係講咗好多剛才李大律師問你，就係「水泉澳咁樣，五十三個都算少，做咩嘢你攞三個？」但係用番呢個邏輯，六個--其實李大律師問你「六個又點呢？」你嘅答案就係話「六個係多咗一倍，但係其實 significance 唔係好多。」對嘛？

答：對。

問：所以其實你嘅做法就係--理想嘅做法可能係度晒咁多個添，最理想，

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如果 money is no object，其實你嘅講法就係話你唔會話為整多啲而整多啲，你係 within reasonable constraint，你做得足夠就夠喇，有啲做得多啲，可能係大家會好似表面上心安啲，但係你就未必一定係為咗人心安而做嘅，如果科學上你覺得其實做多六個，其實做多九個，其實都係唔夠，五十三個都唔滿意嘅話，你做多十個都係唔滿意，你做咗十個，都會嚟問你點解做十個嘅啫，同意嘛？

答：同意。

問：所以呢個係其實 one part of the thinking，係咪？即係你唔會為多而多嘅，同意嘛？

答：同意。

問：另外就係有個關於 cross-checking 嗰個問題，就係尋日水務署問過你，就係你嗰個 protocol，就頭一浸就擺 250，跟住 20、40、60 就擺 50，到到最尾嗰浸又係擺番 250，頭尾嗰兩浸之所以擺 250，就係因為做 quality assurance。

答：係，係，係。

問：就嗰 250 就足夠大，就可以分，有陣時畀兩個 lab。

答：係，係，係。

問：我嘅記憶就係中間擺 50 個啲 sample，你係冇分咗做兩份畀嗰兩個 lab 做，係咪呀？

答：冇。

問：即係嗰十八個 sample，要嚟大家 overlap，就淨係一係頭浸，一係尾浸嘅啫。

答：係，係，係。

問：但係呢一個做法其實個目的主要就係宏觀地去 validate 你嗰個 measurement 嘅準確性之嘛，係咪呀？

答：係。

問：即係科學上，其實你唔覺得因為中間嗰三浸冇咗擺 250 去做呢個 cross-checking，就 invalidate 晒你整個嘅 measurement，

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同意嘛？

答：同意。

問：呢個都 elementary，否則嚟講嘅話，如果唔做中間嗰三個就 invalidate 咗嘅話，就肯定要做，就係你覺得唔會 invalid，所以先唔做之嘛，對嘛？我嘅理解就係。

答：係。

問：好，另外就係剛才代表瑞安嘅陳律師，Mr Geoffrey Chan 就問過你，就係有冇做過一啲--如果你度到某度係超咗標，譬如嗰啲 unaffected estates，或者 affected 都好，你有冇即刻喺附近 beep 過，我聽過你嘅證供，其實你都答過嘅，就係其實你哋本身係冇真係走去自己做一啲新嘅切嚟嘢出嚟嘅測試嘅，對嘛？

答：唔。

問：所以個答案就係冇，其實？

答：係。

問：但係其實我嘅理解，你嘅證供裏面其實都已經係答咗，點解你覺得冇呢個需要，就係你睇番你嘅證供第31段，呢個係 for the avoidance of doubt，140 頁，就係因為其實你見到某個部件轉轉彎彎，其中有一嚟你度到有，唔係一定話水裏面有啲嚟鉛就係來自嗰個轉彎位啲嚟鉛㗎嘛，因為太多數學，太多 randomness，係咪呀？

答：係。

問：除非你真係好似電影 Antman 咁樣，將個人縮咗落去啲嚟嘢度，睇下佢點樣沖咗去，否則你都證明唔到水裏面驗出嚟啲嚟鉛其實就真係來自轉彎位啲嚟嘢，係咪？係咪因為咁，所以你就係話 "In view of the variability and randomness of the lead sources within a branch water supply system"，就 "independent laboratory tests" "would not have added much value."，所以你就不如將你嘅資源就走去 develop 你個 CFD model，係一個宏觀啲嘅睇法，係咪咁解呢？

答：啱。

問：同意，okay，得。最後一個問題就係關於用水習慣嗰度，有一個爭拗

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點就係話究竟邊個時候 draw 個水辦先至係叫做代表性日常飲用水，但係以你嘅經驗，你都從事水質研究好耐，就其實係有一個叫做國際公認嘅一個條文，其實係話畀你聽你要搵出一個居民代表性日常飲用水質究竟係第一浸定係最耐浸嘅，對嘛？有一個國際嘅公約或者有一個國際嘅標準寫出嚟，一個叫做代表性日常飲用水，對嘛？

答：係。

問：其實呢樣嘢就一定係視乎習慣嘅，對嘛？你睇一睇 Prof Fawell 嘅報告第 99 頁，第 99 頁頂個度，其實睇番 98 頁最底個度，“While much of the water consumed would be expected to have contained low lead concentrations, concentrations in the initial quantities of water drawn after standing for extended periods would be expected to contain much higher concentrations of lead as would water drawn from the hot water supply.”，停一停。Hot water supply 點解可能會多啲鉛，就係尋日我都問過你，就係因為你熱嘅話，就會釋出多啲嘅化學物品，呢個尋日問咗你。

答：係。

問：“The quantity of lead ingested would depend on individual habits.”，呢個同意，係咪呀？

答：同意。

問：所以尋日王大律師就問過你，就係佢話叫你睇你嘅 Table 7，你嘅 Table 7 就係文件夾裏面嘅第 162 頁，162 頁 Table 7 就係個三個空置單位裏面做嘅測試嚟嘅。

答：係。

問：就個時間唔同，T 0、30、60 咁樣，同埋就加咗兩個 tap，王大律師就重複咗好多次，就係話 Table 7 就係一 set 嘅數據就係唔關人嘅飲用習慣事，因為係空置嘅咁樣，呢個前提，我哋遲啲會走去討論，因為我哋未必同意呢樣嘢嘅。

但係呢啲數據其實 show 咗出嚟一個 pattern，我嘅演繹就係當然有人住喇，有人住，你第一日去到，可能係積咗唔知幾耐，跟住先至第一次開嘅，第一浸出嚟會好多，跟住慢慢就會變低，譬如話你望下第一個元州邨 12 月 12 號個，entry 個度就係 0.017 咁，跟住

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慢慢 drop 咁樣，積咗好耐，佢會好多，跟住慢慢 drop。其實跟住你隔幾個鐘頭去，佢可能係少啲，但係佢都會繼續 drop 嘅。

其實基本上佢 show 出嚟嘅 pattern 唔係在於有冇人住，而係在於積咗好耐，或者積咗幾個鐘之後，佢嘅 tap 位也好，即係佢個 meter 位也好，entry 位都好，都會係相對多番啲，跟住就會慢慢 drop，你睇一睇嗰個 pattern，你同唔同意？

答：係，係，係。

問：譬如話你睇下元州，佢 entry 嗰度係第一次驗，早上十點半係 entry 0.017，跟住慢慢 drop 到好低好低，呢個係一個 pattern，即係你 draw 嘅緊要性就係嗰個 pattern 就係咁樣。

答：係。

問：你得到嘅就係究竟係個 meter 位多，定係入屋位多，呢度就話咗畀你聽，有人住嘅話唔到畀你聽。

答：係。

問：你跟住到到 12 月 12 號嘅兩點鐘，隔咗四個鐘，隔咗四個鐘，咁你叫做 stagnate 咗四個鐘，其實去到 0.011、0.008，佢嗰四個鐘頭 stagnate 可能唔係--都儲番啲嘢喇已經，係咪呀？

答：係。

問：因為其實你之前早上十點半嗰浸，到咗 T 等如 300，已經 0.0025 喇嘛？

答：係。

問：你等咗四個鐘，佢已經升番到 0.011 喇個 meter，跟住到 entry 落番 0.008，跟住又慢慢 drop off，所以其實呢度主要 show 到個 pattern 就係話到畀你聽，主要係話到畀你聽準--更加準繩地話到畀你聽其實係 meter 位有事定係 entry point 有事，可唔可以咁講呢？其實呢一個嘅測試，即係其實三個 vacant flat 都係為咗更加精準地知道究竟係 meter 位有事定係入屋位有事？

答：係，可以咁講。

問：而啲水停幾耐，當然係影響到你第一浸出到嚟聚積幾多喇。

B

B

C

答：係。

C

D

問：但係主要你個 pattern，其實你嘅目的就係想知道喺邊一點開始積聚嘅，對嘛？

D

E

答：係。

E

F

問：好。

F

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G

H

石先生：我有其他嘅問題。

H

I

主席：唔該。

I

J

唔該晒你，Prof Lee。

J

K

答：好，得。

K

L

主席：你畀完證供。

L

M

答：Okay, okay, 冇問題。

M

N

主席：好多謝你同埋你嘅團隊喺今次個研訊裏面花咁多心機同埋時間...

N

O

答：唔好咁講。

O

P

主席：...同我哋做呢個研究，好多謝晒。

P

Q

答：Okay, 好，係。

Q

R

主席：我哋或者小休。

R

S

石先生：我哋小休一陣，跟住我下一位證人就係 Prof Fawell。

S

T

主席：好呀，好呀。

T

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下午 3 時 24 分聆訊押後

下午 3 時 42 分恢復聆訊

出席人士如前。

MR SHIEH: (In English) Mr Chairman and Commissioner, I now call Prof Fawell, our second expert.

PROF JOHN FAWELL (affirmed)

(All answers in English)

CHAIRMAN: (In English) Take a seat, please.

Examination-in-chief by MR SHIEH

(All questions of Mr Fawell in English)

MR SHIEH: Prof Fawell, you have bundle V1 in front of you.

You have been following the manner in which we took the evidence of Prof Lee.

A. Yes.

Q. And I would follow the same format.

I would read out your expert record into the record, and as I do so, I will stop here and there and ask you to elaborate or to explain certain matters or to respond to certain questions that other parties have raised previously.

Could I ask you first to look at your joint expert report, preliminary, prepared together with Prof Lee,

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which is in bundle V1, page 1. You can see the front

sheet. It says, "Joint expert report (Preliminary)".

A. Yes.

Q. Prepared on 12 November. Could I then ask you to look

at page 3, which sets out your background and the

instructions to you.

A. Yes.

Q. "Prof John Fawell.

Biologist/toxicologist.

(Consultant on drinking water and environment).

Specialist field.

Assessment and management of risks from drinking

water contaminants.

Subject matter ...

To assist the Commission in discharging its duties

under the terms of reference and by acting as an expert

witness in the Inquiry hearings."

Then your curriculum vitae is to be found in

appendix 1, which is page 14.

"Name: Prof John Fawell.

Profession: Consultant on drinking water and

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environment.

Primary specialisation: Assessment and management of risks from drinking water contaminants and from re-use of waste water.

Honours: MBE.

He received the International Society of Regulatory Toxicology and Pharmacology 2013 International Achievement Award."

Then it sets out your academic qualifications: Bachelor of Science. MI, that would be member of the Institute of Biology or something?

A. Yes. That's now the Royal Institute of Biology.

Q. Okay:

"Professional affiliations: Society of Biology. British Toxicology Society ... "

Et cetera, and you were appointed visiting professor at Cranfield University in May 2011.

Cranfield is what one would call a research-based university; it doesn't take undergrads?

A. That's correct.

Q. Therefore you don't see them in UCAS applications, but

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it's a research-based graduate institution?

A. Yes, mostly research.

Q. Mostly research?

A. Yes.

Q. "Experience" -- now, key areas of your experience, at the bottom of the page. You have:

"... worked on the implications of contaminants in the environment for human health and aquatic life since 1979 and is actively involved at both a national and international level.

Key areas included:

-- Closely involved in the WHO Guidelines for Drinking Water Quality as a member of the co-ordinating team since 1988. For the 1993 revision he was co-ordinator for inorganics and substances which affect acceptability to consumers, rapporteur for organics, pesticides and disinfection by-products and organiser of working group meetings on radioactivity and treatment and analysis. Prepared background documents on the toxicology and health risks of a wide range of

substances, with proposed guideline values, for 1993 revision and the 1998 addendum ... co-ordinator for naturally occurring substances and substances from agriculture, industry and human settlements for the preparation of the third edition of the Guidelines in 2003 for which he also prepared several revised background documents. Actively involved in the rolling revision of the Guidelines he was Chairman of the 1998 Medmenham meeting on aspects of protection and control and of microbiological quality."

Can I just skip the rest. In the middle of the page:

"He has continued in that role for the fourth edition of the Guidelines published in July 2011. He was part of the WHO expert group establishing guidelines for the supply of safe drinking water by desalination and a member of the expert group considering the significance of beneficial minerals in drinking water. He was one of the three co-ordinators and one of the authors of the WHO publication 'Chemical safety of drinking water: assessing priorities for risk

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management'. He is co-ordinator for most of the chemical parameters for the preparation of the fourth edition of the Guidelines and has been closely involved with the preparation of most of the other sections. He is a member of the WHO expert group on pharmaceuticals in drinking water."

Now, there then follows various other bullet points about your consultancy and advisory experience, but at page 17, you acted as PhD examiner on the subject.

Focusing on your experience with the WHO Guidelines -- we have heard a lot about them here -- you were co-ordinating team or co-ordinator for particular substances?

A. Correct.

Q. Inorganics and substances which affect acceptability to consumers, et cetera. But in terms of actually writing up relevant sections, you have to educate me and us, did anyone take responsibility for actually writing up a particular part? For example, did you write the parts concerning certain chemicals, or was it a group effort which everyone had to basically endorse?

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A. That's correct. I wrote much of the wording around the different chemicals, in conjunction with the other members of the team, and with the rapporteur of the meeting.

Q. The rapporteur is basically the one heading the particular group, summarising the views and reporting --

A. The person recording and delivering the comments of the groups.

Q. So you were rapporteur for organics, pesticides and disinfection by-products. That doesn't include lead, because lead is grouped under which section?

A. That was grouped under the inorganics. That particular section.

Q. But you were co-ordinator for the inorganics section?

A. Yes, and I have been involved in preparing the revisions to the lead document. For example, for the fourth edition, I wrote the modification to the lead documents.

Q. So the bit which traced through -- I will go through it in detail -- the origin in 1993 and how the threshold could not be established, therefore it's withdrawn, but why the value was retained as provisional, all those,

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you were closely involved?

A. Absolutely.

Q. And you know the thinking behind it?

A. Yes.

Q. Just to make sure that you possess the requisite familiarity on this particular issue, on which I do not think that there should be any degree of controversy.

Could I then go back to the instructions to you at page 3 of the bundle. Under the heading, "Instructions to Prof Fawell":

"I have been instructed to give my opinion on the matters under the terms of reference.

In providing my opinion, I have also been instructed to consider the following areas and undertake the following tasks:

(a) review and verify the findings of the interim and final reports of the task force led by the Water Supplies Department ... in respect of the waterworks system and the inside service system in public rental housing developments, including the overall methodology adopted in the investigation;

(b) identify and explain the international standards (particularly those laid down by the ... (WHO) in respect of the following matters for the purpose of ensuring safety and quality of drinking water in Hong Kong:

- (i) hazards and hazardous events;
- (ii) risk assessment, prioritisation and management;
- (iii) control measures;
- (iv) construction and maintenance;
- (v) inspection and monitoring;
- (vi) management procedures;
- (vii) rectification;
- (viii) the supply and use of plumbing materials; and
- (ix) the procedures and protocols regarding the use and installation of plumbing materials;

(c) in the context of the international standards in

(a) --

(i) review and evaluate the adequacy of the existing Water Safety Plans of the WSD;

(ii) review and evaluate the existing regulatory and monitoring regimes (both prior and subsequent to the

excess lead in drinking water incidents as a result of which new measures have been put in place by public authorities) on quality of drinking water:

(1) at the pre-construct stage;

(2) at the construction stage;

(3) at the completion of construction (before the WSD issues the certificate for water supply connection);

and

(4) at the maintenance stage;

(iii) opine on whether any further metal(s), chemical(s) and/or microorganism(s) should be included as parameter(s) in addition to those set out in the WSD Circular Letter No. 1/2015 for testing of water samples, and if so, the thresholds, benchmarks and/or the acceptance criteria to be set for them; and

(iv) the effectiveness of the recommendations made by the Review Committee;

(d) opine on how the inadequacies (if any) identified for the matters above may be rectified or improved and to make recommendations with regard to the safety of drinking water in Hong Kong; and

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(e) state, provide advice and recommendations on other areas of concern (if any)."

Then there's the usual expert's declaration.

Could I ask you one further question about your experience, before proceeding to the main part of your opinion, of your expert report. Do you have any experience in testifying in court or judicial proceedings as an expert witness?

A. I do.

Q. The most recent experience being about when?

A. Well, as an expert witness, would be a few years ago when I presented evidence at a public inquiry on behalf of the Environment Agency. But I actually was in the High Court two weeks ago, providing evidence on advice that I had given to a water supplier.

Q. That's the Royal Courts of Justice in England?

A. Yes, indeed.

Q. Can I now move to the text of the joint preliminary report, which is a very short text, at page 6.

"Preliminary joint opinion".

I read this for Prof Lee, but because now you are in

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C the box, I will read it for you: C

D "The sampling protocol to identify whether lead is D
E present in the pipework or fittings of drinking water E
F systems in buildings is important in assessing the risks F
G of lead contamination in drinking water. The contact G
H time with lead-containing components such as soldered H
I joints or fittings is a key factor in determining lead I
J concentrations in drinking water. Indeed, a number of J
K authorities suggest fixed stagnation periods before K
L withdrawing samples while others propose first draw L
samples. L

M The International Standards Organisation standard M
N (ISO-5667-5) on sampling techniques of drinking water N
O from treatment works and pipe distribution systems O
P states that 'If the effects of materials on water P
Q quality are being investigated, then the initial draw Q
R off should be sampled. Samples may also be taken after R
S a specified period of stagnation to provide information S
T on the rate at which materials affect quality or the T
U maximum likely effect.' For example, in the UK (England U
V and Wales) standards for drinking water quality, the V

sampling requirement is to take the first litre of water drawn from the tap without flushing. The USEPA also requires that one-litre first draw samples are taken to indicate the level of exposure to lead and copper. In Japan the requirement is to first flush for five minutes and then take a sample for analysis after 15 minutes stagnation.

Fully flushed samples on their own may serve the purpose of assessing the general quality of a drinking water as supplied, but will not give a representative assessment of the concentration of lead or other metals from the internal distribution system to which the consumer is exposed.

Based on the above, data from fully flushed samples are not likely to be representative of the extent of lead exposure."

Now, Prof Fawell, a good deal has been said, debated, about the ISO standards. Can I ask you to look at the ISO standard. C2, page 1538, tab 19. It starts at page 1526.

Page 1538. Do you see, under the heading

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"Pre-collection cleaning, disinfection and flushing"?

A. Yes.

Q. It's a relatively huge document, and doing the best we could, we have identified what appears to be the relevant bit or part concerning sampling method or sampling protocol. So I'm going to start asking you questions, starting from this part of the ISO standard.

If I have barked up the wrong tree, looked at the wrong part --

A. I think that's correct.

Q. -- by all means tell me, and we can look at, let's say, chapter whatever. But this is the correct place to look at?

A. Yes.

Q. Could I ask you basically to develop or elaborate where the quotation in the middle of the preliminary joint opinion comes from?

A. That comes from 6.4.1.

Q. Yes, in the middle?

A. Yes.

Q. Five lines down:

"If the effects of materials on water quality are

A
B
C being investigated, then the initial draw-off should be
D sampled. Samples may also be taken after a specified
E period of stagnation to provide information on the rate
F at which materials affect water quality or the maximum
G likely effect. If the quality of the water as supplied
H to premises is to be checked, then the faucets should
I be
J cleaned and flushed at a uniform rate for 2 minutes to
K 3
L minutes or longer if necessary to achieve constant
M temperature before samples are collected. The faucets
N should be cleaned, disinfected and flushed if samples
O are to be collected for microbiological analysis.
P Faucets should be left flowing at a steady rate during
Q sampling."

P Now, it's under the heading "Faucets", but if you
Q read the text of 6.4.1, some sentences relate to faucets
R but some sentences, for example the sentence five lines
S from the top, "If the effects of materials on water
T quality are being investigated, then the initial
U draw-off should be sampled" -- it doesn't seem to be
V specific to faucets.

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A. Yes.

Q. So can you explain how this fits into our present exercise?

A. It doesn't mean sampling faucets. It means sampling at faucets. In other words, if you are sampling at the tap, this is the instructions as to how you would operate.

Q. If you are sampling water coming out of a tap?

A. Absolutely. And the reason for things like -- it says should be until the constant temperature, that's a very easy way of demonstrating that you are bringing in water from the mains, because that water would be at a constant temperature and you wouldn't get the variation. So it's a very simple, ad hoc approach to being able to do that.

But of course it is not intended to be adopted verbatim under every circumstances. It would be expected that any authority would actually adapt the instructions to their particular circumstances.

Q. Right. Can I also ask you to look at the previous page, 1538, under 6.1.

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A. Yes.

Q. "Pre-collection cleaning, disinfection and flushing",
"General".

A. Yes.

Q. "Cleaning, disinfection and flushing prior to sample
collection ..."

The sample here is sample of water?

A. Correct.

Q. "... depend on specific objectives of the monitoring
programme. In general, sampling to ascertain the
quality of the water delivered to a building, or to
ascertain whether the quality of water delivered within
a building is possibly altered by the service network
within the building, should not be carried out without
thorough cleaning and flushing of the sampling points."

What kind of scenario does this sentence envisage?

A. Well, where it talks about cleaning of the sampling
points, that is very specific, and it's making sure that
your sampling point, which could be the initial part of
the tap, the part that's not got water in normally until
you actually turn the tap on, that that is suitably

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clean, and it's particularly important for looking at microbiological contamination, because you do get microbiological contamination in that area, and that is not coming from the water as examined.

Q. Thank you. So can I ask you then to put the ISO document to ...

Perhaps one more question. At 6.4.1, after the sentence quoted in your report, there's a sentence which says:

"If the quality of the water as supplied to premises is to be checked, then the faucets should be cleaned and flushed at a uniform rate for 2 minutes to 3 minutes or longer ..."

What is the significance of the two to three minutes?

A. That, in many buildings, will clear the internal system,

and that's why it says "or longer" because it will depend on the particular building. But two to three minutes, in many houses, in many countries, would actually take you through to the mains water, so that you are not going to be affected by the internal

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plumbing.

So it's basically saying that you've got to flush it through for a sufficient time to make sure you get to mains water, and to an extent that is duplication of what it's saying about constant temperature.

Q. Because this is ISO, this is not country-specific.

A. No, it's very general.

Q. Therefore, what you are saying is that even though it mentions some numbers, the numbers should not be treated as bible?

A. No. It should be used according to your particular circumstances, to design your sampling, to meet the purposes that you are trying to achieve.

Q. And in accordance also, if I may suggest, of the kind of building, the houses that people live in?

A. That goes without saying, because you cannot have a standard that covers all the possible buildings that there are in the world. For example, in Hong Kong, the public housing blocks, or private housing blocks, are not normally found -- an equivalent is not found, for

example, in Europe.

Q. Thank you. Can I now then move on to your solo report, as opposed to your joint report, which is tab number 3, page 86. I'm not going to read out the instructions because I have read it out already.

Can I move straight to page 90:

"1. I Professor John K Fawell, independent consultant on drinking water and environment of Bourne End in the county of Buckinghamshire in the United Kingdom, have been appointed as one of the Commission's experts to assist the Commission in determining the matters under the terms of reference.

2. Lead in drinking water arises from lead leached from lead pipes, lead solder and other lead containing fittings, including brass and gun metal and also unplasticised PVC ... pipe not manufactured to current standards, ie containing high concentrations of lead stabiliser. It is not normally found due to contamination of source water or in water up the boundary of buildings unless there are lead service connections or lead stabilised PVC pipe (service connections are the pipes that deliver water from the

water main to the building)."

Pausing here, there's a distinction between unplasticised PVC pipe, on the one hand, and -- is there plasticised PVC pipe on the other?

A. There's a particular -- unplasticised PVC pipe is widely used as a water pipe. It is rigid. The plasticiser was in the past a lead-based plasticiser. That leached and gave significant levels of lead, and it was recognised that that quality was inappropriate, and the requirements changed, so unplasticised PVC now requires that there is no lead plasticiser.

Q. Right.

"Leaching can be exacerbated by galvanic corrosion as a result of other metals being joined to lead and will be dependent on factors such as hardness and pH. The level of leaching can be very variable from property to property depending on the configuration of plumbing and also on whether there are lead service connections. The concentration of lead in water is also a function of the surface area of the lead source in relation to the

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volume of water, so a small surface area in relation to a large volume will result in lower concentrations than a large surface area of a similar source in a similar volume. The concentration at any tap will also vary according to the temperature and period during which the water has been in contact with the lead source.

Typically first draw water will have a much higher concentration of lead but this may not reflect the

concentration of lead in water ingested in normal use. Equally, flushed samples would be expected to underestimate the concentration of lead in water ingested in normal use."

The reason why the concentration at any tap will vary according to the temperature during which the water has been in contact explains why, as you may have heard from Prof Lee, that if it's a hot water pipe, there's a higher chance of a higher lead concentration?

A. Yes.

Q. Because it basically increases the solubility?

A. We would expect that to happen. That reflects what we tend to see.

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Q. Thank you. Paragraph 3:

"There are no internationally agreed sampling protocols that can truly reflect average consumption of lead from drinking water and which are reasonably practical to apply. The most effective approach is to identify whether ..."

Pausing here, so there's no particular standard called the average quality of drinking water standard or whatever which tells you flush for how many minutes represents how much -- the kind of water that a normal human being would drink day in, day out?

A. Absolutely, because that will change from circumstance to circumstance, and the way that people use the water will be different between different, in this case, apartments, different buildings. And the only way that is really suitable is to take proportional samples, so that you have a piece of kit that attaches to the tap, and each time the consumer turns the tap on, takes some water, a proportion of that water is taken and sampled. That goes on over however long you wish to continue with

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it.

That gives you a very accurate assessment of intake of lead. It's totally impractical for routine use. It is a research tool, purely and simply, because it is a major disruption. It's very difficult to operate, you have to set pieces of kit up, and it is difficult to do.

Q. Because you need the co-operation of the residents to allow you to actually go in and mess around with their tap?

A. Absolutely. You need their agreement. You would also need an awful lot of very expensive equipment to be able to do sufficient numbers of samples to do it on a routine basis.

It could be done, and has been done, with limited numbers of properties, in order to get a feel for the likely exposure under different circumstances.

Q. In the United Kingdom, we've heard, and we have actually seen reports, on the relevant water quality authority, a kind of survey on water consumption habits --

A. Yes.

Q. -- of people in various parts of England and Wales.

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That had utilised the kind of sampling method which you have just mentioned.

A. It did. I had some involvement in that in the 1980s, and it was a very onerous piece of work to carry out. It's not something -- we were very careful that nobody made any mistakes.

Q. There's one in the 1980s and I think there's a more recent one?

A. Yes. I've not been involved in the more recent ones.

Q. But you have been involved in the one in the 1980s?

A. Yes.

Q. But even if you managed to get some survey done, as to some people consume water in this particular way and some people consume water in that particular way, that only gives you a feel as to the way most people or some people consume their water?

A. Yes.

Q. Does it mean that in designing or in advising on health risks, you can then disregard those which do not fall within, let's say, the top 60 per cent?

A. No. You have to then try and extrapolate to other

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circumstances. It will depend on the type of housing, the sort of population that you are looking at, and how likely it is that they will widely differ in their usage patterns.

But the key thing about the usage patterns on this is that it will -- whatever the usage pattern, it will give you an overall exposure. You have to then do enough different people, different families, properties, whatever, in order to get a broader feel for the level of exposure.

That is a research approach because you simply cannot do that for every single -- basically, it would mean that you would try to give every single household their own standard for lead in water, and that is not sensible or possible.

Q. Can I ask you to look at bundle A4, tab 53.

A. Yes.

Q. You can see page 2745.

A. Yes.

Q. "Water Research".

A. Yes, the "Water Research Centre".

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Q. "Domestic water use patterns", and if you look at the date, over the page --

A. 1986.

Q. The year after it snowed in the summer.

A. That's true.

Q. This is the project that you were involved in in the 1980s?

A. It is, yes.

Q. You were actually part of the team or --

A. Yes, I was involved in providing a certain amount of advice, working with Jolly, Bailey and Bob Lacey, who was the statistician.

Q. This is the one where you said they actually put taps and extra meters and loggers, as we can see at page 2763?

A. Yes.

Q. Why didn't you just do surveys by doing questionnaires and asking people questions?

A. This was considered to be the most scientifically robust way of getting actual data. The problem with surveys and questionnaires is that you have problems with

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recall, a whole range of differences that make it very difficult for an individual. You can get a broad feel for the way that somebody uses the water, but to get the sort of detail that we were looking for, the only way is

to have something that's scientifically robust, and that's this sort of sampling.

Q. Looking back at paragraph 3:

"The most effective approach is to identify whether

lead is present in the pipework leading to the tap used for drinking water and cooking. This is achieved by taking samples of sufficient magnitude to provide a sample of the water in the internal plumbing that is likely to have been in contact with any lead in the system for a sufficient period of time to allow measurable concentrations of lead to be reached.

A positive result, ie a lead concentration close to or in excess of the WHO provisional guideline value of 10 micrograms per litre, or another chosen trigger value, eg 5 micrograms per litre, would then trigger an investigation as to the source of lead, eg leaded

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solder, and the necessary remedial steps to reduce exposure. (See preliminary joint report ...) Samples taken from the fresh-water roof tanks of three public housing blocks show no lead, which suggests that there are no lead service connections or lead stabilised uPVC pipes.

4. The World Health Organization develops Guidelines for Drinking-water Quality, which are revised on a regular basis. The current edition is the fourth and was published in 2011."

We will go through that in greater detail later.

"The guidelines outline a framework for safe drinking water, which considers the overall management of Water Supplies and includes the concept of Water Safety Plans which provide a proactive means of preventing and managing hazards and risks from the catchment to the point at which consumers receive their drinking water, frequently referred to as the source to tap approach."

Just a little bit of an idiot's guide to jargon -- the catchment simply means the place where water is

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initially gathered?

A. That's correct.

Q. Be it a reservoir or a river or lake?

A. Or where it leads into the river or reservoir or lake.

So you would have, for example, if rain falls on fields and hills around a particular source, then that could be the source of various contaminants.

Q. That would count as the catchment as well, is not just the reservoir?

A. That's the catchment, yes. So the catchment is wider than just the source.

Q. The reservoir. When you refer to the "source to tap approach", this is not a term of art which is actually used in the actual guidelines, is it?

A. No, it's --

Q. Is it just a kind of scientist's colloquial reference?

A. Yes, it's a short-term way of describing the approach as

being comprehensive from the source, including the catchment right through to where it's delivered to the consumer.

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Q. The tap?

A. The tap.

Q. "The Guidelines are regarded as the scientific point of departure for the development of National Standards which should take into account the specific circumstances of the country concerned. The guideline values for chemical contaminants provide a basis for assessing the risks to health from drinking water but WHO indicates that local circumstances should always be taken into account in setting national standards and recommend that individual guideline values should be considered in the appropriate context. In this respect the statement that 'A guideline value (for a chemical constituent) normally (my emphasis) represents the concentration of constituent that does not result in any significant risk to health over a lifetime of consumption' should be treated with caution because it does not mean that contamination can be allowed to increase to the guideline value. In addition, some guideline values for chemicals are designated provisional and may be set at a higher value than would be the case for a strictly health-based value because

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practical considerations, eg lead. It is appropriate to try and achieve as low a concentration of a contaminant as possible within the constraints of cost and practicality."

Now, can I take you to that part that you quoted about "a guideline value normally represents the concentration". C2, tab 18, page 1258.

A. Chapter 1 of the Guidelines.

Q. Page 1258, in the "Introduction" chapter.

A. Yes.

Q. It's on the right-hand side of the page, of the print-out, immediately above "Radiological aspects".

A. Yes.

Q. "Guideline values are derived for many chemical constituents of drinking water. A guideline value normally represents the concentration of a constituent that does not result in any significant risk ...", et cetera.

So this is the part quoted.

Can you explain this part about the need for

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caution, because to a layperson like me, once you see a number, you can be tempted to say, "Right, as long as I don't meet the number, I'm safe"?

A. This is one of the reasons that WHO really say that member states should incorporate guidelines into their standards, into their particular standards, and take into account their particular circumstances.

There are circumstances where in practical terms we cannot recommend a guideline value that relates to the actual health-based value. Lead is a particular case in point.

What that means is we can say this is what you can practically achieve, you should try and get lower, and in due course, as we get better at dealing with this, you will be able to get lower, but in the meantime, you've really got -- this is your minimum -- you've really got to achieve this, and then after that you are looking at gradual improvement.

Q. Paragraph 5 addresses lead in particular, and perhaps that would bring out the point that you are trying to make for lead.

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If we look at paragraph 5:

"Lead has been included in all editions of the Guidelines. In the second edition, published in 1993 ..."

We might as well look at that. It's in bundle C21, tab 175-2, page 18941. That is an extract from the 1993 WHO document.

A. Yes.

Q. In fact, it starts at page 18940.

A. It does.

Q. You had a part in this?

A. I did.

Q. Under the heading "Lead":

"Lead is used principally in the production of lead-acid batteries, solder, and alloys. The organolead compounds" -- which I don't try to pronounce -- "have also been used extensively as antiknock and lubricating agents in petrol, although their use for these purposes in many countries is being phased out. Owing to the decreasing use of lead-containing additives in petrol and of lead-containing solder in the food processing

industry, concentrations in air and food are declining, and intake from drinking water constitutes a greater proportion of total intake.

Lead is present in tap water to some extent as a result of its dissolution from natural sources, but primarily from household plumbing systems containing lead in pipes, solder, fittings, or the service connections to homes. The amount of lead dissolved from the plumbing system depends on several factors, including pH, temperature, water hardness, and standing time of the water, with soft, acidic water being the most plumbosolvent.

Placental transfer of lead occurs in humans as early as the twelfth week of gestation and continues throughout development. Young children absorb 4-5 times as much lead as adults, and the biological half-life may be considerably long, longer in children than in adults.

Lead is a general toxicant that accumulates in the skeleton. Infants, children up to six years of age, and pregnant women are most susceptible to its adverse health effects. Inhibition of the activity of ..."

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Is that gamma? No?

A. Aminolaevulinic acid.

Q. Sorry, I won't try to pronounce that.

"... in children has been observed as blood lead levels as low as 5 micrograms per decilitre, although adverse effects are not associated with its inhibition at this level. Lead also interferes with calcium metabolism, both directly and by interfering with vitamin D metabolism. These effects have been observed in children at blood lead levels ranging from 12 to 120 ..., with no evidence of a threshold.

Lead is toxic to both the central and peripheral nervous systems, inducing" -- I won't try to pronounce that -- "neurological and behavioural effects. There is electrophysiological evidence of effects on the nervous system in children ..."

I won't read these. I skip straight to the penultimate paragraph:

"In 1986, JECFA established a provisional tolerable weekly intake (PTWI) for lead of 25 micrograms per kilogram of body weight ... for infants and children on

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the basis that lead is a cumulative poison and that there should be no accumulation of body burden of lead. Assuming a 50 per cent allocation to drinking water for a 5-kilogram bottle-fed infant consuming 0.75 litres of drinking water per day, the health-based guideline value is 0.01 milligrams per litre ... As infants are considered to be the most sensitive subgroup of the population, this guideline value will also be protective for other age groups.

Lead is exceptional in that most lead in drinking water arises from plumbing in buildings and the remedy consists principally of removing plumbing and fittings containing lead. This requires much time and money, and it is recognised that not all water will meet the guideline immediately. Meanwhile, all other practical measures to reduce total exposure to lead, including corrosion control, should be implemented."

This is where the 10 micrograms per litre value was first raised.

A. Yes.

Q. We can see that as translated into 0.01 milligrams per

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litre.

A. Yes.

Q. As a matter of interest, this paragraph actually says most lead in drinking water arises from plumbing in buildings. Just for our general education, you have heard about the incident in Flint in America?

A. I have indeed.

Q. Does that arise from plumbing in buildings, the lead poisoning there?

A. Service connections and buildings, and I actually refer obliquely to this later in my report.

Q. Yes, I know. So every case is different, so that doesn't concern lead solder?

A. It concerns lead fittings and lead service connections, the same as we have elsewhere, where there is a lead pipe that runs from the water main through to the property. These were very commonly applied in the 1940s, 1950s and 1960s, because the lead pipe was relatively flexible, and there was a feeling that it would not result in the lead pipe fracturing if there was movement of the ground.

In some countries, in France, in Paris, for example,

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the water pipes were run very close to the waste water pipe, the sewer, and they were installed because it was felt that there would be less chance of leakage from the sewer into the water pipe.

Q. Right. It says here:

"... most lead in drinking water arises from plumbing in buildings and the remedy consists principally of removing plumbing and fittings containing lead."

What kinds of countries, what kinds of systems is it talking about here? Because we know that in Hong Kong lead pipes were actually banned early last century.

A. That's right, but in many other countries, the UK, many parts of Europe and in the United States, for example, lead service connections in fact are still in place, a reducing number as they are gradually removed, but there were large numbers of them, it wasn't necessarily well recorded as to where those service connections were, and one of the requirements, for example, at the moment is that when the 10 is exceeded and there is an examination of the house, if there is a lead service

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connection, the requirement is that the water supplier changes that lead service connection, warns the consumer that if they have lead pipes within the house, that they should consider replacing those lead pipes.

Q. So, basically, if no symptoms arise, then people just continue to live happily, despite the existence of lead pipes around?

A. Yes, generally.

Q. Symptoms, not in the sense of health symptoms, but symptoms as the exceedance of the 10 --

A. Not all lead pipes will give rise to high levels of lead, because in some circumstances they are coated internally with very high levels of lead carbonate, if you have very hard water, for example, and there the levels of leaching will be considerably lower.

I do know of one water main that's about 500 years old that's lead, and that goes to one of the English cathedrals, and the lead levels in the water are actually very low, because the amount of calcium carbonate that's on the surface of that pipe is so great, it provides a very thick coating.

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Q. Anyway, each system using lead pipes would have maybe its own way of making sure that there's no leaching into the water, whether because --

A. Absolutely.

Q. -- naturally because of hard water, there's coating anyway, or because they use chemicals to reduce the plumbosolvency?

A. Absolutely. One of the other things is that if in a particular zone, basically a supply area, there are a significant number of exceedances of the 10 micrograms per litre, which is used as a trigger value, then there's a requirement for the water supplier to treat the water with orthophosphate, and that orthophosphate will passivate the surface of the lead, reduce the plumbosolvency and reduce the leaching. But you can't get much lower than 10 using that technique.

Q. Right.

CHAIRMAN: Why is that so?

A. It just seems to be one of those practical things.

Nobody is sure exactly why. I suspect that in some cases it's because you get particles breaking off, and

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so on. It does make it difficult to get down.

In some circumstances you may be able to get below. For a particular property, it may be okay. But when you look at the round of all the properties, it gets more difficult.

MR SHIEH: Can I then move on to page 92.

A. Yes.

Q. At the top of page 92, you basically set out the PTWI, which I have actually read out in the text of the 1993 document already, but the third line from the top of page 92, you said:

"... this guideline value was retained in the third edition in 2004 and 2008."

2008 is a revision to the 2004 edition; right?

A. It was an addendum.

Q. It's still third?

A. Yes.

Q. "JECFA re-evaluated lead in 2011 and withdrew the PTWI, stating that it was not possible to establish a new PTWI that would be health protective because the dose-response analyses did not provide any indication

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of

a threshold. The fourth edition was published in 2011 and although the guideline value of 10 micrograms per litre was retained, this was because of practicality in dealing with older systems with existing lead pipes, fittings and solder and cannot be considered in the same light as in the previous editions of the Guidelines. Lead solder was identified as a source of lead in drinking water in the second, third and fourth editions of the Guidelines."

Can we look at the 2011 version, which is bundle C2, tab 18. Page 1446.

A. Yes.

Q. There might be a typo, because your reference in the report is page 1246, but in the actual text which I am using, it's actually 1446.

A. Sorry.

Q. At page 1446, do you see the heading "Lead"?

A. I do.

Q. It should be 1446.

"Lead is used principally in the production of

A
B
C lead ..."

D The earlier part basically repeats the usage of
E lead, but if you actually look at the bottom, it tells
F you the value.

G Provisional guideline value is 10 micrograms per
H litre.

I "The guideline value is provisional on the basis of
J treatment performance and analytical achievability.

K Occurrence: Concentrations in drinking water are
L generally below 5 ... although much higher
M concentrations ... have been measured where lead
N fittings are present. The primary source of lead is
O from service connections and plumbing in buildings;
P therefore, lead should be measured at the tap. Lead
Q concentrations can also vary according to the period in
R which the water has been in contact with the
S lead-containing soldering materials.

T Basis of guideline value derivation. The guideline
U value was previously based on a JECFA PTWI, which has
V been withdrawn, and no new PTWI has been established on
the basis that there does not appear to be a threshold
for the key effects of lead. However, substantial

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efforts have been made to reduce lead exposure from a range of sources, including drinking water. Because it is extremely difficult to achieve a lower concentration by central conditioning, such as phosphate dosing, the guideline value is maintained at 10 micrograms per litre which is designated as provisional on the basis of treatment performance and analytical achievability."

Now, that basically is the message that you try to capture in paragraph 5.

Over the page, at page 1447 of the WHO document.

Under "Additional comments" in the table on top:

"Infants and children are considered to be the most sensitive subgroups of the population.

Lead is exceptional compared with other chemical hazards, in that most lead in drinking water arises from plumbing in buildings and the remedy consists principally of removing plumbing and fittings containing lead."

Then basically there's a repetition of the part that we have seen in 1993.

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In the middle of this page, below the table, there's a sentence which starts:

"Based on the dose-response analyses, JECFA estimated that the previously established PTWI of 25 micrograms per kilogram body weight is associated with a decrease of at least 3 intelligence quotient points in children and an increase in systolic blood pressure of approximately 3 ..."

Millimetre?

A. Mercury.

Q. "Hg" is mercury, is it?

A. Yes.

Q. "... in adults. These changes are important when viewed as a shift in the distribution of IQ or blood pressure within a population. JECFA therefore concluded that the PTWI could no longer be considered health protective, and it was withdrawn.

Because the dose-response analyses do not provide any indication of a threshold for the key effects of lead, JECFA concluded that it was not possible to establish a new PTWI that would be considered to be

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health protective. JECFA reaffirmed that because of the neurodevelopmental effects, foetuses, infants and children are the subgroups that are most sensitive to lead.

It needs to be recognised that lead is exceptional ..."

Again, repeating previous sentences.

Now, a few concepts that I wish you to explain and elaborate for us.

First, there is this concept called dose-response analysis. What is that? Because the previous guideline was based on a dose-response analysis. What is that?

A. That is the relationship between the amount ingested and the adverse or other effect, so that the increase in the amount of the toxicant relates to an increase in the amount of the effect.

So, as you get more, then you are likely to have a bigger effect. That's the normal situation.

So, when going down at that analysis, you can often determine that there is a point below which there won't be any effect. It's a threshold, a point beyond which

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you are not going to get any improvement because that's not going to have any more adverse effects below that level.

In the case of lead, they were not able to determine what that threshold was. Now, that doesn't necessarily mean there isn't a threshold. It just means we can't actually measure it at the moment. It's down below our area of measurement. And that provides a rather difficult situation in setting health-based standards. We don't have a basis for setting a health-based standard, or a guideline in this case.

Q. But does it mean that 10 is no longer health-based?

A. It means that 10 is no longer a health-based guideline value.

Q. Because even adopting 10, there is still the adverse effect --

A. Absolutely.

Q. -- to IQ and blood pressure?

A. Yes. That's what's stated earlier on in that particular section. So it shows that even at the provisional tolerable weekly intake, you will have effects.

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Q. So, basically, it means that you could actually do better for health purposes, but you don't know how much better?

A. Yes. You really need to do better, for health purposes, because you should not be accepting that.

Now, that gets a little bit complicated, obviously, because it involves costs and benefits, and this is looking at a population basis rather than an individual basis. So it is recognised that you need to get as low as you practically can, with reasonable cost, but the difficulty is that we can't give you a value about how far you should go. So you get as low as you can reasonably achieve within the practical terms of what you have available.

Q. But knowing that achieving that could still carry the risk of the 3 point IQ shift or whatever?

A. There would be less than of a risk. The risk would reduce as the exposure reduces, as the concentration and the level of the exposure reduces.

So if we are looking at this in context, in the past, not so long ago actually, before we took lead out

A of petrol, for example, we had children with average
B blood lead levels of around about 10 to 15 micrograms
C per decilitre. The world didn't end, but it was
D undesirable.
E

F When we took lead out of petrol, there was
G a significant drop in blood leads. We also dealt with
H lead from a number of other sources, including improving
I the situation with drinking water. The consequence is
J that, for example, in the UK or in the US, we have
K average child blood lead of 2 micrograms per decilitre
L or less. So there's been a dramatic reduction.

M So the risks from the exposure to lead have been
N reduced significantly. They haven't been completely
O removed, but that risk is a lot less now. It's very
P small. And actually measuring in an individual would be
extremely difficult.

Q Q. Thank you. In the "Lead" section which we have just
R looked at, there is this concept, in the previous page,
S 1446:

T "... on the basis of treatment, performance and
U analytical achievability."

V Is that used in contradiction with health-based?

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It's not based on health considerations, it's based on what you can achieve?

A. No, it's based entirely on practicality. It's nothing to do with the health. It's an indication that we cannot expect to change everything immediately. 2011 was when the JECFA re-evaluation was published. We were privy to that, when we were looking at the development of the fourth edition therefore that was taken into account. It recognises that you cannot overnight deal with that.

What it doesn't say, and perhaps -- and I can assure you it will be in the current addendum that's being prepared for the fourth edition -- it doesn't actually say, "If you don't have any lead to start with, you shouldn't put any in there."

Q. So basically making clearer the message that this really addresses systems --

A. Yes.

Q. -- where you are trying to bring down levels of lead?

A. Absolutely.

CHAIRMAN: Can I ask you, Prof Fawell -- I understand the

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"treatment, performance", but why is "analytical achievability" mentioned?

A. It's because in many countries their ability to measure accurately or reasonably accurately a value or quantify a value of 10 micrograms per litre is not particularly good. So we recognise that there will be countries where this will be very, very difficult to achieve, at this time.

CHAIRMAN: In the context of Hong Kong, we know the concentration of lead coming from China at a very low level --

A. Yes.

CHAIRMAN: -- 0.001 micrograms per litre or something like that, and we also heard from Prof Lee that the analytical achievabilities of their instruments, either in the university or at the Government Laboratories, is within 0.02 or 0.025 milligrams per litre. So does that mean that in the context of Hong Kong, we can actually set a guideline of, say, 2 micrograms?

A. One would argue that in Hong Kong, where lead piping was banned a long time ago, that any standard,

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Hong Kong standard, developed from the guidelines, would be a lot less than 10 micrograms per litre.

CHAIRMAN: Thank you.

MR SHIEH: Prof Fawell, there had been some discussion about the default assumption underlying these values, and how much and how long you need to take "contaminated" water, containing about 10 microgram threshold, before any ill effect would manifest itself. You know about the

70-year drinking period --

A. Yes. 70-year, in this particular context, is something of a red herring.

Q. Why?

A. Because we are talking about the most sensitive subgroups, infants and children, and infants and children tend not to stay as infants and children for 70 years.

Q. Yes. So coming back also to the point. Because the subgroup which is most sensitive to lead would be infants and children, so in designing any sampling or testing protocol, does it mean that one has to be particularly sensitive to habits associated with this

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group?

A. Absolutely. It's really important, because --

Q. Some people drink, you know, distilled water at work or whatever, but some people are home-bound, like infants?

A. Particularly important with bottle-fed infants, who will get most of their intake from water, and who will have a much higher intake of water in relation to their body weight than a breastfed infant.

So some people will prepare a bottle or a series of bottles first thing in the morning. They would fill a kettle, boil a kettle, then make up a series of bottles which are then cooled and be put in the

refrigerator and reheated at later stages. If that happens and they take first-draw water, they will be taking more than 1 litre of water, and they will have the potential for a much higher level of lead under the circumstances, so the infant may actually be getting a much higher level of exposure than an adult would get.

So therefore looking at that and providing advice around that is particularly important.

Q. But coming back to 70-year-old -- forgive me.

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A. That's me.

Q. Infants don't remain as infants for 70 years. They remain as infants for, let's say, two or three years?

A. We are talking about relatively short periods when there can be an impact, because we know that the measurement is in infants and IQ in infants. So we are talking relatively short-term exposure, months to perhaps a very few years.

Q. But does the 70-year thing mean that you have to keep taking it for 70 years, before any ill effects would manifest, so if people complain after two or three years they are making it up, because they haven't actually taken it for 70 years? I'm playing the devil.

A. At these sorts of levels, you would not expect to see acute effects, because the concentrations are relatively low, so you would not expect to see, unless individuals were doing very strange to increase their exposure significantly, acute poisoning effects in individuals.

Now, that doesn't necessarily mean that people are not under significant stress because they are being exposed to a toxin which is an unknown, they did not

volunteer to be exposed to it, it has not got their choice involved. So that can cause a whole range of effects.

I was reading Prof Bellinger's evidence and he actually touches on this and was questioned about it, and it is a difficult area. It is not saying that people who show effects are making it up, but they can be influenced by their knowledge of the fact that they are being exposed, and there are other examples of this.

Q. Can I move on to paragraph 6.

CHAIRMAN: I think, for lead, it's not so much the acute symptoms; it's rather the chronic effects on an individual.

A. Absolutely. In the past, back in the 19th century onwards, there were places where lead concentrations were achieving milligrams per litre, and there you could see frank lead poisoning in some individuals after a relatively short period.

But in this day and age, unless there are very extreme circumstances, that should not be the case, and in Hong Kong that certainly should not be the case.

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CHAIRMAN: Thank you.

MR SHIEH: Paragraph 6:

"In spite of the fact that leaded solder is known to be a significant source of lead in drinking water installations in buildings and that lead solder is banned from use for drinking water systems in many countries, incidents in which lead solder has been used in new buildings continue to occur. In 1997 a new housing estate in Scotland was found to have been plumbed with copper piping installed with lead solder ..."

Pausing here, can we look at the relevant reports, in bundle A1, tab 14 and also tab 15.

A. Yes.

Q. These are the reports and documentation flowing from that saga. There is stage 1 and stage 2 --

A. That's correct.

Q. -- in the Scottish saga, stage 1 being the emergency measures; right?

A. Yes.

Q. And stage 2 being the longer-term work being done as a result of the explosion of the saga, so to speak?

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A. Yes.

Q. We have actually been through that with other witnesses and therefore I won't be exploring that or taking you through them.

Were you aware of this incident?

A. I was partly involved in it.

Q. In what sense?

A. I was consulted by SCIEH and asked to look at the reports and comment on the approaches that they were taking.

Q. Right. For stage 1 or stage 2?

A. It was mostly stage 2, but I was aware of stage 1 because they contacted me to say that this had happened.

Q. So stage 2, the report for stage 2 is the one in tab 15.

A. Yes.

Q. 2003, Scottish Centre for Infection and Environmental Health.

A. Yes.

Q. That's the entity retaining you?

A. Yes.

Q. Then, reading on in paragraph 6:

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"... and in 2001, new properties in Wales were also identified as having lead solder."

Look at the same bundle, bundle A1. In tab 13, you can see the relevant journal reporting on that. We don't seem to have any formal report on this. This appeared in a professional journal, the Journal of Environmental Health Research.

Did you have any knowledge of this incident at the time it --

A. Yes, I was aware of it.

Q. You were aware of it?

A. Because I had reasonably close links with the Chemical Hazards and Poisons Division of UWIC.

Q. I see. You didn't do any work on it but you were aware that --

A. I was aware of this. They contacted me to let me know about it, because it was of note to them.

Q. In these incidents, materials containing lead, soldering materials, pipings --

A. Yes.

Q. -- were used, in spite of the fact that they ought not

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to have been used?

A. That's correct.

Q. I know it may not be a matter for expert evidence, but in your experience, how sound is an assumption that people would just not do things that they are not supposed to do, in the context of using raw materials?

What kinds of things, in your experience, would influence --

A. From long-term experience with lead and leaded solder, in the United Kingdom and in Europe, I would say that you simply can't rely on that, unless you have some very, very powerful mechanisms in place to stop it happening, because --

Q. Why? Why can't you rely on people's self-discipline?

A. Because half the time, people don't even know the difference between different solders. They are sold in plumbing supplies, and often -- it may not be always but often -- I know from experience they are not clearly designated as being different, and there is a price difference, and surprising, people actually will often choose the cheaper of the two, which is the leaded

solder.

And there is another issue, that leaded solder is actually easier to apply than the unleaded solder. You need more skill to apply the unleaded solder properly, and leaded solder is still allowed in many countries for domestic heating systems.

Q. Non-potable water systems.

A. Non-potable water systems. Therefore, there is a danger that people will take the wrong material, and also when repairs take place, frequently you take the first solder to hand, particularly if it's an emergency repair.

CHAIRMAN: Are you referring to a normal DIY man or are you referring to a professional plumber?

A. I'm very cautious here, I'm afraid, Chairman. I am largely talking about the normal DIY, but many of these are used by professional plumbers as well. In the UK, we looked at and discussed with the government about getting lead solder banned full stop, and the government were unwilling to do this because of representations from the heating side of the plumbing industry, and so they retained the leaded solder.

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We then continued to provide to improve the training of plumbers and the certification of plumbers, which government again were unwilling to do, for some bizarre reason which is totally beyond me.

The plumbers themselves were trying to get a certification system in place, because they saw this as important for the reputation of their particular industry.

Scotland now has such a system. The first one that

I can find is Hong Kong.

MR SHIEH: So we are advanced, on paper?

A. On paper, yes.

CHAIRMAN: Let's continue tomorrow. I think we have heard enough for the day. I would be grateful if you can come back tomorrow morning at 9.30, Prof Fawell.

WITNESS: Thank you to you.

CHAIRMAN: The hearing is now adjourned. Thank you.

2016年2月16日

下午5時01分聆訊押後

A *Annex: Realtime English Transcription based on floor / Simultaneous Interpretation* A

B Commission of Inquiry into Excess Lead Found in Drinking Water Day 55 B

C Tuesday, 16 February 2016 C

D (9.34 am) D

E (Transcript of simultaneous interpretation E

F except where otherwise specified) F

G PROF JOSEPH HUN WEI LEE (on former oath) G

H Cross-examination by DR WONG (continued) H

I DR WONG: Good morning, Prof Lee. I

J I would like to take you to V1/149, figure 1. J

K By the 40th second, it would be over 20 metres, that K

L is the length of the pipe? L

M A. Could you repeat, please. M

N Q. By the 40th second, the flushing pipe will be more than N

O 20 metres; is that correct, to say this? O

P A. Yes, more than 20. P

Q Q. 50? Q

R A. No, 20 metres. R

S Q. Yes, yes. 20 metres. The length of the horizontal pipe S

T is 20 metres. The plumbing volume is on the basis of T

U 20 metres? U

V A. Yes, a typical length is this. V

Q. In this particular case it's 20 metres? Q

A. Yes. A

- 1 -

Q. By the time we reach the 40th second, the whole horizontal pipe would have flushed once; is that right?

A. Yes, you may put it this way.

Q. By the time we reach the 60th second, it would be 40 metres; is that right?

A. Can you speak up a little bit? I can't hear you.

Q. T equals 60 -- it would reach 40 metres. T equals 80, it would be 50 metres. That would mean that the pipe would have been flushed twice?

A. Right.

Q. Let me refer you to two figures. Page 173.2. These are the figures that we obtained on Saturday from your attachment. Page 173.2, Yan On Estate, there are two data I would like to refer you to. Yan On -- hold on a second, please.

A. Yes.

Q. Yan Yuet House, if you look at 920, Yan Yuet, flat 920, the flow rate is 269. That's about an average flow rate. So it's approximate to the figure 1 model.

The first-draw water is 0.005, second draw, 0.005, the third draw, 0.006, the fourth drawn water,

60 seconds, 0.027. That's much higher than, isn't it?

T equals 60 seconds -- by that time, that would take us to the down pipe, because it is 40 metres. This is beyond the horizontal pipe, isn't it?

A. I don't think you can put it this way. We are looking at it in a linear way. In fact, it is three-dimensional. There are trappings and things.

Figure 1 is a summary, a conceptual idea. Say, for instance, 60 seconds, 0.027, is in down pipe -- not necessarily. Maybe it's still in horizontal. There are twists and turns and there are a lot of recirculations. One single particle may go around and around before coming out.

So it is likely it is within the supply chain, although I don't rule out the down pipe, but based on the data, this is really the case.

Let's deal with the physics. In the 20 metres of the supply chain, figure 1 is a translation or interpretation, but in actual fact this is not translational. With all the bends and everything, a single particle may vary. If you imagine, in the

water supply system, if there are lead particles in different parts of the water supply chain, there may be many different reasons why we wouldn't see them until after 60 seconds. There is an element of randomness in the turbulence and a particle may be picked up at random.

So there is no conflict there.

Q. Thank you. Thank you for your elaboration.

The other observation is this. Let's take 920 as an example. If you take the first-draw water and second-draw water, we can't really see the effect, can we? Because it's not until the fourth draw that we can see 0.027. Even if you flush it, you can still get the same result. If you want to see whether, in the pipes, the lead has been leached into the water after you flush it for one minute, you can still see it, can't you?

A. We said yesterday that there are some outliers that may not be in line with the trend.

Q. Outliers, I will come to that in a moment.

A. To answer your question -- I beg your pardon -- yes, after flushing one or two minutes, the value would still

be representative. It would represent the lead contamination. There is indeed representativeness, although the value would be on the low side, because of the physical property.

Comparatively, there is still a value there, although this is not maximum exposure.

Q. I agree with you that this is not maximum exposure.

Let's have a look at another data. Yan Chung House, 2403, the flow rate is 146, a little bit smaller. The first-draw is 0.003; the second, very clean, nothing; the third draw, 0.012; the fourth draw, 0.008; the fifth draw, 0.030.

Professor, when you get the flushed samples, you can see that the changes in the lead are being leached into the water, according to the figure?

A. To a certain extent, this makes sense, but my interpretation is that the flushed sample means that you turn the tap on and then flush it for two to five minutes. That's the maximum flow. That's my understanding of the fully flushed sampling. This is also turning the tap on, full on.

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C Q. But the flow is smaller here? C

D A. The flow is smaller here. D

E Q. Prof Fawell has a submission, paragraph 25. Let me turn E
to that. V/98. E

F "(In English) ... the most probable cause of the F
G lead exceeding 10 micrograms per litre in flushed G
H samples is particles of lead compounds mobilised by the H
I flushing process from the deposits downstream of the I
J joints containing lead solder." J

K Do you agree with this conclusion? K

L A. My understanding is that there are two components L
M leading to high concentration. One is dissolved, the M
N other one is particles. From this sampling data, the N
O two components do exist. So this is a rather general O
P statement. It doesn't conflict with what we said. But P
Q I don't think it's all down to particles. Some of them Q
R are dissolved, and there are dissolved particles. We R
S have some measurements in this regard. S

T Q. Let's look at another diagram. Paragraph 6, page 132: T

U "(In English) There is currently no universal U
V accepted method for sampling lead in drinking water; the V

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C appropriate method depends on the particular purpose for C

D which sampling is carried out." D

E We agree with this absolutely. So that depends on E

F the purpose. If the purpose is to get the maximum, to F

G capture the maximum, then when you decide the sampling G

H method, it will be different from what you would like H

I to I

J get as a representative sample. J

K CHAIRMAN: Wait. Representative sample of daily drinking K

L water, what do you mean? L

M DR WONG: Representative sample. M

N CHAIRMAN: What do you mean by "representative sample"? N

O DR WONG: Let's look at the WHO standards. O

P CHAIRMAN: It seems that we have returned to yesterday's P

Q issues. Q

R DR WONG: C2/1258. This is a WHO document. On the R

S right-hand side, the second paragraph: S

T "(In English) The guidelines to not attempt to T

U define minimum desirable concentrations for chemicals U

V in V

drinking water."

Next:

"(In English) Guideline values are derived for many

C chemical constituents of drinking water. A guideline
D value normally represents the concentration of
E
F a constituent that does not result in any significant
F risk to health over a lifetime of consumption."

C

D

E

F

G CHAIRMAN: So? Yes, it's so written.

G

H DR WONG: If we have a sampling protocol which aims at
I getting the maximum concentration, with this in mind --

H

I

J CHAIRMAN: I can't hear you.

J

K DR WONG: Prof Lee, if we decide the sampling method, the
L purpose of which is to find the maximum of lead
L concentration in drinking water, with this purpose in
M mind, when we design the method, we would design the
M format with this in mind. For example, how many
N first-draw samples, sample volume, weighting, how to do
O the calculation, and so on and so forth; right? If the
P purpose of sampling method is about compliance with WHO
Q standards, that is the representative lifetime
R consumption.

K

L

M

N

O

P

Q

R

S CHAIRMAN: Please say it again.

S

T DR WONG: If the sampling method, the purpose of which is
U to

T

U

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C find a representative thing to represent the C

D concentration of the constituents, that does not result D

E in any significant risk to health over a lifetime of E

F consumption. If I had this purpose in mind, then the F

G sampling method would be different; do you agree? G

H A. Different circumstances may lead to different matters, H

I I agree, but for this incident, I think the purpose is I

J to identify risks associated with lead contamination. J

K If you talk about compliance, the general conditions are K

L all right within, and it is something within buildings. L

M It's average over a lifetime. If you don't have the M

N maximum, you don't have the mean; you don't know what N

O is the consumption over a lifetime. O

P Q. You mentioned something about ISO in your preliminary P

Q report. ISO 5667, C2/1539. You have seen this before? Q

R In the middle part, 6.4.1, I would like you to look R

S at paragraph 3: S

T "(In English) For non-microbiological sampling, all T

U fittings should be removed and faucets cleaned then U

V flushed for 2 minutes to 3 minutes (to constant V

temperature) before samples are collected."

Can you see that? ISO is an international standard.

For non-microbiological sampling, that is lead and
chemical sampling, it seems it is clear that:

"(In English) ... all fittings should be removed and
faucets cleaned then flushed for 2 minutes to 3 minutes
(to constant temperature) before samples are collected."

Why is there a need to maintain constant
temperature? What's the use of that?

A. Of course, there's some background to this paragraph.
With different temperature, you would affect the
chemical reaction and biological behaviour. So

I believe this is some background to this general
advice.

CHAIRMAN: Are we just talking about faucets? What's the
relationship with the fittings and everything that we
are talking about? Because this is just about faucets.

DR WONG: Prof Lee actually has cited something from the
first paragraph. I will refer that to Prof Lee.

CHAIRMAN: Where can we find this in Prof Lee's preliminary
report?

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C DR WONG: V/6. The second paragraph -- C

D CHAIRMAN: V6? D

E DR WONG: V1, page 6. The second paragraph: E

F "(In English) The International Standards F

G Organisation standard (ISO-5667-5) on sampling G

H techniques of drinking water from treatment works and H

I of pipe distribution systems states that 'If the effects I

J materials on water quality are being investigated, then J

K the initial draw off should be sampled. Samples may K

L also be taken after a specified period of stagnation to L

M provide information on the rate at which materials M

N affect quality or the maximum likely effect.' For N

O example, in the UK (England and Wales) standards for O

P drinking water quality ..." P

Q CHAIRMAN: There's no need to read out the rest. Q

R DR WONG: Okay. R

S CHAIRMAN: So you have read out this paragraph. What next? S

T DR WONG: Turning back to 6.4.1 -- T

U CHAIRMAN: Which shows 6.4.1. In line 5, are you really U

V citing 6.4.1, Prof Lee, or are you referring to other V

paragraphs?

A. On the whole, 5667-5 covers a big field. I refer to it to make the point that we need stagnation, we have to consider what the first draw is. It's not just really about 6.4.1. This is about faucets.

COMMISSIONER LAI: You should spell out the linkage as you see it. What's the relationship between what you have referred to and what you are trying to suggest?

DR WONG: Prof Lee, I just want to make sure that I understand it correctly.

CHAIRMAN: I can see in line 5, under the big heading "(In English) Faucets", but Prof Lee, in his preliminary general opinion, was talking about the big picture, when you link the two together.

DR WONG: Well, Prof Lee, in V1, page 6, was the quotation from this particular paragraph or from another page of the ISO document?

A. I don't think it's directly related. It's from a general source.

CHAIRMAN: Then we have a big problem. If you take a sentence out of context, it doesn't make sense; it's

C confusing. C

D DR WONG: Sorry, Chairman -- D

E CHAIRMAN: You should have done your homework. You should
F look up the entire document and you can suggest that
G there's no -- you cannot find anything like that, except
H in this paragraph. H

I DR WONG: Actually, the Commission's counsel was also
J referring to 6.4.1, when he asked questions. J

K CHAIRMAN: Well, you represent the WSD. You could have
L challenged Mr Shieh or other counsel that this is taken
M out of context. M

N DR WONG: Maybe I should move on, to avoid further
O controversy. O

P CHAIRMAN: You say that this is in the preliminary joint
Q report. Are you suggesting that that particular
R reference or sentence is incorrect? R

S DR WONG: No. I'm just saying that we should look at the
T entire paragraph. T

U CHAIRMAN: Well, this is about faucets. The first sentence
V is:

"(In English) Depending on the objectives of the
monitoring programme, it should be decided whether

samples are required from faucets ..."

We are talking about faucets. Then they talk about sampling methods. It is not about general quality of water.

DR WONG: Is it?

CHAIRMAN: It's about investigating the water that passes through the faucets, and how faucets can contaminate water.

DR WONG: Chairman -- or maybe I should put the question to Prof Lee.

CHAIRMAN: Well, you should tell us. Although I know what you are trying to say, but the Commissioner next to me is not in a court every day. If you want to show something, you should tell us what you are trying to express, what's your objective of that, so that people understand what you are driving at.

DR WONG: All right. Correct.

MR SHIEH: In 6.4.1, concerning flushing -- Mr Wong's point is that whether it should be flushed or not depends on the objective, so I don't think -- the contention is not that we should have a flushed sample. If you look for

C general quality of water, it's agreed. The question is
D not whether it should be flushed. To find the general
E quality, or the contention is with different objectives,
F you should have different sampling. If you just want to
G know the general quality of water, then you need to do
H flushing. So I think the first question is not really
I appropriate, if we want to find general quality.

C

D

E

F

G

H

I
J CHAIRMAN: Then there's no need to ask. Flushed is the
K answer, because if there's no flushing, it may not be
L the maximum, but depending on the stagnation period, it
M can be eight hours, six hours, 12 hours of stagnation.
N Depending on the period of stagnation, the so-called
O maximum concentration would depend on the sampling
P protocol.

I

J

K

L

M

N

O

P But the question is if I want to find out, for
Q example, the maximum concentration within 12 hours,
R I need to allow stagnation. If I just want to know, in
S the afternoon, 12 noon, after everyone has risen up and
T out, and you want to find out the water quality, then
U you flush the sample, and you think that that is the
V representative sample, say so.

P

Q

R

S

T

U

V

But as Mr Lai told you yesterday, in Hong Kong, many people would rise in the morning and drink water from the tap. Can the director advise people in NT West to flush for two minutes and NT East to drink right away, but Kowloon West, it's dangerous, flush it for five minutes? So which is a representative sample?

DR WONG: Chairman, I'm with you.

CHAIRMAN: Coming back to Mr Paul Shieh's opposition, for the fully flushed sample, if you say that this is a representative sample, you say so, we don't have to get into an argument. You don't have to put this to Prof Lee, because this is your stance and we understand your stance. Your chief chemist, Mr Chan, has already said this. Whether this is right or wrong is another matter altogether.

COMMISSIONER LAI: Let me say this. We all understand the WSD's position. The safest way is to flush the system for some time before consumption; it would be safest. After flushing, if the water test did contain lead, then there are problems. That is your position. It cannot be clearer. But there are some people who argue, "Do we

really need to flush the water before consumption?"

Some say that we should expect a higher standard, that at any one time we can turn on the tap and drink the water in a safe way.

We have seen the water in many housing estates that is problem-free. Whether you flush it or whether you take the first-draw sample, there are no problems. This is the case with many of the housing estates. Why cannot this be the standard? In overseas jurisdictions, the UK and the US, they had the lead fittings. They have been around for a long time they cannot achieve the standard that we can achieve in Hong Kong, because we have already banned the lead fittings for a long time, and the situation of lead being leached into the water is very low. We can achieve a pretty high standard. At any one time we can turn on the tap and drink the water safely. That's another argument together.

In fact, we do have the clear idea that at different times of sampling, the results may be different. As I said yesterday, taking sample is taking sample. If leaded solder is used, some is lead-free, and the

results may be different. We all accept this variation.

I think the position can't be clearer.

The WSD's position is that one should flush the tap before using the water -- is this the standard that we should accept? That's the difference.

DR WONG: Thank you very much, Mr Lai, for your observation.

On behalf of the WSD, I must say that for the WSD, it is our objective to achieve safe water out of the tap without flushing. This is very much our objective. In water treatment, we all seek to achieve this objective.

CHAIRMAN: So the representative sample should be any time, isn't it, whether it is stagnation or whatever, whatever sampling method or protocol would be the same?

DR WONG: It would yield minimal value. There is a transient nature.

CHAIRMAN: You are wrong. This is not the stance of the WSD, if you are saying that water coming out of the tap after stagnation would not be acceptable, if this is your stance -- is that what you mean?

DR WONG: Chairman, if I may clarify, if I may explain here.

Our objective is obviously for the water to come out of

the tap safe for consumption.

CHAIRMAN: But once the water has entered into the inside system, we understand that once it is in the inside service there are limitations. The water may not come out of the tap at the same quality as the water going into the system. That we understand. But this is not the subject we are discussing.

COMMISSIONER LAI: That's a responsibility problem. The WSD

is saying by the time the water reached -- before it reaches the connection point, it is safe. When the water comes out of the tap unsafe, then it is quite another matter. So it is a question of responsibility. Once the water has entered into the flat and lead is in the water, then there is this element of responsibility; should it be the responsibility of the WSD or anybody else?

CHAIRMAN: The professor has a point.

A. Mr Wong, I have read that sentence. If the quality -- the supply to the premises is to be checked, if the water supply to the system is to be checked, then the faucets should be clean and flushed at a uniform rate

for two to three minutes or longer, if necessary, to
achieve constant temperature.

Inside the system, the water may be at a different
temperature. The purpose is to check the quality of the
water supplied. To answer your question, 6.4.1 is
a general picture that also applies. The purpose is
different, the purpose is to check the quality of the
water as supplied.

DR WONG: Thank you so much, Prof Lee.

Prof Lee is absolutely correct.

CHAIRMAN: I know he is correct. We understand what
Prof Lee is trying to drive at in his report. If you
want to know about the general quality of the water,
either you take the sample from the lot boundary or you
can flush it for 30 minutes or 60 minutes. You can
flush it until the water is clean and then you take the
sample. Then it is the general quality of the water
supply.

But in this Inquiry, the focus is not so much on the
general quality of water supplied. We are talking about
the water in the inside service.

C As Prof Lee has undertaken, he is looking at the
D changes in the water quality.

C

D

E DR WONG: I have no further follow-up, Chairman, on this.

E

F Professor, you said:

F

G "(In English) If the quality of water as supplied to
H the premises is to be checked, then the faucets should

G

H

I be cleaned and flushed at a uniform rate for 2 minutes
J to 3 minutes ..."

I

J

K How do you understand the water quality supplied to
L the premises?

K

L

M The plumbing volume, if we use two to three minutes,
N we may not get water from the connection point because
O the plumbing volume would be a couple of hours.

M

N

O "If the quality of the water as supplied to the
P premises is checked ..."

O

P

Q Then we cannot understand that to be at the
R connection point. We should understand it to be at the
S individual flats.

Q

R

S A. "Premises" means the lot boundary. Intuitively, it
T should be the lot boundary, not the distribution system.

S

T

U Q. If the premises are interpreted as the lot boundary, you

U

V

V

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C cannot take the water in two to three minutes? C

D A. Yes. D

E Q. So flushing for investigation purposes, you are taking E

F water from the inside service. It does carry some value F

G because there are particles running through the flow G

H path. H

I A. What is your question? Let's see. I

J Q. My question is the two to three-minute flushing, it J

K would depend on different contexts. It may not refer to K

L the connection point. It may not refer to the lot L

M boundary. Do you agree? M

N CHAIRMAN: I don't understand your question, Mr Wong. Can N

O you make it simpler for us, please? O

P DR WONG: My question is very simple: P

Q "(In English) If the quality of the water as Q

R supplied to the premises is to be checked ..."

S The "premises" will have to depend on the context, R

T it doesn't have to be interpreted as the lot boundary. S

U CHAIRMAN: Where are you talking about? T

V DR WONG: 6.4.1. That's also read out by the professor: U

"(In English) If the quality of the water as V

C supplied to the premises is to be checked ..."

C

D Then it would depend on the context. Some, we could
E achieve that in two to three minutes, but in Hong Kong,
F you cannot be talking about the lot boundary.

D

E

F CHAIRMAN: The first paragraph?

F

G DR WONG: Yes.

G

H A. I wouldn't disagree, but I doubt whether this is
I applicable to Hong Kong. This may not be the situation
J of Hong Kong, when this guideline was drafted.

H

I

J

K If you are talking about a single house, in terms of
L the premises, then it would be different. I don't think
M there is the lot boundary in the background. I think it
N is a general principle that you should flush for long
O enough to make sure you get the water as supplied.

K

L

M

N

O

P Q. Let me refer you to another document. Prof Lee, C19.6,
Q page 14593. Prof Lee, this is the fourth witness
R statement of Mr Chan Kin Man, our chemist, who has made
S a response to your opinion, we cited the UK, the US and
T Japan. We cite Canada. Have you read this document,
U Professor?

P

Q

R

S

T

U A. I have read Mr Chan's document.

U

V

V

C Q. Page 14593, the guideline for Canada. The left-hand
D side, the guideline:

E "(In English) The maximum acceptable concentration
F (MAC) for lead in drinking water is 0.010 mg per litre.
G It is recommended that faucets be flushed before water
H is taken for analysis or consumption."

I This is the conclusion drawn --

J CHAIRMAN: What conclusion? This is the guideline, not
K conclusion.

L DR WONG: Yes.

M CHAIRMAN: This is a recommendation. What do you mean by
N "no higher than that"? Don't add something into that.

O DR WONG: It's the maximum acceptable concentration. If
P this is the MAC, then the recommendation is that you
Q should find out whether this standard is reached, and
R the recommendation is to have the faucets flushed.

S CHAIRMAN: This is for general quality. This is acceptable.
T You want to test the general quality, by all means,
U flush. We have covered that already. It's back to
V Mr Shieh's point. What is the question you want to ask,
question 1 or question 2?

If you want to tell us, as far as general quality is concerned, then you need to do the flushing, everyone here accepts, even Mr Lee is nodding his head.

DR WONG: I just want to make it clearer.

CHAIRMAN: It's already clear enough.

DR WONG: Let's just say if the benchmark is the WHO standard of 10 milligrams, if we are to do an exercise --

CHAIRMAN: What exercise?

DR WONG: To check the general quality of water in Hong Kong to see if it's in line with WHO standards, then we should use flushed samples.

CHAIRMAN: Yes, acceptable to all here.

DR WONG: Then I can save some time.

CHAIRMAN: Do you know what we have been talking about? Do you understand that?

DR WONG: I just want to clarify something. It seems there's an opinion that we should capture the maximum lead concentration, and then benchmark it with the 10 milligrams of the WHO.

CHAIRMAN: I don't think anyone has said that. Has anyone said that? Who said the maximum should be equal to the

WHO benchmark? Or maybe I have misunderstood something.

The maximum is dependent on the sampling protocol, the stagnation period, say it's 20 or other length of time.

So how can you compare the maximum with the WHO

benchmark?

DR WONG: I understand what you are saying, but it seems that we are speaking at cross-purposes.

CHAIRMAN: No. The general position is this. If the general quality of water is 10 micrograms and the fully flushed samples would be accepted, but Prof Lee has taken one additional step. If you want to find out the inside service on lead in water, we need to do this sampling protocol. For example, 20, 40, 60 seconds; you would be able to capture -- when the water really flows out of the tap, how the lead concentration would decline. After a minute, in three flats, after 300 seconds or whatever, you can see the change.

Then, looking back, you can use data to do a computational fluid dynamic analysis, and you can tell the leach.

DR WONG: That's not a problem, but what I don't quite

C understand is if the modelling is to try to get the C
D measurement of maximum and then you can use it to find D
E out the concentration, and then you try to conclude E
F whether in this building the WHO standards are complied F
G with, then that's a problem. I can agree that you want G
H to take the extra step to find out the maximum. Then H
I I don't have a problem with the modelling. I

J If we use such a sampling protocol and then we try J
K to get the building concentration and then the flat K
L concentration, and then we compare the finding with the L
M WHO benchmark, and then we say that it's a breach, M
there's a logical thought there.

N CHAIRMAN: All right. If the WSD thinks that this is not N
O in O
P exceedance of the WHO standards, so be it. Prof Lee is P
Q not trying to argue whether this estate is an affected Q
R estate or not. He is just trying to tell us, when lead R
comes out, and factually how.

S The WSD and the Housing Department may decide -- you S
T may decide you don't need to do anything after seeing T
U Prof Lee's reports. Then you have to shoulder your U

political responsibilities.

DR WONG: I will be talking about Prof Fawell's report. One of the recommendations for sampling protocol is to do some preparation. I was asking Prof Lee about the sampling components, sampling volume, the time taken.

Prof Lee, if the WSD wants the benefit from your research, do you think that your sampling protocol can be further improved, and if so in what ways?

A. As I said yesterday, there's an objective to start with,

and the sampling would be able to achieve the objective.

As for modifications and how to interpret on this basis what is a reasonable sampling approach, I will have to leave that to the WSD and the Housing Department, because the best fit for purpose for sampling protocol is something only the WSD can tell, because it has to be suitable and appropriate for the objective and environment.

CHAIRMAN: There are many variations from estate to estate.

How can one generalise?

DR WONG: Chairman, every estate is different, but we need to go by some kind of criteria. We cannot re-invent

C a sampling protocol for each estate. C

D CHAIRMAN: It's up to the WSD. You can draw up Hong Kong
E water sampling guideline or protocol. There's one from
F the WHO. You can certainly come up with something based
G on local circumstances, not just for public rental
H housing estates. It's something for Hong Kong
I generally. You shouldn't just be looking at the case of
I PRH. I

J DR WONG: Well, we follow ISO. J

K CHAIRMAN: The same goes for ISO. ISO applies to the whole
L world. Hong Kong is a developed city. If you go to
M a village in Africa, they may not even have a beaker.
N How can you do this? It's ISO, it's all the same, it's
O the WHO, but you have to fit, to adapt, to the local
P environment and conditions. You should tell Prof Lee or
Q you should ask your people in the WSD, you are
R scientists, you are the true experts on drinking water.
S You should sit down, devise a plan, a protocol, sampling
S guidelines, suitable for everyone in Hong Kong.

T DR WONG: I have heard you, Chairman. I have heard the
U suggestions. I will relay the message. But I would
V

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C like to spend five minutes to look at Canada, C

D a developed country, and water sampling protocol for D

E drinking water that they have adopted, the rationale and E

F the principles involved. So let's look at page 14601. F

G Prof Lee, you can see the rationale there. The G

H left-bottom corner, you have this: an MAC formula. The H

I right-hand side, top right-hand corner, it's based on I

J a two-year-old child, and consumption of 0.6 litres per J

K day, average daily consumption for a two-year-old child. K

L Then you can see two paragraphs in bold letters. In L

M order to get the maximum acceptable concentration, the M

N analytical sampling would have to be based on the N

O flushed samples. O

P "In order to minimise exposure to lead introduced P

Q into drinking water from plumbing systems, it is Q

R recommended that only the cold water supply be used, R

S after an appropriate period of flushing to rid the S

T system of standing water, for analytical sampling, T

U drinking, beverage preparation and cooking." U

V CHAIRMAN: In Canada, they may be still using lead pipes. V

Do you understand?

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C DR WONG: Maybe. C

D CHAIRMAN: It must be. That's why context is important. D

E Don't quote out of context. E

F A. What's your question? F

G DR WONG: Do you agree with this Canadian sampling protocol? G

H You may say it is not suitable for Hong Kong because in H

I Canada they use lead pipes. I

J A. The literature would be referring to the cumulative J

K impact of lead. So you want to look at the average K

L concentration, naturally. As I said yesterday, the mean L

M concentration is really about the lead intake. M

N On the point of whether it should be flushed, N

O I don't see any conflict here. If it's not been used O

P for a long time, you need to flush it so as not to have P

Q any distortion. It is reasonable. We asked for Q

R flushing for five minutes the night before. We need to R

S consider that stagnation -- an appropriate period of S

T flushing. Even for our sampling protocol, we do it. We T

U flush it for five minutes the night before. U

V So I think everyone adheres to the same principles. V

W We all agree on the point about short-term consumption. W

There's nothing that we don't agree to.

Q. In your preliminary report, you refer to the US and the UK. Did you look into Canada, Australia and New Zealand?

A. It's something fundamental. I think Prof Fawell has the same view. We look at the major jurisdictions, systems, and it seems to be a commonly-held understanding. I did not refer to all the countries concerned. I didn't, in other words.

Q. In the fourth statement of Mr Chan, he refers to New Zealand, Japan, Australia. After they make a pledge or maximum, they use flushed samples.

A. Please repeat your question.

Q. In Canada, Australia, New Zealand, Japan, as mentioned by Mr Chan's statement, they all use flushed samples.

CHAIRMAN: For the purpose of testing what?

DR WONG: Testing general quality of water.

A. As I said, it's not controversial. In Japan, they flush first, and then allow stagnation for 30 minutes to an hour. It is not controversial.

Q. In Mr Chan Kin Man's statement, there's a diagram showing how it's done in Japan, flushing for five

C minutes and allow stagnation for an hour. In Japan,
D they don't take the first draw.

C

D

E A. They stagnate the water, they flush five minutes, then
F they stagnate.

E

F

G Q. So they don't take the first-draw water?

G

H A. The stagnation period is different though. The

H

I sampling, you can say that eight hours ago, flushed five

I

J minutes and after eight hours we take the first draw of

J

K water in the morning. I can't see the conflict between

K

L the two.

L

M Q. There's a minor point, though. You said that in Japan,

M

N they use the first draw.

O A. It is a general statement.

N

P Q. In your preliminary report, you refer to the US. The

O

purpose of getting the first draw is not to test the

P

Q general quality of water.

Q

R A. They have the action levels.

R

S Q. You know, the action level and the MAC level would be
T different?

S

T A. Action level means there is an action.

T

U Q. They said that after the sampling, if there is

U

V

V

a 10 per cent concentration, then they would take
action, otherwise they won't take any action.

A. Yes.

Q. I have another subject to take up with you, Prof Lee.
The sampling procedure. Was it you who was in charge?

A. Yes.

Q. Did you tell your research team how cross-contamination
should be avoided?

A. In our appendix, yes. Appendix IV, if I remember
correctly. Appendices IV and V, we have mentioned that.

We have the HSEO, the Health, Safety and Environment
Office. There is a lab, and the officer in charge would
provide the training. The sampling team does have some
research background. They have the MPhil qualification.

They do have some research sense and must have some
relevant experience. Also, the HSEO lab provides the
training, and we've had a number of trial runs before

we

mounted the exercise.

So the key thing is to stop contamination. That's
the key thing. We cannot stress and emphasise this

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C more. C

D Q. Prof Lee, V/169, if you look at the pictures there -- D

E let's look at picture (a). The person took the sample E

F at the tee joint with bare hands. The bottle is very, F

G very close to the faucet there, isn't it? G

H A. Yes, this is taking water from the tap. H

I Q. Do you think the distance is safe? I

J A. Safe in the sense that there is no contamination? J

K Q. Yes. Did you think that this distance is safe in terms K

L of no contamination? L

M A. We took the sample there. If you look at this picture, M

N you can't see whether the bottle is touching the tap. N

O We try not to touch the tap. We did consider the O

P particular point. Everything has been discussed. We P

Q try to avoid touching. Q

R Q. (b). This is the entry point. You are taking a water R

S sample there. There is a wire hanging down, the S

T earthing hanging down. There is some wiring touching T

U the pipe. How do you respond to that? U

V A. This is not clear from the picture. V

CHAIRMAN: This was installed by the Water Supplies

Department, wasn't it? That's the water meter and the entry point. It is the WSD that did the installation.

A. Let me explain this.

CHAIRMAN: Are you saying that this was wrongly done?

A. These vacant flats, we looked at them together with the WSD and the HD. They were very helpful and they had the meter installed and then we took the measurement there.

What is your point? Are you saying it is not safe?

That's how they do it. They allow us access to the

flat, and we can't make it perfect. I don't think I'm with you here. How is it relevant to the sampling?

Q. Professor, you took sampling from the 43 estates, to look at the water quality -- 43 buildings, 14 estates.

Did you conduct a similar exercise before?

A. No, this is the first time that I did this exercise.

But field sampling, I've always been doing it.

Q. Field sampling I know, but drinking water sampling, how many times have you done it?

A. Drinking water for housing estates -- are you talking about drinking water in terms of lead?

Q. Not necessarily lead, not sea water, but drinking water

sampling.

A. Drinking water sampling, for water quality, I have done a lot; Dongjiang water, I've done it. I have looked at the whole of Hong Kong, all the reservoirs. Obviously, this is a new issue for Hong Kong, and we want to identify a solution. That's the whole purpose.

So this lead issue is new to me. There is so much that is new to me.

Q. Faced with this new issue, you devised a new protocol. You have devised a new sampling protocol for this new problem.

A. Senior counsel, let me interrupt here. We devised a protocol that can achieve the purpose.

Q. We understand your objective and that is to find out the maximum concentration. Was it you who devised the protocol on your own or was it devised in a team or together with Prof Fawell?

A. I was the chief architect but I had to talk with the team. They talked about the sampling interval, the resources. I talked with the chemists, the researchers.

We did have a lot of considerations.

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C	The design of the whole sampling protocol was the	C
D	result of a lot of interactions. We have to make it	D
E	achievable. We must have water support and quality.	E
F	Without any quality being achieved, we may as well not	F
G	do it. Also, the constraints of resources, can we	G
H	achieve these within a couple of weeks? We spent about	H
I	a month and we have to work alongside with the	I
J	government departments, and we may identify you need	J
K	full sampling and they may refuse.	K
L	To answer your question, I must say that I was the	L
M	chief architect for the whole programme, but in	M
N	developing the protocol, it was teamwork.	N
O	Q. So that explains why you spent two months on the	O
P	preliminary report.	P
Q	CHAIRMAN: How many people are there in your team?	Q
R	A. Three or four were closely related. We have been	R
S	working for many, many years there. They are very	S
T	experienced researchers. They have covered many, many	T
U	different issues.	U
V	We do have chemists in the labs, a couple of them.	V
	We also have a few coordinators, someone who is in	
	charge of the whole thing. We have Dr Lau in this HSEO.	

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C Willingness is also important. In this day and age, C

D this is important. D

E I am glad that the students are also willing to E

F do it. F

G CHAIRMAN: I'm sure there must be half a dozen who have G

H a doctorate degree in your team? H

I A. Six or seven. I

J DR WONG: That means why you spent two months or more J

K putting together the report. K

L CHAIRMAN: What question is this? L

M A. Well, the whole survey covered the period until the M

N 24th. I think on the 24th we submitted a report, and N

O there were some loose ends to tie up and we will have O

P the results to be made available. That took us until P

Q the Lunar New Year, and that's the whole process as Q

R senior counsel. R

S DR WONG: Finally, let me look at some of the data. This S

T is my final topic. Page 173.1. T

U If I may refer you to page 173.2, Ching Ho Estate, U

V Ching Hin House, flat 2202. Ching Ho Estate, Ching Yu V

House, flat 2202; flow rate 306, T equals to zero;
second, 0.002; and the third one, nothing, 0.082; the
fourth one, zero; then the flat concentration, 0.011.
So the third one shows excess lead concentration.

We will look at Yan Chung. If you up look at
Yan Yuet, 920, flow rate 269.

A. What was it?

Q. Yan Yuet, 920. Flow rate, 269. The fourth draw, 0.027,
but the flat concentration is okay. It's because the
weight for the fourth draw is lower compared with other
draws. So although it fails at the fourth draw and it's
a high figure, the overall concentration is still okay?

A. Yes, you can put it like that.

Q. The next page, 173.3. Lower Ngau Tau Kok, Kwai Yuet,
the first one. Sometimes you take two samples,
sometimes three. You said it is because of resource
constraints, time limits, so you didn't take five for
all. 1718, for Kwai Yuet, first draw is very good,
0.007. The second draw, after T equals 40 seconds,
0.013. This is excess, but the flat concentration is up
to standard. It is because of the weight given. Kwai

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C Sun, flat 2720. C

D A. Yes. D

E Q. Flow rate, 336. The first draw is very clean, 0.003; E

F second, T equals 40 seconds, 0.014. Again, the flat F

G concentration is okay. Again, it's about the weight G

H given. H

I A. Yes, you can put it like that. I

J Q. I won't go over all the examples, but there are many, J

K such examples. K

L A. Counsel, maybe I can supplement. These samples are L

M still there. You can get more data, so that you can get M

N a full picture for comparison. If you have five N

O samples, the picture is fuller, in a sense. We can O

P supplement the data, if need be. P

Q Q. In many cases, the first draw is okay. No exceedance, Q

R and the second may be okay. Then, for the third or R

S fourth or fifth draw, it's excessive. S

T A. Correct. T

U CHAIRMAN: Do you have any questions, Mr Lee? U

V MR LEE: I would like to ask questions later. V

CHAIRMAN: You may be the last one to want to ask questions,

or other counsel would like to ask questions.

The Housing Department first?

Cross-examination by MR YIN

MR YIN: Prof Lee, I represent the Housing Authority. I want you to do some clarifications about your report. You know this Commission of Inquiry is mainly tasked to look into the 11 affected estates with contaminated drinking water. So, for the 11 affected estates -- and you know there's a task force of the WSD, they have done some isotopic analysis and they have cut open some pipes to check, and they are very sure that the source is the soldering material. Do you agree?

A. Well, based on the figures and data, yes.

Q. For your sampling of water samples, you have the first draw, 20 seconds later, 40 seconds, 60 seconds; you take different draws and you test the lead content in water. That's all you did?

A. No.

Q. That's the computational dynamic, but you did all these without knowing the source of lead?

A. Well, exactly. That's what I wanted to find out, the

C source of lead. As I said in my report, this is a big C
D problem, covering a number of estates, more than 100 D
E buildings. The WSD took so many samples and still it's E
F just 4 per cent, 4 per cent coverage. In July and F
G August, the task force within a short period of time G
H looked into the water supply systems in three systems, H
I and they took out some components to test -- from three I
J representative flats, they took out components for J
testing.

K We act as independent experts. There are still some K
L uncertainties. For example, the three flats might not L
M be representative. The actual concentration might be M
three times as much.

N So within the short period of time allowed, we want N
O to achieve something. We have been analysing a lot of O
P field data. Field data can be very divergent and P
Q complicated, so without a target you cannot draw any Q
R conclusion.

S The Housing Department's measurement -- this is S
T important, this is the number of milligrams for T
U an elbow, for a tap, a fitting. Does it answer the U
V

C question, that it is hazardous or -- so the CFD is C
D a tool, and that is given the measure to data, given the D
E general situation with the fluid dynamic, can it reflect E
F what happened, that the lead content, as I turn on the F
G tap, will be measured? We want to have consistency and G
H we want to make sure that there's a scientific inference H
I that you can validly make. So CFD is important.

I Q. I understand that. I

J A. Even if I cut open fittings or many more fittings, I may J
K not be able to achieve what we want. K

L Q. I think, in your report, you have tested water samples L
M from not just the 11 affected estates; there are six M
N more estates covered. Based on the isotopic analysis N
O conducted by the WSD and also on the analysis of the O
P cut-open fittings, we know that the source of lead P
contamination is soldering material.

Q My question is, for the six other estates, not the Q
R 11, not the "affected estates", the other six, in your R
S investigation and tests we know the number of water S
T samples which have been tested to have lead.

T In your methodology, did you have anything to tell T
U you that the source of contamination is from the U
V

C soldering material or from other fittings? C

D
E A. We covered some unaffected estates, because we have
F looked at the data, we have identified cases of
G exceedance, and we went through them yesterday. We
H really wanted to look at the extent of the problem. So
I it was a sampling exercise. We know that generally
J speaking, their problems are not as serious. So we
K selected six estates and some buildings. You can see
L from the data we discussed yesterday, the four estates,
M the extent of the risk is small.

N Q. I understand that. Actually, my question is a simple
O one. The data is classified in three types, 1, 2, 3,
P and you lump the six estates with the 11 affected
Q estates, and it gives people the impression that you can
R generalise and conclude something about the 17 estates,
S although in some estates the concentrations are higher
T and in the other, lower.

U A. But the overall impression is that all the 17 estates
V are contaminated. That's not really the case. For
Choi Tak, Sau Mau Ping, from the data, the risk is
comparatively lower. For Yee Ming, as I said yesterday,

it's low.

CHAIRMAN: I think the question is for the six unaffected estates, they may be affected by the lead content of fittings only.

MR YIN: Can you clarify this particular point?

A. This requires another investigation. They are direct measurements taken in the three flats.

Q. What you have measured will tell you there is lead in water. It doesn't tell you where the lead comes from? From your samples, you can't tell that.

A. You can put it that way.

Q. Please look at some data, some tables. Page 173.4, for Yee Ming. Mr Shieh asked you questions about that yesterday.

Please look at Yee Ming Estate. You said yesterday Yee Ming is special. You went to investigate in three flats. You looked at the water samples. For two of the three, it's zero. It's below detection. In one of the flats, only one sample, T equals 60, there's a spike, a very high reading, and that's all.

From this pattern, and also from the perspective of

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C statistical analysis, would you say that it's C

D an outlier, just one single exceedance? D

E A. We talked about singularity yesterday. But we should E

F not be complacent. We have repeatedly discussed the F

G matter with our chemists and Government Laboratory. We G

H did consider doing it again but for various reasons, we H

I didn't. I

J If you look at literature on lead variation in water J

K supply systems in various countries, you would know it's K

L complicated. Chemistry and other things are at play. L

M So from time to time you get a sample like that. We M

N have QA. If you trust the data -- well, it can come N

O from different sources. We are now presenting the data O

P as they are. P

Q Q. Compared with the affected estates -- Q

R A. Yes, there's a big difference. R

S Q. They have a range. They come in a range. S

T A. Yes. T

U Q. All the samples contain lead with different U

V concentration. But this one is different, singularly V

U different. So perhaps the nature is different, the

V

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C nature of the problem is different? C

D A. Yes. The same for Kwai Chung. D

E Q. Just one problematic sample. E

F A. Whether it's lead concentration or intake, the level is F

G low. G

H Q. Page 173.2, Kwai Chung, again just one special sample. H

I Page 173.1, Sau Mau Ping, Shui Chuen O, Un Chau Phase I

J 5, the same. You have the singular data. J

K In terms of pattern, for the six housing estates K

L that are unaffected, and 11 affected estates, the L

M situation is vastly different. M

N A. The sampling largely confirms the situation. N

O Q. C19.1. We looked at this yesterday. Page 9889. You O

P can see -- looking at the valves, "copper alloy" -- if P

Q this is in water for 24 hours during the stagnation Q

R period, it can go beyond the 10 microgram per litre R

S contamination. S

T A. I have to clarify. This is within 24 hours, how much T

U micrograms are leached. This is not the microgram per U

V litre for the tap. V

Q. Let me clarify here also -- obviously we don't know now, the data is not sufficient for us to come to any conclusion, but from the six unaffected housing estates, we saw these anomalies and there may be some lead element that comes from the standard -- from the fittings that are up to standard, maybe some particles just fall out or something, and that led to this singular figure; would you agree?

A. For Yee Ming, that is 0.15. I think the WSD report also contains this. The number, the concentration, would be very small. I know where you are coming from but I don't think I can agree with you. We are talking about micrograms.

Q. Do you agree that for these six housing estates -- we saw some singular figures -- do you agree with me in saying that if the situation is like leaded solder was used all over the place, then it would have been possible to see nothing in the first-draw and second-draw samples; do you agree?

A. We have a number of classes of buildings, pre-2005, post-2005, that were unaffected. We also looked at some

of the affected estates, and the risk of contamination
is low. I mean, we do have a number of classes.

Cross-examination by MS LAM

(All questions from Ms Lam in English)

MS LAM: Professor, we will be asking you a few questions
in

English. I am guessing that you probably won't require
translation, but if you require it, please do put on the
headphones.

A. (In English) That is okay.

CHAIRMAN: I think if you speak up a bit. You represent?

MS LAM: I represent China State, one of the four main
contractors.

A. (In English) Yes, sure.

Q. I would like to ask you a few questions about the
first-draw sample that I think was touched upon
yesterday in some of the questioning from Mr Wong. We
established yesterday that the first-draw sample
volume is 250 millilitres.

That we can see from page V/149, figure 1, which we
have referred to quite a number of times. Figure 1,
first-draw sample, 250 millilitres, and that was after

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C a stagnation period of about six to 12 hours. **C**

D

E A. (In English) Yes. **E**

F Q. If I may then ask you to go to the task force report at **F**

G page 745, you see this is a table of the leaching test **G**

H results from Hong Ching House of Kai Ching Estate. **H**

I A. (In English) Yes. **I**

J Q. If you go to items H33 and H33A, you see there's **J**

K a description, "Tap at kitchen (mixer) (copper alloy)" **K**

L and "Tap at kitchen_part 2 (swan neck (copper alloy)". **L**

M I understand that the kitchen tap consists of two **M**

N components, ie the mixer and swan neck? **N**

O A. (In English) Yes. **O**

P Q. If you go across the table, you see the immersion water **P**

Q volume for these two items are 31 millilitres and **Q**

R 89 millilitres. Do you see that? **R**

S A. (In English) Yes. It's 31, yes. **S**

T Q. 31 and 89. In other words, the combined total immersion **T**

U volume for the kitchen tap at Hong Ching House is **U**

V 120 millilitres; do you see that? **V**

T A. (In English) Yes. **T**

U Q. 31 plus 89. **U**

V

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C	A. (In English) Yes.	C
D	Q. If I could just quickly take you to another one, which is Hung Hei House, at page 772.	D
E	A. (In English) 772, yes.	E
F	Q. If we go to items F31 and F31A, again, these are items	F
G		G
H	for the "Kitchen tap (mixer)" and "Kitchen tap	H
I	(swan neck)", and if you go across the table, you see	I
J	the immersion water volume, they are 92 and 70. In	J
K	other words, the total of combined immersion water	K
L	volume is 162 millilitres; do you see that?	L
M	A. (In English) Yes.	M
N	Q. You can take it from me that I have done the same	N
O	exercise for the other two estates, Yuet Ching and	O
P	Luen Yat, and the total immersion water volume for those	P
Q	estates is 151 and 127 millilitres. In other words, the	Q
R	total tap volume of kitchen taps ranges from between	R
S	120 millilitres to 162 millilitres. Do you follow?	S
T	A. (In English) Not quite, actually. In other words,	T
U	there's a tap --	U
V	Q. Yes, the immersion water volume.	V
	A. (In English) Yes. But I think what they are referring	

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C to here is they are trying to measure the possible lead C

D leached from the tap, the component itself. D

E Q. Correct. E

F A. (In English) And hence there's an immersion volume, it F

G that applies. The tap -- of course it comes in G

H different forms -- but you see, when you turn on a tap, H

I it goes into this swan shape (demonstrating), so I

J suddenly the water is before this swan shape. So J

K I don't really see the point. K

L I think the purpose is slightly different for this L

M test, because they want to measure the amount of lead M

N leached from the tap. N

O Q. Correct. Perhaps we can get a clearer picture if we O

P then turn to page 663, where they have a diagram P

Q illustrating how they have done the leaching test. Q

R A. (In English) 663. R

S Q. So this not exactly the same component, but we can see, S

T basically, what they have done for the leaching test, T

U for the component, the way that they immerse it in water U

V is by the internal volume, so they have put water inside V

the component, not outside. It's inside the component.

A. (In English) Yes.

Q. What I am getting at is that -- so the total water volume that is contained within a tap, we can see from these results, ranges from between 120 millilitres to 162 millilitres?

A. (In English) Yes.

Q. My question for you is, that's roughly around half to two-thirds of the first-draw sample volume of 250 millilitres, so bearing in mind the internal kitchen tap volume, would it be fair to say, in cases where the highest concentration of lead was found in the first-draw sample, that a major or at least a significant source of lead was likely the copper alloy tap?

A. (In English) Actually, I don't quite understand the question, because -- you see, this, from the picture, from the swan tap, this swan part (demonstrating) is after the valve. So once you turn on the tap, then the water flows out.

Q. Yes.

A. (In English) But the water we are interested in is the

water that has been stagnant in the system.

Q. Yes.

A. (In English) Which is before the valve. So, in other words, although the water passes through the swan neck, but it is not -- the effect of the swan neck during that five to ten seconds is probably minimal. You see the physical picture. You see, this is the stagnant water (indicating water jug), this is the swan, this is the valve.

Q. Yes.

A. (In English) So yes, there is some possible leach, but once you turn on the tap, then this water has been standing for eight to 12 hours.

Q. Yes.

A. (In English) So it starts to flow out. The time it takes to flow is probably very small. So I don't quite see this. That's the first point.

The other point is that even from the WSD report, they also concluded the contribution of alloys is very small, and if you look at one of the figures in my report, which is figure 7, if I remember correctly --

I think it's figure 7.

Yes, figure 7, the amount of lead deposits they found in these fittings is very small. I think there is some tap, but comparatively it is very, very small.

So, in other words, holistically, based on the data available, the amount of lead that can be leached from these copper/lead alloy taps probably, I would think, would be very minimal.

Q. Yes, but at least the first-draw sample would reflect the concentration of lead in the components around the vicinity of the tap; would you not agree?

A. (In English) Yes, it would be, and that's precisely what the CFD model can do, because what it is, is really just a tool, so you think of it as a linear line, and at different points in the line you impose different sources, lead sources, and the lead sources can be an elbow, can be a valve, can be a tap.

Now, I would suggest that if you impose the lead sources corresponding to what you measure for these taps and you go through the calculation, it will give you very, very minimal differences.

I think, in fact, if I understand your question correctly, I think -- it has a contribution, certainly, but it would be relatively small, I think, from all indications.

Q. We know that from at least out of the 250 millilitres, at least around 120 to 160 millilitres of that came from water contained in the tap.

A. (In English) You see, once you -- I am just trying to figure out -- maybe -- my understanding of the tap is very simple, just a tap and then a swan (demonstrating). A tap is a tap; right?

Q. Yes.

A. (In English) So, when you turn off the valve the night before, which we asked the residents to do, then this portion is not in contact with water, this swan (demonstrating) is not in contact with water.

So, in a way, it doesn't quite factor into the stagnation sample of first-draw, because that portion is not in contact with water, until the moment you turn it on.

Q. Right.

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C	A. (In English) Right? I mean, this is the tap; right?	C
D	It's not psycho, this is physical.	D
E	So this (indicating water jug) is the stagnant	E
F	water. I turn on the tap. Before I turn on the tap,	F
G	there is no water in this swan; right?	G
H	Q. Yes.	H
I	A. (In English) So the only way lead can leach into the	I
J	water is during that five seconds.	J
K	Q. Yes.	K
L	A. (In English) Anyway, that will come out of the	L
M	calculation, but basically, if you think about it, it's	M
N	probably very, very minimal.	N
O	Q. Just one more question -- but the water, there would be	O
P	water inside the mixer, though, would there not?	P
Q	A. (In English) Yes, there would be.	Q
R	Q. In fact, if we go back to page 745, we see that in fact	R
S	it is the mixer which has a much higher concentration	S
T	of	T
U	lead compared to the swan neck. For example, if you go	U
V	back to page 745, at item H33, we see that the mixer,	V
	for the mixer, the amount of lead leached is 133, as	

compared to the swan neck which is at 23.9. So the amount of lead contained leached from the mixer is actually a lot more in a swan neck.

A. (In English) Yes. It's only 31 millilitres. From this page, 745, the volume of the mixer in the tap is about 31 millilitres; right?

Q. Yes.

A. (In English) So that's about 10 per cent, let's say, 50 per cent of the volume.

Q. Yes.

A. (In English) I agree with you. But on the other hand -- mind you, this is a static test. So I agree with you.

Q. So it would be a contributing factor?

A. (In English) Yes, definitely. Definitely.

Q. Now, if we go to page 173.3 -- I just wanted to quickly have a look at the figures. In Hung Hom, at the top, you see, for Hung Yan House, flat 1715, the first-draw was 0.021, and then for the next four samples it tapered out. Do you see that?

A. (In English) For Hung Hom?

A *Annex: Realtime English Transcription based on floor / Simultaneous Interpretation* A

B Commission of Inquiry into Excess Lead Found in Drinking Water Day 55 B

C Q. Yes. C

D A. (In English) For Hung Yat? D

E Q. Hung Yan, 1715. E

F A. (In English) Hung Yan, 1715, okay. F

G Q. First-draw was 0.021, and then for the other four G

H samples, it tapered off. So this is one of the examples H

I that you mentioned where the peak lead concentration in I

J the first-draw sample; right? J

K A. (In English) Yes. K

L Q. The same applies for flat 107, two rows down, we see the L

M first-draw is 0.048, and then it tapered off, and the M

N same applies for Hung Yat, flat 3811, first-draw, 0.037, N

O and then it tapered off. The same applies for Hung Yiu, O

P flat 1917, and the first draw, 0.013. P

Q So you see that for Hung Hom, four out of nine flats Q

R had the highest concentration in the first-draw sample. R

S A. (In English) Yes. S

T Q. I'm not going to go into details, but if we switch T

U through, 173.5, we see Kai Ching, at the bottom. U

V A. (In English) Yes. V

Q. Again, we see various samples where again the highest

concentration of lead was in the first draw, and that includes, for example, flat 3113 for Hong Ching, the first draw, 0.110; flat 2402, first-draw 0.028; Lok Ching, flat 421 and Lok Ching, flat 1806, and so on and so forth.

So this scenario -- do you see that, Professor?

A. (In English) Yes, Lok Ching and Hong Ching, I am with you.

Q. So you see the scenario where the key lead concentration is in the first-draw sample --

A. (In English) Yes.

Q. -- that scenario is not necessarily confined to estates completed before 2010, because we know that Kai Ching was completed in 2013 and Hung Hom was completed in 2011.

A. (In English) Yes.

Q. Do you agree with that? It's not necessarily confined to estates completed before 2010.?

A. Yes, it's not absolute. It's just on the whole it's a general comment. It's not a theorem by many means, it's not an absolute.

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C Q. Not a cut-off? C

D A. Not an absolute cut-off. D

E Q. Just very quickly, if you go back to page 173.1, you see E

F we have two estates, Shui Chuen O and Un Chau Phase 5. F

G These are both China State estates. Can you confirm G

H that basically none of the samples taken were found to H

I have exceeded the WHO value? I

J A. (In English) Yes. J

K MS LAM: Thank you very much. K

L CHAIRMAN: Let's take a break. 20 minutes. L

M (11.24 am) M

N (A short adjournment) N

O (11.48 am) O

P CHAIRMAN: Mr Chan. P

Q Cross-examination by MR G CHAN Q

R MR G CHAN: Prof Lee, my name is Chan. I represent Shui On. R

S Please go to page 169 of your report. There are S

T three photos. The taps at the entry point, they were T

U installed -- they were not there, but in order to take U

V the water sample there, they were installed for that V

T purpose?

U A. Well, the meter was taken out by the WSD and then the U

V

tap was installed.

Q. Okay. Do we know what the specs of those fittings are?

A. Well, they installed them. We didn't measure the meter.

Q. I just want to know the spec of the tap and the fittings. Ordinary fittings, or fittings approved by the WSD?

A. Well, the meter was installed by the WSD, so the assumption is that they were up to the required standards.

DR WONG: (Chinese spoken).

MR G CHAN: I just want to make sure they are compliant fittings. We know that some fittings do contain lead. It may have something to do with this leaching tap.

So a simple question is this. You take water samples from this one. You have the stagnation, and the tap is made of alloy. There may be lead. During the stagnation period, the lead may be released into the water. Maybe you can share your insight with us.

A. We wanted to know that after stagnation, what's the concentration. We are now talking about the meter.

Q. I'm talking about the tap.

A. It's where the meter was. So a tap was installed. We assume that it was compliant. We will draw samples of 250 millilitres. It's the upstream level. You can refer to figure 1.

Q. But there's no argument about that.

CHAIRMAN: You mean from this location to the point of entry to the flat, the contribution of the meter was not included?

MR G CHAN: Well, you have a tap installed here, where the meter was. Would the tap installed there have a contribution?

CHAIRMAN: That's common sense. The amount of leaching is another matter.

MR G CHAN: So it might be a contributing factor?

A. If it's up to the required standards, then it should be minimal. The WSD Task Force report also mentions this point. The one with significant lead leaching was from the non-compliant fittings.

Q. I have no further questions on that point.

Please take a look at page 173, Kwai Luen Estate Phase 2. You took samples from six flats. The first

row, Kwai Luen Estate Phase 2; yes?

A. Yes.

Q. Before you went to take the samples, did you check whether the soldering material used in these six flats contained lead or not?

A. No, no lead. Actually, we didn't know which flats. The Housing Department staff led our sampling team to the flats, randomly selected.

Q. Yesterday, Mr Lai asked you that from the evidence we have heard, there were people using leaded soldering stick and there were people using non-leaded soldering stick. For Kwai Luen Estate Phase 2, for example, we did not check whether the joints were joined together by leaded soldering sticks. So, if the lead content is excessive, we cannot really infer whether it's due to the use of leaded soldering stick or non-leaded soldering stick?

CHAIRMAN: I don't understand your question. We know that there was excess lead in Kwai Luen Estate.

MR G CHAN: Prof Lee said the flats were selected randomly

and there was no previous check that leaded soldering material was used or not, for the joints. But now we have the results as shown here. Six samples. All six contained excess lead. All they can prove is there is excessive lead. It doesn't really tell you whether it's contributed by leaded soldering stick.

CHAIRMAN: The fittings' leaching rate is low, so if the data is high, then there's no other reason.

MR G CHAN: If in one of the flats non-leaded soldering stick was used, and still excessive lead was found, it would be an anomaly, so how can you rule out that it was not a problem due to soldering stick? If one of the flats contained fittings jointed by unleaded soldering sticks, so what will be the source, if we are to infer from your data?

A. That's why we need the CFD model. You have measured many things. It cannot be translated into water tap concentration. So we need to have a model. For example, we have to base on the release rate of jointed fittings or solder joints and copper alloy. So, if the alloy is compliant, the copper alloy is released and

leaching rate is low. It would not be contributing to a situation we have.

For example, 0.286, it's not scientifically consistent. The order of magnitude is not consistent.

Q. (In English) It's not a problem. I don't have a problem with that. It's like what I'm trying to --

CHAIRMAN: Use Chinese, please.

MR G CHAN: The reason why I suggest this is that in Kwai Luen, there are flats where the leaded soldering stick was used and others where non-leaded soldering stick were used.

Are you suggesting that it could not be due to leaching? You didn't know whether, for the pipes concerned, non-leaded soldering sticks were used. You only find excessive lead in the samples taken in the estate. If non-leaded soldering stick was used for a particular flat, then the contributing factor should be something else. Shouldn't you be looking into the cause? Can you really find out the cause?

A. For these flats, the data, the readings of lead are high. Unless you say that there are no solder joints in

these flats, otherwise I just cannot think of other reasons, based on what we have known.

Q. (Chinese spoken).

CHAIRMAN: This is a theoretical question. WSD has already confirmed that solder joints were used in Kwai Luen.

MR G CHAN: Let me put it this way. Prosperity supplied the solder stick to the site, some containing lead, some not containing lead.

CHAIRMAN: What about it?

MR G CHAN: So, in the process of installation, some materials contain lead, some don't. How do you know, for these six flats, they contain lead or not? How can you exclude that factor?

CHAIRMAN: We don't have to look at the individual flats. Shui On, that's your business. Now, for Ho Biu Kee, that's your plumber, and Ho Biu Kee supplies the components and materials. What difference does it make to us? Was it the tap that was leaching or was it the materials that were leaching?

MR SHIEH: I think he is postulating that for a certain estate, if the plumbing contractors deliver certain

materials, some containing lead and some don't, how can you make sure that in the flat the worker used leaded solder stick for that particular flat? Unless the question is like this.

CHAIRMAN: This is a theoretical academic question.

MR SHIEH: Unless he is asking Prof Lee that room 1246, have you checked whether the joints contained lead or not -- I think that was his question.

CHAIRMAN: Is that your question?

MR G CHAN: I think Mr Paul Shieh was already asked the question for me.

CHAIRMAN: I won't allow this question.

Please take a seat.

Cross-examination by MR LEE

MR LEE: Prof Lee, I represent the coalition of the victims of contaminated drinking water. I am really pleased that you are giving expert evidence here for the Commission. There are a couple of questions I hope you can clarify.

In Hong Kong, is it the case that the water quality is good enough, from the mains running through to the entry point? In terms of lead, the water in Hong Kong

is pretty good, isn't it?

A. From the statistics, yes.

Q. We looked at a lot of data. The WHO standards are 0.010

and some are zero. You said this is undetectable.

A. Undetectable, it is 2 to 2.5. It should be 2 for the government lab. That's 0.002, that's undetectable, and in many estates it is 0.0025. 0.002 is undetectable.

Q. Can I say this: you are assuming that from the mains, the connection point, it is undetectable, 0.000 or something, so when it is undetectable, you would assume there is no lead; even if there is lead, it is undetectable, isn't it?

A. Right.

Q. So if the WSD's supply of water is so good in terms of lead concentration, when the water enters the flats, when people turn on the tap, it would become 0.003 instead of 0.002. So there are problems with the water once it enters into the flats. So there must be something wrong with the water pipes?

CHAIRMAN: Assuming that there are no external factors.

Assuming there are no external factors.

A *Annex: Realtime English Transcription based on floor / Simultaneous Interpretation* A

B Commission of Inquiry into Excess Lead Found in Drinking Water Day 55 B

C A. For the inside service. C

D MR LEE: The question is where 0.003, 4, 5, 6, 7, 8, 9 or D

E 10 -- beyond that, it would be below standard, wouldn't E

F it? F

G A. This is a provisional guideline. The WHO use 10, and G

H there's the provisional guideline value -- they stress H

I "guideline". I

J Q. Even if it hits 10, it is still up to standard, or 10 J

K is K

L below standard? I can't quite get this clear in my own L

M mind. M

N A. As I said, this is a relative reference point. It N

O doesn't -- it is a measure of lead risk. O

P Q. If someone turns on the tap, flushes it for two minutes, P

Q and it still registers 0.009, then there are problems, Q

R aren't there, because there is no first-draw test? R

S A. There is a presence of lead. S

T Q. And in high quantity, isn't it? If you take the T

U first-draw sample, then it should go beyond the WHO's U

V standard, because after flushing for two minutes it V

still registers 0.009.

Can I make this assumption or this inference?

A. To a certain extent, our data reflects all this. When we designed the sampling protocol, other than Choi Tak and Choi Fook, which are unique circumstances, all of rest of them reflect the same situation.

Q. In Hong Kong's public housing estates, they are totally different from those in other jurisdictions. In the UK, they would be really frightened by these great big, massive monstrosities in Hong Kong. In the UK, if they want to test the water quality, they turn on the tap and they would get the water from outside within two minutes?

A. Yes, I think you can put it this way.

Q. But in Hong Kong, nowhere near. If you live in a housing estate, it would take more than an hour because the water would route through the rooftop tank and everything. You turn on the tap, and if you wanted to find out the water quality from the mains, it would be hard, because the water tanks are really massive. There must be 800 units in a block in a housing estate?

A. Senior counsel, there is a bit of difference here. We

do have data regarding the sump tank and the roof tank.

Q. So the situation is different. In other jurisdictions, they have houses, in two minutes you get the water from the mains, but in Hong Kong, the situation is rather unique, which is different from other countries. So, in Hong Kong, we have to have our own method. The WHO doesn't propose any particular protocol for sampling the water. For the housing blocks, if you look at the corridor there, there are so many units running all the way down to the end of the corridor, maybe a few dozen or 20 or something, and 20 on the other side, in parallel. Is it the case that the last unit down the corridor would have the highest risk?

A. My understanding is that there are four meter rooms per floor. That's my understanding from the Housing Department. And each meter room would be responsible for half a dozen units, or four.

Q. Let's take a block, for instance. Here, there is a corridor (demonstrating), and there is another corridor, and you have the staircases in the middle, and there may be many units.

A. Yes, there are a couple of meter rooms.

Q. How do they pay the water tariff?

CHAIRMAN: There are four or five individual meters.

MR LEE: Right, there are individual meters.

COMMISSIONER LAI: You have never been to a public housing estate, senior counsel?

MR LEE: I have been there many years ago, when I visited the households.

When you took the sample, you run the water for a couple of minutes. If your unit is close to the down pipe, then it will be different from the unit down the end of the corridor; are you with me?

A. Yes.

Q. From the down pipe and then running all the way down the corridor, it would be different between the two units.

So you don't know whether the units are near the down pipe or not?

A. If you may refer to page 173 of my report, table VI-1, there are three vacant flats that we looked at. Some units have longer pipes; 29 metres for Kai Ching and 14

for Un Chau. So, for Kai Ching, there are so many bends

C and elbows to travel through. Different units, even if
D they are on the same floor, would have a different
E length of pipes, and also the bends would be different.
F It means that the lead concentration also varies.

C

D

E

F Q. Let's take a unit, for instance -- it doesn't matter how
G far away it is from the down pipe -- if they turn the
H tap full on for 20 seconds, how far would the distance
I cover? Would it cover up to the meter room?

F

G

H

I

J A. I think so. If you look at figure 1, 20 seconds -- bear
K with me, 149. It depends on the unit. 20 seconds,
L that's the average flow rate, and it would cover about
M 10 metres or so. If it is next to the down pipe, it
N would be different. For units further away, it would be
different.

J

K

L

M

N

O Q. You have given us the information. You said that the
P first-draw water doesn't contain the highest
Q concentration of lead.

O

P

Q

R A. Some, yes. 60 per cent.

R

S Q. In 60 per cent of cases, would it be the case that the
T water picks up the lead along the way?

S

T

U A. Yes, if there is a high concentration of lead in the
V meter room, it would pick up along the way.

U

V

A *Annex: Realtime English Transcription based on floor / Simultaneous Interpretation* **A**

B Commission of Inquiry into Day 55 **B**
Excess Lead Found in Drinking Water

C Q. I am grateful to you for all the photos. I have a **C**

D science stream in my school, but I did art, and I am **D**

E grateful to you for all the diagrams there. **E**

F Also, we understand that for lead to be in the **F**

G water, the major factor is the leaded solder materials. **G**

H Would there be the possibility that fittings might **H**

I contain lead? **I**

J A. Yes, as the literature tells us. But relatively **J**

K speaking, the level is lower. **K**

L Q. Have you done anything to prove that if nothing else **L**

M contains lead and only fittings contain lead, then how **M**

N much lead can be found in water? **N**

O A. We have done some analysis, comparative concentration. **O**

P Let's say we don't use any soldering material and there **P**

Q are only fittings, we would be able to comply with the **Q**

R standards. **R**

S Q. So what's the expected level? **S**

T A. A very low level. According to the WSD Task Force **T**

U calculation that's been made, it's a low level. We just **U**

V want to look at the calibration. It can be done, but we **V**

estimate the level to be low.

A *Annex: Realtime English Transcription based on floor / Simultaneous Interpretation* **A**

B Commission of Inquiry into Excess Lead Found in Drinking Water Day 55 **B**

C Q. What about approximately? **C**

D A. I really can't answer this question. In the water **D**

E supply system, the amount of lead is something really **E**

F uncertain. **F**

F Q. Would you say it's negligible? **F**

G A. It depends, because there are chemical reactions **G**

H **H**

I involved, and corrosion, organic corrosion. So it **I**

J depends on the sources, but on the whole, the level **J**

K would be low. **K**

L Q. Can we ignore such levels? **L**

L A. If the fittings are compliant, the level will be low. **L**

M Q. But we don't know whether the fittings are compliant or **M**

N not, or you don't know that. It makes a big difference **N**

O whether the soldering material contains lead or not, but **O**

P a big difference would be made for leaded components and **P**

Q fittings and those not leaded? **Q**

R A. From the WSD Task Force report, you can see that from **R**

S the three selected flats, some alloys are causing **S**

S excessive lead, but are relatively minor in nature. **S**

T Q. Perhaps I would ask some questions later. If the **T**

U joints -- then leaded soldering material is used by the **U**

V **V**

C worker, if he is skilled compared with one who is not
so

C

D skilled, would a big difference be made, through

D

E workmanship?

E

F A. Well, this review benefits from a demonstration arranged

F

G by the Construction Industry Council. It seems that

G

H workmanship has a bearing on whether lead will be found
in water.

H

I Q. For copper pipes, how long -- what's the longest copper

I

J pipe? Sometimes, you need to join pipes, if the length

J

K is too much, and also you need to have bends. How long

K

L is one single piece? If you don't know, it's okay.

L

M A. It could be as long as 5 metres for a pipe in the
N corridor.

N

O Q. They have soldering material applied to the outer rim,
P and then they would join two pieces together. Why does
Q lead leach into the water, the solder?

O

P

Q

R A. If excessive solder is used when jointing the pipes, and
S also the coupling may not be exact. In the past, people
T might use coupling components, so they join two pipes
U together.

R

S

T

U

A *Annex: Realtime English Transcription based on floor / Simultaneous Interpretation* **A**

B Commission of Inquiry into Day 55
Excess Lead Found in Drinking Water **B**

C Q. We know that leakage is certain if leaded solder is **C**

D used? **D**

E A. Not necessarily. **E**

F Q. But if workmanship is poor? **F**

G A. Yes, then there's -- **G**

H Q. Earlier this morning, in your evidence, when you **H**

I answered a question from the Housing Authority, you said **I**

J WSD only took 4 per cent as samples, and you said the **J**

K lead content may not be fully reflected through the **K**

L samples. **L**

M A. I was trying to explain why we want to do a comparative **M**

N sampling test. The sample is small. **N**

O Q. So you did this. You took samples. What's the **O**

P percentage coverage? **P**

Q A. They cover 4 per cent. Our percentage is low. Three **Q**

R flats in a building, there are 800 flats in a building. **R**

S We selected random samples. **S**

T Q. So the coverage in terms of percentage is under **T**

U 4 per cent? **U**

V A. Yes. **V**

V Q. It's not a criticism. You have to do it quickly and you **V**

don't have a lot of funding?

A. This is not a statistical model. It's a targeted approach. We are guided by an underlying theory. It's not like just taking samples.

Q. In answering a question, you said you could not answer whether it would be a hazard or poisonous to me. They took samples --

CHAIRMAN: In what context, Mr Lee?

MR LEE: They were talking about the 4 per cent of samples, and you said, "I could not answer the question whether it's hazardous or poisonous". Now the Commission is enquiring into this matter. For tenants of public rental housing estates, they are very concerned. They are not interested in data and figures. They will tell you, "I want to turn on the tap, I want to boil the water for drinking. Is the water contaminated or hazardous"?

A. I cannot answer this question. This is a limited scope -- this is a study with limited scope, which may show the comparative problems. On the whole, the readings are consistent with the findings of the WSD.

But we may be able to tell the maximum involved in a relative manner. Whether it will lead to any incident -- this is just for reference. We are talking about a small number of samples.

Overall, after reading everything, the risk is relatively low. The risk is low, however you measure it.

Q. But for first draw, it may be different. For the affected estates, it's a different case; right? If you turn on the tap and drink the water, it's not safe? Maybe for individuals it's still okay.

A. Yes.

What we want to bring out is this. If you want to quantify the problem -- actually, I want to bring up this point. Now we have an intake level based on scientific study. Let's assume that the UK standard is correct, only 14 per cent of those people drinking this kind of water would have problems. I will just multiply the lead intake by 14 per cent. But it may be different for different users. Let's say if I live in one of the housing estates, the average exposure to an adult is like 0.14 times the exposure level, and still, in some

C cases, it's excessive. So we have to attach importance

C

D to these cases.

D

E Although it's a small sample size, still we can
F reflect the problem to some extent. We know that we
G have to face up to the problems faced by the estates,
H the six estates. But in terms of lead contamination, if
I you want to have a reference point, then these data
J provide a reference point.

E

F

G

H

I

J

K Q. But the tenants, ordinary tenants, don't know this,
L unless they have access to the information on the
M internet. So it may be relatively safe, but it is not
N sure, because for their block, for any block, not many
tests have been conducted?

K

L

M

N

O A. Based on the information available, the Housing
P Department and the WSD should be able to get the picture
Q and come up with measures.

O

P

Q

R Q. If you do it for every block, if you take sufficient
S number of water samples, residents would be much more
assured?

R

S

T A. In other countries, maybe it would be for the owner to
U do it. After all, if we are talking about a finite

T

U

A *Annex: Realtime English Transcription based on floor / Simultaneous Interpretation* A

B Commission of Inquiry into Excess Lead Found in Drinking Water Day 55 B

C sample size, every reading costs you \$170. C

D Q. How much is involved in a reading? D

E A. If you measure one sample, it costs you \$170 and I don't E

F remember whether it's a discounted rate or not. F

G Chemical analysis is usually costly and G

H labour-intensive. I think that's what I can say in H

I response to your question. I

J Q. I know it's costly to do the test, but our government J

K is K

L rather rich. L

M Please take a look at page 163 of your report. M

N Appendix IV, "(In English) Sampling protocol", N

O "(In English) Introduction", line 3, the third line: O

P "(In English) The purpose of the field sampling was P

Q to provide (i) ..." Q

R I want you to look at (ii): R

S "(In English) ... a basis for general health risk S

T assessment." T

U Then what you did, it's from the perspective of U

V health risks faced by the tenants, the residents. So is V

U it poisonous -- or I should say hazardous, rather -- to

V

A	<i>Annex: Realtime English Transcription based on floor / Simultaneous Interpretation</i>	A
B	Commission of Inquiry into Excess Lead Found in Drinking Water	B
	Day 55	
C	me? We need to find out the risk, low-risk or	C
D	high-risk. WHO, the "H" is health, it's the World	D
E	Health Organization. I represent the victims of lead in	E
F	water. So the important thing is whether the water they	F
G	drink is safe.	G
H	A. Over the years, I've boiled water. It's my practice.	H
I	The practice remains unchanged.	I
J	Q. The microorganisms can be killed off in the boiling	J
K	process, but this doesn't work for lead. If you turn on	K
L	the heater water, it would cause more trouble.	L
M	A. Yes, turn on the cold water.	M
N	Q. If someone is living in a housing unit, and he is	N
O	telling you, "You are the expert, I'm living here. My	O
P	habit is, first thing in the morning, to turn on the tap	P
Q	and boil the water for use." That's the water for	Q
R	consumption.	R
S	There is another person who wouldn't turn on the tap	S
T	first thing in the morning. When he turns on the tap	T
U	later in the day, he will do the washing-up. I think it	U
V	all depends on the habit one has. You cannot	V
	tailor-make the system for individuals; you have to look	

A *Annex: Realtime English Transcription based on floor / Simultaneous Interpretation* A

B Commission of Inquiry into Excess Lead Found in Drinking Water Day 55 B

C at the global picture. C

D I think the same applies to the process of water D

E sampling. From your data, paragraph 21, line 3: E

F "(In English) In about 37 per cent of the cases in F

G which lead was detected, the maximum concentration is G

H observed in the first draw sample ..."

I The highest lead concentration, only 37 per cent for I

J the first-draw sample. J

K "(In English) ... followed by a monotonic decrease K

L in the subsequent samples (at T equals 20 seconds and L

M so on). In other cases (around 63 per cent), the maximum M

N concentration is detected in the second sample at T N

O equals 20 seconds, followed by a sharp decrease." O

P For the second-draw sample, 0 to 20 seconds, P

Q the percentage is 63 per cent. As we said, maybe the Q

R water has picked up the contaminants? R

S You have to say "yes" or "no", because otherwise the S

T record will not have what you said. T

U A. Okay. U

V Q. So if your purpose is to find out when the kitchen tap V

contains the highest concentration of lead, it seems that zero to 39 seconds would be the period to look out for. For the third-draw sample, or 40, 60, 80, the reading is pretty low. Even if there is lead in the water, the reading is pretty low; is that right?

A. Yes, generally speaking, yes.

Q. I hope you can help me here. When you took the samples, you were aware of all these problems, and the WSD has conducted the investigation. The task force has put out the report. At least the government felt that for the excess lead to be there, it was really caused by the leaded solder.

So, when you looked at the situation, the scope was more narrow, because at the beginning they didn't know where the lead came from. T equals 0 through to T equals 19 or 20, then T equals 39. So you should be able to get the highest concentration of lead. You are trying to find the maximum, and then in two draws of water, you should be able to get the maximum concentration.

A. Well, you can say that under some situations, the second

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C draw would yield the highest concentration. But it all C

D depends on the volume of the sample also, not just the D

E timing. But I follow your argument. I can take a big E

F bucket and take the sample. You can also get an average F

G concentration. What are you driving at? G

H CHAIRMAN: He is saying that using your protocol, exactly H

I your protocol, from 0 to 20 seconds, these two sets of I

J data would enable you to capture the maximum lead J

K concentration in most cases. K

L MR LEE: That's the first two draws of water? L

M A. Yes. M

N Q. The other method is to get a larger capacity container, N

O you run the water from zero seconds all the way to 39 O

P or 40 seconds; that would cover everything, wouldn't it? P

Q The maximum concentration would be there. Q

R A. Sorry, senior counsel, I was looking at the data. In R

S some situations, T equals 40, the concentration is still S

T high. T

U Q. That's because of the presence of particles. I will put U

V further questions; I think we have to deal with them as V

special cases.

C A. Yes.

C

D Q. So how many litres do you need to cover the first and

D

E the second draws?

E

F A. It would take 4 to 5 litres.

F

G Q. First and second draws together would be 4 to 5 litres?

G

H A. Yes.

H

I Q. Let me put this to you. First and second draws, if they

I

J contain lead, then lead is there, but if it doesn't

J

K contain lead, that would be okay. If it contains lead

K

L in the first and second draws of water, you would

L

M capture that, and for the third, fourth and fifth draws,

M

N the concentration would be low.

O Your purpose is to find out the maximum

N

P concentration. Why then do you need to have the third,

O

Q fourth and fifth draws? Because with the third, fourth

P

R and fifth, you bring down the concentration of lead,

Q

S because you have to take an average.

R

T A. When we did the sampling, we didn't know about it at

S

U all. Each unit may have different situations. For the

T

V WSD data, they cover a couple of minutes. So, in our

U

plan, this is part of the sampling protocol. Even if we

V

do it all over again, we would do the same thing,
because there are so many uncertainties.

As I said, it would be costly to do the water
sampling, we don't really want to miss anything, because
that's very important data. Two draws may not enable us
to capture everything and then you waste the resources.

Q. Yes, I understand that when you designed the protocol,
you had draws one through to five, I understand, but
once you got the figures, you realised that the first
two draws would be sufficient. If you add up to eight
draws, then you bring down the concentration.

COMMISSIONER LAI: Mr Lee, perhaps you may like to have
a look at the recommendations on page 142:

"(In English) A flushing time [should be] in the
order of 0.5-1 minute appears to be adequate for
guarding against risks of lead contamination."

There is such a recommendation there.

MR LEE: My argument is if the purpose is to find out the
maximum concentration of lead in a unit, then all you
needed to do is take two draws of water. That's from
half a minute to one minute. Two different things

C altogether, I beg your pardon. If you tell the
D residents that when you take water for consumption, to
E play safe, please run the water for one to two minutes.

C

D

E

F COMMISSIONER LAI: No, he is saying half a minute to one
G minute.

F

G

H MR LEE: I agree with that.

H

I CHAIRMAN: Are you saying that with more draws, then the

I

J concentration would be diluted, so those affected will

J

K become unaffected? So you are on the other extreme of

K

L the WSD; the professor is more neutral.

L

M MR LEE: Professor, are you with me?

M

N A. Yes, I am.

N

O Q. You said that if you do it again, you would do the same

O

P thing. That's something I can't accept. I think you

P

Q could have changed your protocol. Because the

Q

R sampling -- because of the third, fourth and fifth

R

S sample draws, then the buildings, the blocks, the

S

T affected blocks, would become unaffected blocks and that

T

U would be very detrimental to the residents, in

U

V particular those with children. That's the unintended

V

consequence.

A. Mr Lee, I don't think I can wholly agree with that. If I have five sets of data, I can look at all of them. If they are in the clear, then it would be very clear they are in the clear. Except for the individual units, the situation that you mentioned, the risk that you highlighted doesn't seem to exist from the statistics.

Q. Those affected, yes, the problem doesn't exist, but those unaffected?

A. I think for most of them it is pretty clear.

Q. But for the unaffected, you did it on a random basis. After flushing, you collected the data, and it was not up to the WHO level, although it is not a failure but it's still very high, and then with additional draws of water, those affected now become unaffected. Can you

follow my logic?

A. Yes. Can you cite any examples?

Q. I haven't got any examples here, but let me ask you the principles first.

CHAIRMAN: There is such a possibility. There is a possibility. Mr Lee SC, the question should be like this. I fully understand your point. I understand his

point as well. How do you define "affected" and "unaffected"? That's basically a political decision. It's got nothing to do with the professor. It is not his decision.

MR LEE: When someone makes this political decision, and then I follow this decision and the principles thereof, then I should be categorised as someone affected, and now, according to the protocol, it's unaffected.

CHAIRMAN: But what can you do if the decision-maker doesn't want to make the change? So the scientific approach is what Prof Lee has done, but you may not like his sampling protocol or the calculations because of the effects of relying on such calculations, but on the same token, they don't want your calculations.

MR LEE: Prof Lee doesn't really agree with the calculations, because they don't test first-draw.

CHAIRMAN: Let's have a discussion about this later.

I don't think Prof Lee can answer your question.

Prof Lee took five samples, and here is the data. You can make any use of the data as you see fit. You want to use it for a different purpose, but objectively, we

C have the data. C

D MR LEE: Maybe I can add something to the question. D

E You understand my logic: one and two would be E
F sufficient, and the concentration would not be diluted F
G because of third, fourth and fifth draws, as far as the G
H classification of the estate as affected or not. So H
I people can make use of the data to decide whether the I
J estate is affected or not. The data is there for anyone J
who wishes to make a calculation like that.

K CHAIRMAN: It would be a political decision. The WSD is K
L saying that up to the fifth are not okay, all of them L
M are not okay. Let's assume that I asked Prof Lee to do M
N the same sampling exercise in all housing estates, and N
O if we get the findings, the WSD will still not recognise O
P the results, because in their view the sampling method P
is not right.

Q So whether you classify an estate as affected or not Q
R depends on the line you draw. Mr Lai rises, the first R
S thing would be to boil water. He would be affected, S
T surely. But I only rise at 5 pm, I would certainly be T
U unaffected. For different individuals, it would be U
V different. V

MR LEE: It's the other way around, because as a judge you cannot really rise at 5 pm.

CHAIRMAN: I know what you are trying to say.

A. Chairman -- Mr Lee, you make a very insightful point.

I just want to supplement a little bit, by way of

an example. Let's look at Yan On Estate, Yan Hei House

flat 206.

MR LEE: Page number?

A. Yan On, page 173.2. Yan On Estate, Yan Hei House, the middle one, flat 206, the first one. This is the example I want to use. In this example, the first draw, 4; the second one, 18. It's relevant to what Mr Wong SC said something about this this morning. It depends on not just the time but the volume. You can have a first draw of 1 litre; it would resolve the problem, and you would say that the worst situation can be shown by a first draw of 1 litre instead of the first two samples. It doesn't really just depend on the time but also on the volume. And if we have the two combined, the average is just over 10. And this one, the flat concentration is not excessive.

C So it has to do with the time you take the sample
D and also the volume of the sample.

C

D

E Q. Your method will not affect the volume?

E

F A. I can only follow what you have found under your

F

G methodology.

G

H Q. In your statement, your report --

H

I CHAIRMAN: Prof Lee, if we have used the first draw and we

I

J take 1 litre as a sample size, then the number of

J

K affected units will be higher; is that correct?

K

L A. It should be the same. In an indirect way, this shows
M the intake level of the first litre. It's consistent
N with the flat concentration data.

L

M

N CHAIRMAN: So not much difference?

N

O A. Okay, not much difference.

O

P MR LEE: A few short questions about your report. Please

P

Q refer to your report. Paragraph 7 -- I have already

Q

R asked some questions about this, so I will be quick

R

S here. Paragraph 7 of your report:

S

T "(In English) As this review progressed, it became
U clear that an independent field sampling of drinking
V water at the affected [public rental housing] estates

T

U

V

C would be necessary."

C

D First, you did not think of taking samples yourself?

D

E A. No special idea.

E

F Q. But then as things progressed you thought you should
G take the samples. Is it because the WSD did not take
H the first-drawn samples?

F

G

H A. Not exactly. If you look at the guidelines, it's really
I geared towards getting the mean exposure.

H

I

J

J

K Q. Exposure means exposure faced by the residents, the
L extent of hazards faced by the residents, the health
M aspect?

K

L

M A. Yes.

M

N Q. Then:

N

O "(In English) The lead concentration measured on the
P 1,325 drinking water samples in the 11 'affected
Q estates' are all based on 'fully flushed samples' (ie
R for each flat, a 250 mL sample was taken after flushing
S the tap for 2-5 minutes). While this sampling method
T provides a measure of water quality of the bulk water
U supply, it does not reflect the actual and sometimes
V high lead concentrations to which the residents are

O

P

Q

R

S

T

U

V

C exposed. Such data does not provide an estimate of the C
D mean lead concentration used for drinking and cooking, D
E nor an adequate basis for assessment of health risks." E

F So you are saying, if there's no first-drawn samples F
G used for testing, there may be a health risk? G

H A. Yes. H

I Q. "(In English) This concern on the inadequacy of the I
J sampling method adopted by the Water Supplies Department J
K was expressed in the joint expert report ..."

L After the release of your joint expert report, the L
M department still insists on not doing this. So far, M
N they haven't taken any first-draw samples; do you know N

O that? O

P A. No, I don't know what the WSD has been doing. P

Q Q. I also have some questions on paragraph 10. Let's look Q
R at the last three lines on page 133. Before you took R
S samples, you told the residents. S

T "(In English) The sampling was carried out in the T
U early morning (between 6.30-9.00 am); the resident was U
V informed by HD staff to flush the kitchen and wash basin V
taps the night before the sampling for 5 minutes before

C going to bed, and not to use the kitchen tap afterwards
D before the sampling. The tap flow rate was also
E measured."

C

D

E

F Let's say you are going to take the sample tomorrow
G and tonight the Housing Department will send someone to
H tell the residents to do the flushing for five minutes
I before going to bed. So you want to clean the whole --
J the pipes and the fittings, and do they have to take out
K extra fittings, and that will ensure clean samples and
L accurate samples. But that will not be in line with the
M habit of usage.

F

G

H

I

J

K

L

M A. Well, to make sure the water supply chain is a normal
N system.

M

O Q. You want to make sure that the data, the findings are
P accurate, and this is a worthwhile step, I agree. But
Q for the residents, you are not reflecting their habits
R of usage, because if they clean the tap --

N

O

P

Q

R

S A. Normally, the tap would be in constant use and the water
T would be in constant flow, so there will be a natural
U flushing.

S

T

V Q. But that would be the situation whereby they would not

U

V

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have been flushing for five minutes in the night before?

A. Well, if it's in constant use, it would be just like doing the flushing.

Q. You want the water to stand for a few hours first?

A. But we are talking about here the worst-case scenario, And if it's in constant use, you are talking about different stagnation periods involved. Now we have the overnight stagnation, which is the longest.

Q. A family, after they have cooked the dinner, after they have washed the dishes, about 8 or 9 pm, that would be the last time they use the kitchen tap. From that time onwards, it's up to the next morning, so it's the stagnation period. Now you want them to flush for five minutes before going to bed, so it is a much shorter period. So you are saying that this is not actually the worst-case scenario for the family who live there?

A. But some people rise very early.

Q. Are you referring to the charts of the Housing Department?

A. We asked them whether they flushed the water. Some forgot to do so. But it didn't make any difference to

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C the results. C

D Q. What are you saying? What's the point you are making? D

E A. We asked them whether they flushed. We asked them last E

F night, the night before; we asked them about the F

G questions. G

H Q. You asked them to flush the water before they go to bed? H

I A. That's part of the experiment. I

I CHAIRMAN: Let's come back after lunch. 2.30. I

J (1.01 pm) J

K (The luncheon adjournment) K

L (2.30 pm) L

L MR LEE: Please turn to your report. You said that there L

M may be a sudden upsurge. I can give you some examples. M

N Prof Fawell thinks that this might be due to some N

O presence of particles. Do you remember that paragraph? O

P A. Yes. P

Q Q. How do you view this? There is a sudden upsurge in the Q

R reading; what causes this? R

S A. I said yesterday that it may be due to the pickup of S

T particle. T

U Q. Is it the case that the particle enters into the water U

V parcel and dissolves into it? V

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C A. There may be some lead particles in the water sample. C

D We use acid to dissolve it and that may explain it. D

E Q. If you don't add acid, what will happen? You have to E

F add the acid? F

G A. It depends on the lab practices. As I said yesterday, G

H it seems from the data that the solubles of the H

I particles are high. I

J Q. But then there is a sudden surge and then it comes back J

K down. This sudden spike, did you use acid for testing K

L the whole way through? L

M A. There is a procedure. There is a machine. M

N Q. Let's say there were five samples. All of them involve N

O the use of acid. O

P A. Yes, we use the same procedure. P

Q Q. For these particles, if they are ingested, what's going Q

R to happen? That represents a lot of lead. It may have R

S dissolved in the water, you may use the water to do the S

T cooking, and if you ingest this, there will be a great T

U deal of lead being ingested? U

V A. Senior counsel, I'm no doctor. Prof Bellinger's V

U conclusion is that lead can be cumulative. Like other

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C heavy metals, they are cumulative and this would build C

D up inside you. The effect is more like cumulative. D

E Q. When you take the sample, how should you go about E

F treating it? It goes down and then surged and then F

G comes back down; how do you treat all of this? G

H A. We look at all the five samples. We have the H

I concentration, we have the first-draw and we have the I

J overall assessment. We didn't ignore that. We didn't J

K ignore any of the samples because each sample would K

L represent certain things. L

M Q. If this is ingested, if you disregard that, then that M

N doesn't appear. N

O A. Yes. O

P Q. Paragraph 23 -- may I refer you to that paragraph? "(In P

Q English) Flat concentration", line 3, and then line 4: Q

R "(In English) Based on the flat concentration, R

S 53.2 per cent and 58.2 per cent of the samples have S

T excess lead (depending on 2 or 5 samples respectively) T

U as compared to the 8 per cent for the individual flushed U

V sample ..."

V There should be five samples. From some record, you V

tested two samples in some cases?

A. In some cases, because of the time and resource constraint, most of them contain five samples, but for 86 of them, we collected the samples, and when we analysed them, the most important thing would be between zero and 40. So for these cases we had two samples. For some flats, there are two samples. That's why we had two results for them.

In the circumstances, the best estimate -- that was the best estimate we came up with.

Q. Paragraph 3, are you talking about those affected estates?

A. All of them. All the samples. Some involving affected and some unaffected estates. Lower Ngau Tau Kok Estate, Un Chau, I think all scattered around, if I recall, and there are affected estates.

MR SHIEH: 173.17, that's table 5. All of them are "affected". Between 2 and 3, there is an asterisk there.

MR LEE: If they are unaffected, I'm not going to worry, because all the others are affected.

C If I may turn now to paragraph 30, the fifth line
D from the bottom:

C

D

E "(In English) Given the mass of lead deposited in
F the components of the water supply chain it can be
G roughly estimated that it could take as long as
H 5-10 years for most of the lead mass to be leached into
the water, especially for the pipe joints."

E

F

G

H

I So it could take five to ten years for most of the
J lead mass to be leached into the water?

I

J

K A. That's the estimate. That's the projection on the basis
L of the data.

K

L

M Q. How do you project that? This is your projection or
N someone else's projection?

M

N

O A. WSD Task Force did measure the lead deposits, how much

O

P lead in different components, and they also measured the
Q leaching rate, say 5 to 10 micrograms and 200 micrograms
R per 24 hours, and we extrapolate from that and that
S would give you some rough idea about the time taken for
T the leaching process to take place. So we estimate it
U would take five to ten years. For those pre-2010, the
V situation may not be as serious.

P

Q

R

S

T

U

V

Q. Please refer to A2, page 915. Further down, turn to
Shui Chuen O Estate Phase 1.

Chairman, if you don't mind, I will sit down and
have a look.

CHAIRMAN: Please.

MR LEE: Shui Chuen O, that's number 4. Line 1,

Shui Chuen O Estate Phase 1. That's number 4. Ching

Chuen House, Shui Chuen O, there are four houses there.

Yes, there are four houses there. Year of completion:

2015. Number of flats: 3,039. How many have been

tested there? Do you have any idea? That's page 159 of

your report. The last one is Shui Chuen O, Hei Chuen,

you covered Hei Chuen, only one block, three samples;

is

that correct? There are four blocks. You covered only

one block, and you take random units from the upper,

middle and lower. What about the other three blocks?

A. For the unaffected estates, we just take a look. There

are only 11 samples, and we have to look at the entire

picture. We could have taken more samples but we think

that that would be enough. The focus was on the

affected estates, but the unaffected estates, we had reason to believe that there would be slight exceedance, and there may be individual parties who thought that there were problems that occurred before, and that's why we selectively sampled the flats. We looked at the benefit/cost ratio, and we decided on 11 plus 6. For each estate, we covered one or two blocks. For the unaffected estates, relatively the scope would be smaller and the risk is also correspondingly lower.

Q. When you selected the unaffected estates, you saw problems there?

A. There were problems. The WSD -- there are some different interpretation of the reports, so it was more like for confirmation.

Q. Because of different interpretations, that's all the more reason why you have to conduct more detailed investigation?

A. Mr Lee, I beg to differ. I would basically look at the statistics, the mass of statistics and data. There is such a big volume of data. Page 160, for instance, table 3. There's only 0.3 per cent that exceeded the level. So we are looking at the data and statistics.

So it's not the same level of seriousness, and the

priority was put on the affected estates. So we had six

or seven from each block. If in random sampling we

found there were exceedances, then it would be

a different situation. From the random sampling, we saw

that the risk was low. So that's our logical thinking.

Q. The logic should be the other way around. For those

that are affected, whether you conduct any sampling, it

would be the same from the victims' point of view. I'm

always looking at things from the victims' point of

view.

CHAIRMAN: Well, that's outside our terms of reference. Our

terms of reference are to find out the causes of lead
in

these estates.

MR LEE: If that's the case, then we don't have to check the

affected estates.

CHAIRMAN: How do we know it's true? We are not the WSD.

We are not the Housing Department. Can we cover all

unaffected estates? Yes, but it will not be able to be

completed in a few months, and it's not with such

C a budget. C

D So, Prof Lee, you are saying that if data for the D
E unaffected estates is more or less accurate, that's why E
F he did not devote so much to these estates. Honestly, F
G I can tell you why Shui Chuen O Estate was checked: G

H because according to the WSD original test, some H

I exceedance was recorded, but they said that they found I

J some particles in the seat, and that's why Shui Chuen J

O

K was tested. Then one counsel provided supplementary K

L information to the Commission, and I made the decision, L

M that why don't we look at Shui Chuen O again. M

N But there are some residents who did not want us to N

O go there to do the second tests, because it's rather O

P a nuisance for them. That's why we only covered three P

Q flats in the building, upper floor, middle floor and Q

R lower floor. There are many reasons behind which R

S Prof Lee hasn't told us. Because of their constraints, S

T we need the co-operation of the residents and the T

U Housing Department. To many of the residents, one test U

V is already too much. V

MR LEE: I get your point.

CHAIRMAN: Since there's a problem, why don't we cover all the four blocks, all the different floors, and we should not just cover three flats and we should cover ten flats.

I agree that could be done, but that would be outside our scope. It should be for the job of the executive branch. We will present other data, and after you have seen the data we have presented, if you think it is sufficient, or if you think it is insufficient, the executive branch of the government can always opt to do more. If you think you are comfortable with the data, nothing more would be done, fine, then you have to shoulder the political responsibility arising from that.

MR LEE: It seems we are missing a lot out.

CHAIRMAN: Yes, I agree. We are only covering 11 plus six estates. We are not covering all unaffected estates in Hong Kong. So I won't object to your view. If we want to put all the PRH residents' minds at ease, then theoretically we should do everything again, but that's

not something we can do.

MR LEE: Perhaps I can ask the WSD people why.

CHAIRMAN: By all means.

MR LEE: For Shui Chuen O, what do you think would be the proper approach for the WSD, assuming that they have the manpower, the budget and the resources? You only cover one house.

CHAIRMAN: Maybe that's not so much a problem of

Shui Chuen O. What about Kwai Chung Estate? It may be better to target Kwai Chung Estate.

MR LEE: I want to cover both.

CHAIRMAN: Okay, cover both.

MR LEE: What do you think? You think there might be problems and maybe there are problems with Shui Chuen O,

and if money is not a consideration, if you consider the tenants' health, residents' health, what do you think

the government should do?

A. The residents' health has to be considered. I checked my own flat. It's okay. First draw, 12 noon, at 7 pm. It's okay. So I'm assured. Maybe there are particles

from day to day, but that's what I can do. It's
a question of risk assessment.

From the residents' point of view, absolutely,
something can be done.

Q. You are very correct. You have done it for your flat
and you are assured, you don't have to worry. Residents
cannot expect them to do this for 800 units in their
estate. But if there's not even one unit which has been
tested, then they are worried. For example, in my
estate, what if my block hasn't been tested? At least
the one next to mine has been tested. So how much
should be done in order to assure the residents?
I agree you cannot do this for every flat.

A. There are many variables involved. I find it very
difficult to give an opinion, because all parties
concerned have to shoulder some responsibility and the
situation differs from one estate to another.

So, senior counsel, your question is difficult to
answer. I understand the concern. But the report and
the information could inform the stakeholders to find
a solution to address the issues you have raised.

C Generally speaking, data from this report and past
D studies would form a framework, should be able to
E establish a framework. There are many different ways to
F do the general risk assessment and there are different
F interpretations on what to do.

C

D

E

F

G Q. For your flat, you mentioned doing the test, taking the
H samples in the morning, during noon and in the evening.

G

H

I Should the government make reference to your practice?

I

J It's very logical, to coincide with the times of having
K the three meals.

J

K

L A. It's just spread over the day. First draw is definitely
M a must. It's based on intuition. I was just curious;
M I wanted to find out.

L

M

N Q. If people have the money, people living in private
O housing estates, if they want to do some tests, should
P they follow your example, taking the test in the
Q morning, at noon and in the evening?

N

O

P

Q

R A. Well, the individual owners' co-operation might wish to
S consider doing this.

R

S

T Q. That would also be dependent on the time they prepared
U their meals, and in between there would be some time for
V the water to stand.

T

U

V

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C A. But generally, in between, there would be people using C

D water. D

E Q. I'm talking about the kitchen tap. E

F A. But it's connected with the wash basin. In some F

G systems, it's direct supply to the kitchen. In some G

H others, it's through the wash basin. So if you turn on H

I the tap in the bathroom, you would cause the water to I

J flow through the kitchen as well. J

K Generally speaking, in the UK, the stagnation time, K

L that is the intake use time, is 30 minutes. That's L

M generally the practice. M

N Q. Paragraph 36 of your report. Please turn to that. N

O A. Which paragraph? O

P Q. 36. P

Q "(In English) Independent planned sampling and Q

R analysis of lead contamination of 43 buildings in 17 PRH R

S estates have confirmed the main WSD findings. S

T Regardless of the method of sampling, the 'affected T

U estates' and the 'unaffected estates' are largely U

V confirmed." V

Your conclusion is that your findings are in line

with the findings of the WSD?

A. Generally, on the whole, and in relation to the identification of more seriously-affected estates, yes.

Q. But the affected estates would be those with similar findings. What about the unaffected? Because you only took samples, and the sample size was very small. You wouldn't be able to confirm their findings through your study.

A. Well, the sample size was also small.

Q. But more than yours?

A. Well, there are some statistical considerations. When the data is low, ours are also low.

Q. But they have more samples than you?

A. We are more planned and focused, to capture the worst-case scenario, because you included first-draw, and I also read in terms of randomness -- but two sets of results tally.

Q. Let's say there are four blocks with 800 units. Then you only test three out of the 3,200 units.

A. Yes, numerically, that's true, but in the past they only took 4 per cent.

Q. But you don't have 4 per cent?

A. No, I was talking about past WSD sampling. It was about 3.9 per cent or 4 per cent.

Q. So you think it's a small percentage?

A. Yes. Whichever way you look at it, it's a low percentage. Otherwise, a lot of resources will be required.

Q. But when it comes to health, then the resource consideration or that things cannot be done, realistically, then you have to counter that, balance that, with the problem children face when they grow up.

A. I think we have been able to present a comparative health risk picture. Senior counsel, of course ideally, we can assess each and every building, but the real situation is as we have seen.

Q. I think the chairman said this should not be looked into in our terms of reference.

CHAIRMAN: That's not what I said. The first item in the terms of reference is to find out the cause, although the WSD has already done some checks, but we have to do it independently. We have a different set of terms of

C reference, but there are so many housing estates, so C
D many buildings in Hong Kong. Can the Commission experts D
E check everything? That's not possible. Therefore, at E
F that time, I made a considered judgment that we are F
G going to take a look at the borderline housing estates, G
H to see if they have any problems, apart from the H
I so-called borderline estates. As I have just mentioned, I
J we received a letter from a counsel and then we covered J
K that building as well. Shui Chuen O was already bound K
L to have some problems, so we took a look again as to L
M whether we can cover more. Of course we can, subject to M
N availability of resources. N

O But our considered judgment at the time was to look O
P at the unaffected borderline cases, to ascertain whether P
Q they are unaffected borderline cases. Q

R Prof Lee's conclusion by and large confirms that. R
S There may be an odd one out. S

T The question is, can we go back and conduct more T
U detailed investigation? Yes, we can, but it's not U
V something for us to do. Prof Lee and Prof Fawell have V
adopted their protocol, but it doesn't mean to say that

C their protocol is absolutely perfect for the unaffected
D estates. If you want to investigate further, you need
E to have all the stakeholders to work out an acceptable
F sampling protocol and sampling method. You may need the
G residents, Housing and the water supplies to sit down
H and work out the extent to which this should be done,
I because this is, after all, very disruptive to the
J residents. You have to have the experts. Prof Lee
K simply cannot, within a short space of time, the
L protocol that should be established for the rest of the
M housing estates, if further investigation is to be
N undertaken. I appreciate your concern but you are
O approaching this from the residents' point of view.
P I appreciate your position. If you and I were living in
Q the public housing estates, we have kids and we have to
R feed the babies, then the tap water should not contain
S any lead. These housing estate residents may be living
T there for a few decades and the kids may not leave until
U after their education. The impact can be really very
V significant.

But even if you pursued this line of questioning

with Prof Lee, he may not be able to answer these questions. If you ask me, I don't think we can address these questions here.

MR LEE: I have a simple question. Shui Chuen O, for instance, there are 3,200 units, but for some reason only three units were taken samples of. You can't confirm anything from that, can you?

A. Which estate are you talking about?

Q. Shui Chuen O. 3,200 units altogether. You took three out of them. I'm not saying for a moment you are wrong. There are many factors. But the fact remains that you only tested three.

But given the small proportion, you cannot really confirm anything, can you; do you agree?

A. Shui Chuen O, I think a lot of units have been tested. 53 have been tested.

If you look at the table, 915, Shui Chuen O Phase 1, there are 3,000 flats. 53 have been tested.

Q. So they test in small number and you tested in even smaller number; do you agree?

A. Well, it is the issue of the size of the sampling.

Q. From the health of the residents' point of view, 3,200,

C you covered 53, this is a small proportion, and your

C

D size is even smaller, isn't it?

D

E A. Our nature is different.

E

F Q. This is not being critical. I'm not being critical of
G you.

F

G

H A. Our sampling is different from theirs.

H

I Q. And you did test at first draw?

I

J A. Ours are more targeted. Our thinking is that we have
K limited resources so we are limited to three. For these
L three units, if the first three draws tested okay, then
M they should be okay. Sometimes, the second draw would
N be high, so we had a small number of samples but we look
O at the maximum exposure. There's maximum exposure. If
P we cannot pick up anything, then there would be
significance.

J

K

L

M

N

O

P

Q Q. But the sample size is simply too small, isn't it?

Q

R A. Well, of course, if we test them all, the better, but
S how many do we need that would be enough to prove
T a point? I understand what you are saying. If we have
more samples, then it would be more perfect.

R

S

T

U Q. If you test three more, then you double the size. The

U

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C probability of getting it right would be small still, C

D but you double the sample size if you test three more. D

E A. But would there be any significance if you double the E

F number? F

G Q. Still small in terms of size. G

H A. So do we need to double the size? H

I Q. Logically, even three, six or nine would be small. Even I

J 53 was small. J

K COMMISSIONER LAI: Are you saying that we should test more? K

L Three, small; three, six or nine, they are small -- how L

M many do we need to test? M

N MR LEE: Of course it would be subject to resources. N

O COMMISSIONER LAI: There has to be a limit. For those O

P unaffected estates, the initial thinking was that if the P

Q WSD tested the water to be okay, then if it is in the Q

R clear in the first draw, then it should be okay. R

S At Shui Chuen O, for instance, there are some S

T problems and they can study whether these estates are T

U okay or not, and this is something that would be beyond U

V the remit of Prof Lee. I think it would be for the V

government departments to think whether these kinds of

C housing estates should be subject to further C

D investigation to ascertain the quality of the water. D

E MR LEE: All right. Shui Chuen O Estate, there is E

F a Long Chuen House, there are problems there. There are F

G problems picked up in the test. Are you aware of that? G

H CHAIRMAN: Yes, we are aware of that. We are aware of the H

I problems. Shui Chuen O, we didn't mean to conduct any I

J tests. But Long Chuen House, there were problems picked J

K up. K

L Not only that, for certain blocks, we entrusted the L

M accredited laboratory to conduct the tests, and there M

N were exceedances. We meant to go back and conduct N

O a sampling test but the residents said, "No, please O

P leave us alone." P

Q MR LEE: There may be other residents who would be prepared Q

R to accept it. R

S CHAIRMAN: We can't knock on every single door. We do have S

T limitations. I believe if you ask 3,000, you may be T

U able to find 30 or 60 who will be prepared to U

V accommodate. V

I don't want to get bogged down on this point,

C

Mr Lee. For those units that allow tests to be

C

D

conducted, they refused the second time. If they

D

E

refused the second time, what else can we do?

E

F

I understand fully your concern, it would be best if we

F

G

test every single household, because each type would be

G

H

different, the bends and the tees and the meter rooms

H

I

would be different. In theory, we should cover every

I

single unit.

J

If the Housing Department wants to put the

J

K

residents' minds at ease, if they see Prof Lee's

K

L

figures, by all means they can go back and conduct

L

further tests.

M

MR LEE: Paragraph 37.

M

N

N

O

CHAIRMAN: Since, if you go on like this, then you seem to

O

P

be saying the Commission is not doing enough.

P

Q

MR LEE: I understand the Commission has done what it could

Q

chose not to do, or something which has gone beyond its

R

R

terms of reference.

S

CHAIRMAN: Yes, we have gone beyond the terms of reference.

S

T

MR LEE: Paragraph 37. But nobody is seeking judicial

T

U

review.

U

V

V

CHAIRMAN: There is a JR in the bundle, and I'm sure that
this is not the first.

MR LEE: Paragraph 37. There is only one point here:

"(In English) Lead contamination in the densely
populated PRH estates seems to be dominated by lead
solder deposits in the numerous joints of the water
supply chain from the down pipe to the individual
flats."

Do you think that there are problems with the down
pipes, the horizontal section?

A. Yes, the down pipe, when it becomes horizontal.

MR LEE: Thank you very much. I have no further questions.

CHAIRMAN: Any re-examination?

Re-examination by MR SHIEH

MR SHIEH: Yes, I have some follow-up.

I have some questions relating to the major
direction. There were questions put this morning
regarding the figures, like if we cover more, if we
extend the period of seconds, what's going to happen.

I would like to look at it from a more macro point
of view. I'm no scientist myself. I did put a question

C to you before: why did you choose five samples instead
D of zero, 20, 40, 60, 80, and why didn't you use the
E first-draw 1 litre kind of method. There were questions
F about whether there is any literature in support. The
G literature is not alive, the actual need is more
H dynamic. So, with any experiment, the literature would
I be there for reference. You have to follow the law, but
J the literature, it all depends on the situation, and in
K this case you try to devise something which is more
supportive for the situation.

L You chose five samples. Of course, you couldn't get
M 1 litre for the first draw. But you agree that if you
N have five samples, zero, 20, 60, 80, once you have --
O you can have these to arrive at the concentration or you
P can have extrapolation to work out the value, it would
be fairly accurate?

Q A. Yes.

R Q. Conversely, if you follow the literature, after you take
S the first draw of 1 litre, assuming that you go there
T for one day, and you have to have a trade-off between
U one draw and 1 litre, or five draws from 0 to 80. One

draw, you may not be able to get all the five movements.

With five draws, you can achieve two purposes. One

draw, you can't achieve the two purposes.

A. Right.

Q. So with the five samples taken, this is a compromise and

this is achieving two ends with one move.

Secondly, much has been asked and answered about

Shui Chuen O. Mr Lee asked but Shui Chuen O, three

samples, it's a small size, why did you take three, and

then he asked you, what about six. It's double the size

but it's not very significant. The significance is not

a lot. The ideal approach is to test all units, if

money is not a consideration.

So, in other words, you are not going to have

a bigger size for the sake of it. You just want to get

what is sufficient, subject to constraints.

You may be able to reassure people by having more.

If you are not happy with 63, then if you do ten more,

it will not be reassuring in that people will just ask

you a different question, "Why 10?"

And also the issue of cross-checking. WSD

representative asked about your protocol. For the first

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C draw, 250, and then 20, 40, 60, you take 50, and then C
at

D the last draw, 250. You want to do this for quality D

E assurance. The first and the last are 250. So it would E

F be sufficient for two labs to use. F

G But for those taken in the middle, you don't divide G

H it into two portions, so it's either first or second for H

I the two labs. The purpose is to validate the I

J measurement in a macro manner. Scientifically, you J

K don't think that without taking 250 for the middle three K

L draws that would invalidate your entire findings? L

M A. Agreed. M

N Q. So you think that taking the three draws with a volume N

O of under 250 would not invalidate your findings? That's O

P why you opted for it? P

Q A. I agree. Q

R Q. Mr Geoffrey Chan representing Shui On asked you this R

S question. If you find in some unaffected estates or S

T affected estates there is a problem, you don't do any T

U tests by having some sections cut out by analysis. But U

V your evidence also shows why there's no need. V

C Please refer to paragraph 31. For the avoidance of
D doubt, page 140. When you find that a certain component
E with a bend, it doesn't mean that the lead you find in
F the water comes from that bend, because there's a lot
G of
H randomness, unless you have what we see in the movie,
I where somebody has turned into a miniature man and you
J go inside to check. So you cannot be sure that the lead
K in water comes from the lead in the bend. It says:

C

D

E

F

G

H

I

J

K "(In English) In view of the variability and
L randomness of the lead sources within a branch water
M supply system ..."

K

L

M

N So you rather expand your efforts in developing the
O CFD model; is that correct?

N

O

P A. Yes.

P

Q. Last question, on the habit of water consumption.

Q There's a contentious issue here. What is
R a representative daily water sample, if it's drawn at
S a particular time? But there's no well-recognised
T international practice to find out a representative
U water sample of a residents' drinking water system;

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there's no international standard as regards when the
sample should be taken. It all depends on the habit.

Could you turn to page 99 of Prof Fawell's report.
At the bottom of page 98:

"(In English) While much of the water consumed would
be expected to have contained low lead concentrations,
concentrations in the initial quantities of water drawn
after standing for extended periods would be expected
to
contain much higher concentrations of lead as would
water drawn from the hot water supply."

Let's pause here. Why is it that hot water supply
would contain more lead? Yesterday, I asked you this
question. Because if it's heated, more chemicals would
be released into the water.

"(In English) The quantity of lead ingested would
depend on individual habits."

This is agreed.

Mr Wong asked you yesterday to look at your table 7.
It's page 162 in the bundle. Table 7 relates to the
tests for vacant flats, different tests at different

times, T equals zero, 30, 60, and so forth. Mr Wong repeatedly said that table 7 contains a set of data not related to people's habits, because they are vacant flats. We may another discussion later. We may or may not agree with him. This table shows a pattern.

Although they are not occupied, in the first day you don't know how long the water had been standing, so the content was high and then gradually it dropped. For the first one, Un Chau Estate, 12 December, so a lot of water has accumulated, and then it gradually dropped. A few hours later, it would be lower, but it's a trend of dropping.

The question is whether it's unoccupied, and also, because it's been standing, whether it's at the tap, the meter or entry, the level would go up and then gradually it drops.

Please look at the pattern. At Un Chau, the first test, 10:30, entry 0.017, and then dropped to a very low level. So that's the pattern. Here, it tells you whether there's more at the meter location or the entry location. If it's occupied, you cannot tell this.

C At 2 o'clock, after four hours of standing, you took C
D another sample, 0.011, 0.008. The four hours of D
E stagnation means that more is accumulated. So it's E
F smaller than 0.0025, in the morning, and then after, at F
G 2 o'clock, it's 0.008. So it tells you a pattern, or G
H tells you more accurately that at the meter there's H
I a bigger problem at the metre than at the entry point. I
J Can it really tell you this? So it can tell you more J
K accurately where the problem lies, whether it's at the K
meter or the entry point?

L A. Yes. L

M Q. And of course the time of standing would affect the M
N concentration in the first draw, but you just want to N
know where the accumulation starts?

O A. Yes. O

P MR SHIEH: I have no other questions. P

Q CHAIRMAN: Thank you, Prof Lee. You have completed your Q
R testimony. I thank you and your team for offering so R
S much assistance and expending so much time in assisting S
T the Inquiry. Thank you very much.

(The witness withdrew)

U MR SHIEH: Let's have a break before we have the next U
V

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C

D witness, Prof Fawell. D

E CHAIRMAN: Yes. E

F (3.25 pm) F

G (A short adjournment) G

H (3.42 pm) H

I MR SHIEH: (In English) Mr Chairman and Commissioner, I now I

J call Prof Fawell, our second expert. J

K PROF JOHN FAWELL (affirmed) K

L (All answers in English) L

M CHAIRMAN: (In English) Take a seat, please. M

N Examination-in-chief by MR SHIEH N

O (All questions of Mr Fawell in English) O

P MR SHIEH: Prof Fawell, you have bundle V1 in front of you. P

Q You have been following the manner in which we took the Q

R evidence of Prof Lee. R

S A. Yes. S

T Q. And I would follow the same format. T

U I would read out your expert record into the record, U

V and as I do so, I will stop here and there and ask you V

T to elaborate or to explain certain matters or to respond

U to certain questions that other parties have raised

V

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C previously. C

D Could I ask you first to look at your joint expert D
E report, preliminary, prepared together with Prof Lee, E
F which is in bundle V1, page 1. You can see the front F
G sheet. It says, "Joint expert report (Preliminary)". G

H A. Yes. H

I Q. Prepared on 12 November. Could I then ask you to look I
J at page 3, which sets out your background and the J
K instructions to you. K

L A. Yes. L

M Q. "Prof John Fawell. M
N Biologist/toxicologist. N
O (Consultant on drinking water and environment). O
P Specialist field. P
Q Assessment and management of risks from drinking Q
R water contaminants. R
S Subject matter ... S
T To assist the Commission in discharging its duties T
U under the terms of reference and by acting as an expert U
V witness in the Inquiry hearings." V

Then your curriculum vitae is to be found in

C appendix 1, which is page 14. C

D "Name: Prof John Fawell. D

E Profession: Consultant on drinking water and
environment. E

F Primary specialisation: Assessment and management
G of risks from drinking water contaminants and from
H re-use of waste water. H

I Honours: MBE. I

J

J

K He received the International Society of Regulatory
L Toxicology and Pharmacology 2013 International
Achievement Award." K

M Then it sets out your academic qualifications: M

N Bachelor of Science. MI, that would be member of the
O Institute of Biology or something? O

P A. Yes. That's now the Royal Institute of Biology. P

Q Q. Okay: Q

R "Professional affiliations: Society of Biology. R

S British Toxicology Society ... " S

T Et cetera, and you were appointed visiting professor
at Cranfield University in May 2011. T

U Cranfield is what one would call a research-based U

V

V

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C university; it doesn't take undergrads? C

D A. That's correct. D

E Q. Therefore you don't see them in UCAS applications, but E

F it's a research-based graduate institution? F

G A. Yes, mostly research. G

H Q. Mostly research? H

I A. Yes. I

J Q. "Experience" -- now, key areas of your experience, at J

K the bottom of the page. You have: K

L "... worked on the implications of contaminants in L

M the environment for human health and aquatic life since M

N 1979 and is actively involved at both a national and N

O international level. O

P Key areas included: P

Q -- Closely involved in the WHO Guidelines for Q

R Drinking Water Quality as a member of the co-ordinating R

S team since 1988. For the 1993 revision he was S

T co-ordinator for inorganics and substances which affect T

U acceptability to consumers, rapporteur for organics, U

V pesticides and disinfection by-products and organiser V

of

C working group meetings on radioactivity and treatment
D and analysis. Prepared background documents on the
E toxicology and health risks of a wide range of
F substances, with proposed guideline values, for 1993
G revision and the 1998 addendum ... co-ordinator for
H naturally occurring substances and substances from
I agriculture, industry and human settlements for the
J preparation of the third edition of the Guidelines in
K 2003 for which he also prepared several revised
L background documents. Actively involved in the rolling
M revision of the Guidelines he was Chairman of the 1998
N Medmenham meeting on aspects of protection and control
O and of microbiological quality."

P Can I just skip the rest. In the middle of the
Q page:

R "He has continued in that role for the fourth
S edition of the Guidelines published in July 2011. He
T was part of the WHO expert group establishing guidelines
U for the supply of safe drinking water by desalination
V and a member of the expert group considering the
significance of beneficial minerals in drinking water.

He was one of the three co-ordinators and one of the authors of the WHO publication 'Chemical safety of drinking water: assessing priorities for risk management'. He is co-ordinator for most of the chemical parameters for the preparation of the fourth edition of the Guidelines and has been closely involved with the preparation of most of the other sections. He is a member of the WHO expert group on pharmaceuticals in drinking water."

Now, there then follows various other bullet points about your consultancy and advisory experience, but at page 17, you acted as PhD examiner on the subject.

Focusing on your experience with the WHO Guidelines -- we have heard a lot about them here -- you were co-ordinating team or co-ordinator for particular substances?

A. Correct.

Q. Inorganics and substances which affect acceptability to consumers, et cetera. But in terms of actually writing up relevant sections, you have to educate me and us, did anyone take responsibility for actually writing up

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C a particular part? For example, did you write the parts C

D concerning certain chemicals, or was it a group effort D

E which everyone had to basically endorse? E

F A. That's correct. I wrote much of the wording around the F

G different chemicals, in conjunction with the other G

H members of the team, and with the rapporteur of the H

I meeting. I

J Q. The rapporteur is basically the one heading the J

K -- K

L A. The person recording and delivering the comments of the L

M groups. M

N Q. So you were rapporteur for organics, pesticides and N

O disinfection by-products. That doesn't include lead, O

P because lead is grouped under which section? P

Q A. That was grouped under the inorganics. That particular Q

R section. R

S Q. But you were co-ordinator for the inorganics section? S

T A. Yes, and I have been involved in preparing the revisions T

U to the lead document. For example, for the fourth U

V edition, I wrote the modification to the lead documents. V

Q. So the bit which traced through -- I will go through it

in detail -- the origin in 1993 and how the threshold could not be established, therefore it's withdrawn, but why the value was retained as provisional, all those, you were closely involved?

A. Absolutely.

Q. And you know the thinking behind it?

A. Yes.

Q. Just to make sure that you possess the requisite familiarity on this particular issue, on which I do not think that there should be any degree of controversy.

Could I then go back to the instructions to you at page 3 of the bundle. Under the heading, "Instructions to Prof Fawell":

"I have been instructed to give my opinion on the matters under the terms of reference.

In providing my opinion, I have also been instructed to consider the following areas and undertake the following tasks:

(a) review and verify the findings of the interim and final reports of the task force led by the Water Supplies Department ... in respect of the waterworks

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C system and the inside service system in public rental **C**

D housing developments, including the overall methodology **D**

E adopted in the investigation; **E**

F (b) identify and explain the international standards **F**

G (particularly those laid down by the ... (WHO) in **G**

H respect of the following matters for the purpose of **H**

I ensuring safety and quality of drinking water in **I**

J Hong Kong: **J**

K (i) hazards and hazardous events; **K**

L (ii) risk assessment, prioritisation and management; **L**

M (iii) control measures; **M**

N (iv) construction and maintenance; **N**

O (v) inspection and monitoring; **O**

P (vi) management procedures; **P**

Q (vii) rectification; **Q**

R (viii) the supply and use of plumbing materials; and **R**

S (ix) the procedures and protocols regarding the use **S**

T and installation of plumbing materials; **T**

U (c) in the context of the international standards in **U**

V (a) -- **V**

(i) review and evaluate the adequacy of the existing

Water Safety Plans of the WSD;

(ii) review and evaluate the existing regulatory and monitoring regimes (both prior and subsequent to the excess lead in drinking water incidents as a result of which new measures have been put in place by public authorities) on quality of drinking water:

(1) at the pre-construct stage;

(2) at the construction stage;

(3) at the completion of construction (before the WSD issues the certificate for water supply connection);
and

(4) at the maintenance stage;

(iii) opine on whether any further metal(s), chemical(s) and/or microorganism(s) should be included as parameter(s) in addition to those set out in the WSD Circular Letter No. 1/2015 for testing of water samples, and if so, the thresholds, benchmarks and/or the acceptance criteria to be set for them; and

(iv) the effectiveness of the recommendations made by the Review Committee;

(d) opine on how the inadequacies (if any)

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C identified for the matters above may be rectified or C

D improved and to make recommendations with regard to the D

E safety of drinking water in Hong Kong; and E

F (e) state, provide advice and recommendations on F

G other areas of concern (if any)." G

H Then there's the usual expert's declaration. H

I Could I ask you one further question about your I

J experience, before proceeding to the main part of your J

K opinion, of your expert report. Do you have any K

L experience in testifying in court or judicial L

M proceedings as an expert witness? M

N A. I do. N

O Q. The most recent experience being about when? O

P A. Well, as an expert witness, would be a few years ago P

Q when I presented evidence at a public inquiry on behalf Q

R of the Environment Agency. But I actually was in the R

S High Court two weeks ago, providing evidence on advice S

T that I had given to a water supplier. T

U Q. That's the Royal Courts of Justice in England? U

V A. Yes, indeed. V

Q. Can I now move to the text of the joint preliminary

C report, which is a very short text, at page 6. C

D "Preliminary joint opinion". D

E I read this for Prof Lee, but because now you are in E
the box, I will read it for you:

F "The sampling protocol to identify whether lead is F
G present in the pipework or fittings of drinking water G
H systems in buildings is important in assessing the risks H
I of lead contamination in drinking water. The contact I
J time with lead-containing components such as soldered J
K joints or fittings is a key factor in determining lead K
L concentrations in drinking water. Indeed, a number of L
M authorities suggest fixed stagnation periods before M
N withdrawing samples while others propose first draw N
samples.

O The International Standards Organisation standard O
P (ISO-5667-5) on sampling techniques of drinking water P
Q from treatment works and pipe distribution systems Q
R states that 'If the effects of materials on water R
S quality are being investigated, then the initial draw S
T off should be sampled. Samples may also be taken after T
U a specified period of stagnation to provide information U

on the rate at which materials affect quality or the maximum likely effect.' For example, in the UK (England and Wales) standards for drinking water quality, the sampling requirement is to take the first litre of water drawn from the tap without flushing. The USEPA also requires that one-litre first draw samples are taken to indicate the level of exposure to lead and copper. In Japan the requirement is to first flush for five minutes and then take a sample for analysis after 15 minutes stagnation.

Fully flushed samples on their own may serve the purpose of assessing the general quality of a drinking water as supplied, but will not give a representative assessment of the concentration of lead or other metals from the internal distribution system to which the consumer is exposed.

Based on the above, data from fully flushed samples are not likely to be representative of the extent of lead exposure."

Now, Prof Fawell, a good deal has been said, debated, about the ISO standards. Can I ask you to look at the ISO standard. C2, page 1538, tab 19. It starts

C at page 1526. C

D Page 1538. Do you see, under the heading D

E "Pre-collection cleaning, disinfection and flushing"? E

F A. Yes. F

G Q. It's a relatively huge document, and doing the best we G

H could, we have identified what appears to be the H

I relevant bit or part concerning sampling method or I

J sampling protocol. So I'm going to start asking you J

K questions, starting from this part of the ISO standard. K

L If I have barked up the wrong tree, looked at the wrong L
part --

M A. I think that's correct. M

N Q. -- by all means tell me, and we can look at, let's say, N

O chapter whatever. But this is the correct place to look O

P at? P

Q A. Yes. Q

R Q. Could I ask you basically to develop or elaborate where R

S the quotation in the middle of the preliminary joint S
opinion comes from?

T A. That comes from 6.4.1. T

U Q. Yes, in the middle? U

V

V

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C A. Yes. C

D Q. Five lines down: D

E "If the effects of materials on water quality are E

F being investigated, then the initial draw-off should be F

G sampled. Samples may also be taken after a specified G

H period of stagnation to provide information on the rate H

I at which materials affect water quality or the maximum I

J likely effect. If the quality of the water as supplied J

K to premises is to be checked, then the faucets should K

L be L

M cleaned and flushed at a uniform rate for 2 minutes to M

N 3 N

O minutes or longer if necessary to achieve constant O

P temperature before samples are collected. The faucets P

Q should be cleaned, disinfected and flushed if samples Q

R are to be collected for microbiological analysis. R

S Faucets should be left flowing at a steady rate during S

T sampling." T

U Now, it's under the heading "Faucets", but if you U

V read the text of 6.4.1, some sentences relate to faucets V

T but some sentences, for example the sentence five lines

U from the top, "If the effects of materials on water

V

C quality are being investigated, then the initial
D draw-off should be sampled" -- it doesn't seem to be
E specific to faucets.

A. Yes.

F Q. So can you explain how this fits into our present
G exercise?

H A. It doesn't mean sampling faucets. It means sampling at
I faucets. In other words, if you are sampling at the
J tap, this is the instructions as to how you would
K operate.

L Q. If you are sampling water coming out of a tap?

M A. Absolutely. And the reason for things like -- it says
N should be until the constant temperature, that's a very
O easy way of demonstrating that you are bringing in water
P from the mains, because that water would be at
Q a constant temperature and you wouldn't get the
R variation. So it's a very simple, ad hoc approach to
S being able to do that.

T But of course it is not intended to be adopted
U verbatim under every circumstances. It would be
V expected that any authority would actually adapt the

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C instructions to their particular circumstances. C

D Q. Right. Can I also ask you to look at the previous page, D

E 1538, under 6.1. E

F A. Yes. F

G Q. "Pre-collection cleaning, disinfection and flushing", G

H "General". H

I A. Yes. I

J Q. "Cleaning, disinfection and flushing prior to sample J

K collection ...". K

L The sample here is sample of water? L

M A. Correct. M

N Q. "... depend on specific objectives of the monitoring N

O programme. In general, sampling to ascertain the O

P ascertain whether the quality of water delivered within P

Q a building is possibly altered by the service network Q

R within the building, should not be carried out without R

S thorough cleaning and flushing of the sampling points." S

T What kind of scenario does this sentence envisage? T

U A. Well, where it talks about cleaning of the sampling U

V points, that is very specific, and it's making sure that V

C your sampling point, which could be the initial part of
D the tap, the part that's not got water in normally until
E you actually turn the tap on, that that is suitably
F clean, and it's particularly important for looking at
G microbiological contamination, because you do get
H microbiological contamination in that area, and that is
not coming from the water as examined.

C

D

E

F

G

H

I Q. Thank you. So can I ask you then to put the ISO
J document to ...

I

J

K Perhaps one more question. At 6.4.1, after the
L sentence quoted in your report, there's a sentence which
M says:

K

L

M "If the quality of the water as supplied to premises
N is to be checked, then the faucets should be cleaned and
O flushed at a uniform rate for 2 minutes to 3 minutes or
P longer ..."

M

N

O

P

Q What is the significance of the two to three
R minutes?

Q

R

S A. That, in many buildings, will clear the internal system,

S

T and that's why it says "or longer" because it will

T

U depend on the particular building. But two to three

U

V

V

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B Commission of Inquiry into Excess Lead Found in Drinking Water Day 55 B

C minutes, in many houses, in many countries, would C

D actually take you through to the mains water, so that D

E you are not going to be affected by the internal E

F plumbing. F

G So it's basically saying that you've got to flush it G

H through for a sufficient time to make sure you get to H

I mains water, and to an extent that is duplication of I

J what it's saying about constant temperature. J

K Q. Because this is ISO, this is not country-specific. K

L A. No, it's very general. L

M Q. Therefore, what you are saying is that even though it M

N mentions some numbers, the numbers should not be treated N

O as bible? O

P A. No. It should be used according to your particular P

Q circumstances, to design your sampling, to meet the Q

R purposes that you are trying to achieve. R

S Q. And in accordance also, if I may suggest, of the kind S

T of building, the houses that people live in? T

U A. That goes without saying, because you cannot have U

V a standard that covers all the possible buildings that V

there are in the world. For example, in Hong Kong, the

public housing blocks, or private housing blocks, are not normally found -- an equivalent is not found, for example, in Europe.

Q. Thank you. Can I now then move on to your solo report, as opposed to your joint report, which is tab number 3, page 86. I'm not going to read out the instructions because I have read it out already.

Can I move straight to page 90:

"1. I Professor John K Fawell, independent consultant on drinking water and environment of Bourne End in the county of Buckinghamshire in the United Kingdom, have been appointed as one of the Commission's experts to assist the Commission in determining the matters under the terms of reference.

2. Lead in drinking water arises from lead leached from lead pipes, lead solder and other lead containing fittings, including brass and gun metal and also unplasticised PVC ... pipe not manufactured to current standards, ie containing high concentrations of lead stabiliser. It is not normally found due to contamination of source water or in water up the

C boundary of buildings unless there are lead service
D connections or lead stabilised PVC pipe (service
E connections are the pipes that deliver water from the
F water main to the building)."

C

D

E

F Pausing here, there's a distinction between
G unplasticised PVC pipe, on the one hand, and -- is there
H plasticised PVC pipe on the other?
I

F

G

H

J A. There's a particular -- unplasticised PVC pipe is widely
K used as a water pipe. It is rigid. The plasticiser was
L in the past a lead-based plasticiser. That leached and
M gave significant levels of lead, and it was recognised
N that that quality was inappropriate, and the
O requirements changed, so unplasticised PVC now requires
P that there is no lead plasticiser.

I

J

K

L

M

N

O

P Q. Right.

P

Q "Leaching can be exacerbated by galvanic corrosion
R as a result of other metals being joined to lead and
S will be dependent on factors such as hardness and pH.
T The level of leaching can be very variable from property
U to property depending on the configuration of plumbing
V and also on whether there are lead service connections.

Q

R

S

T

U

V

V

C The concentration of lead in water is also a function
of

C

D the surface area of the lead source in relation to the

D

E volume of water, so a small surface area in relation to

E

F a large volume will result in lower concentrations than

F

G a large surface area of a similar source in a similar

G

H volume. The concentration at any tap will also vary

H

I according to the temperature and period during which the

I

J water has been in contact with the lead source.

J

K Typically first draw water will have a much higher

K

L concentration of lead but this may not reflect the

L

M concentration of lead in water ingested in normal use.

M

N Equally, flushed samples would be expected to

N

O underestimate the concentration of lead in water

O

P ingested in normal use."

P

Q The reason why the concentration at any tap will

Q

R vary according to the temperature during which the water

R

S has been in contact explains why, as you may have heard

S

T from Prof Lee, that if it's a hot water pipe, there's

T

U a higher chance of a higher lead concentration?

U

V A. Yes.

V

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B Commission of Inquiry into Excess Lead Found in Drinking Water Day 55 B

C Q. Because it basically increases the solubility? C

D A. We would expect that to happen. That reflects what we D

E tend to see. E

F Q. Thank you. Paragraph 3: F

G "There are no internationally agreed sampling G

H protocols that can truly reflect average consumption of H

I lead from drinking water and which are reasonably I

J practical to apply. The most effective approach is to J

K identify whether ..." K

L Pausing here, so there's no particular standard L

M or whatever which tells you flush for how many minutes M

N represents how much -- the kind of water that a normal N

O human being would drink day in, day out? O

P A. Absolutely, because that will change from circumstance P

Q to circumstance, and the way that people use the water Q

R will be different between different, in this case, R

S apartments, different buildings. And the only way that S

T is really suitable is to take proportional samples, so T

U that you have a piece of kit that attaches to the tap, U

V V

and each time the consumer turns the tap on, takes some water, a proportion of that water is taken and sampled. That goes on over however long you wish to continue with it.

That gives you a very accurate assessment of intake of lead. It's totally impractical for routine use. It is a research tool, purely and simply, because it is a major disruption. It's very difficult to operate, you have to set pieces of kit up, and it is difficult to do.

Q. Because you need the co-operation of the residents to allow you to actually go in and mess around with their tap?

A. Absolutely. You need their agreement. You would also need an awful lot of very expensive equipment to be able to do sufficient numbers of samples to do it on a routine basis.

It could be done, and has been done, with limited numbers of properties, in order to get a feel for the likely exposure under different circumstances.

Q. In the United Kingdom, we've heard, and we have actually seen reports, on the relevant water quality authority,

a kind of survey on water consumption habits --

A. Yes.

Q. -- of people in various parts of England and Wales.

That had utilised the kind of sampling method which you
have just mentioned.

A. It did. I had some involvement in that in the 1980s,
and it was a very onerous piece of work to carry out.

It's not something -- we were very careful that nobody
made any mistakes.

Q. There's one in the 1980s and I think there's a more
recent one?

A. Yes. I've not been involved in the more recent ones.

Q. But you have been involved in the one in the 1980s?

A. Yes.

Q. But even if you managed to get some survey done, as to
some people consume water in this particular way and
some people consume water in that particular way, that
only gives you a feel as to the way most people or some
people consume their water?

A. Yes.

Q. Does it mean that in designing or in advising on health
risks, you can then disregard those which do not fall

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B Commission of Inquiry into Excess Lead Found in Drinking Water Day 55 B

C within, let's say, the top 60 per cent? C

D A. No. You have to then try and extrapolate to other D

E circumstances. It will depend on the type of housing, E

F the sort of population that you are looking at, and how F

G likely it is that they will widely differ in their usage G

H patterns. H

I But the key thing about the usage patterns on this I

J is that it will -- whatever the usage pattern, it will J

K give you an overall exposure. You have to then do K

L enough different people, different families, L

M properties, M

N whatever, in order to get a broader feel for the level N

O of exposure. O

P That is a research approach because you simply P

Q cannot do that for every single -- basically, it would Q

R mean that you would try to give every single household R

S their own standard for lead in water, and that is not S

T sensible or possible. T

U Q. Can I ask you to look at bundle A4, tab 53. U

V A. Yes. V

Q. You can see page 2745. U

V

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B Commission of Inquiry into Excess Lead Found in Drinking Water Day 55 B

C A. Yes. C

D Q. "Water Research". D

E A. Yes, the "Water Research Centre". E

F Q. "Domestic water use patterns", and if you look at the F
date, over the page -- F

G A. 1986. G

H Q. The year after it snowed in the summer. H

I I I

J A. That's true. J

K Q. This is the project that you were involved in in the K
1980s? K

L A. It is, yes. L

M Q. You were actually part of the team or -- M

N A. Yes, I was involved in providing a certain amount of N
advice, working with Jolly, Bailey and Bob Lacey, who O
was the statistician. O

P P P

Q Q. This is the one where you said they actually put taps Q
and extra meters and loggers, as we can see at R
page 2763? R

S A. Yes. S

T Q. Why didn't you just do surveys by doing questionnaires T
and asking people questions? U

V U V

A. This was considered to be the most scientifically robust way of getting actual data. The problem with surveys and questionnaires is that you have problems with recall, a whole range of differences that make it very difficult for an individual. You can get a broad feel for the way that somebody uses the water, but to get the sort of detail that we were looking for, the only way is to have something that's scientifically robust, and that's this sort of sampling.

Q. Looking back at paragraph 3:

"The most effective approach is to identify whether lead is present in the pipework leading to the tap used for drinking water and cooking. This is achieved by taking samples of sufficient magnitude to provide a sample of the water in the internal plumbing that is likely to have been in contact with any lead in the system for a sufficient period of time to allow measurable concentrations of lead to be reached. A positive result, ie a lead concentration close to or in excess of the WHO provisional guideline value of

C 10 micrograms per litre, or another chosen trigger C
D value, eg 5 micrograms per litre, would then trigger D
E an investigation as to the source of lead, eg leaded E
F solder, and the necessary remedial steps to reduce F
G exposure. (See preliminary joint report ...) Samples G
H taken from the fresh-water roof tanks of three public H
I housing blocks show no lead, which suggests that there I
J are no lead service connections or lead stabilised uPVC J
pipes.

K 4. The World Health Organization develops K
L Guidelines for Drinking-water Quality, which are revised L
M on a regular basis. The current edition is the fourth M
and was published in 2011."

N We will go through that in greater detail later. N

O "The guidelines outline a framework for safe O
P drinking water, which considers the overall management P
Q of Water Supplies and includes the concept of Water Q
R Safety Plans which provide a proactive means of R
S preventing and managing hazards and risks from the S
T catchment to the point at which consumers receive their T
U drinking water, frequently referred to as the source to U
V

C tap approach."

C

D Just a little bit of an idiot's guide to jargon --

D

E the catchment simply means the place where water is

E

F initially gathered?

F

F A. That's correct.

G

G Q. Be it a reservoir or a river or lake?

H

H A. Or where it leads into the river or reservoir or lake.

I So you would have, for example, if rain falls on fields

I

J and hills around a particular source, then that could

J

be

K the source of various contaminants.

K

L Q. That would count as the catchment as well, is not just

L

M the reservoir?

M

N A. That's the catchment, yes. So the catchment is wider
than just the source.

N

O Q. The reservoir. When you refer to the "source to tap

O

P approach", this is not a term of art which is actually

P

Q used in the actual guidelines, is it?

Q

R A. No, it's --

R

S Q. Is it just a kind of scientist's colloquial reference?

S

T A. Yes, it's a short-term way of describing the approach
as

T

U

V

being comprehensive from the source, including the catchment right through to where it's delivered to the consumer.

Q. The tap?

A. The tap.

Q. "The Guidelines are regarded as the scientific point of departure for the development of National Standards which should take into account the specific circumstances of the country concerned. The guideline values for chemical contaminants provide a basis for assessing the risks to health from drinking water but WHO indicates that local circumstances should always be taken into account in setting national standards and recommend that individual guideline values should be considered in the appropriate context. In this respect the statement that 'A guideline value (for a chemical constituent) normally (my emphasis) represents the concentration of constituent that does not result in any significant risk to health over a lifetime of consumption' should be treated with caution because it does not mean that contamination can be allowed to increase to the guideline value. In addition, some

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B	Commission of Inquiry into Excess Lead Found in Drinking Water	B
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C	guideline values for chemicals are designated	C
D	provisional and may be set at a higher value than would	D
E	be the case for a strictly health-based value because	E
F	of	F
G	practical considerations, eg lead. It is appropriate to	G
H	try and achieve as low a concentration of a contaminant	H
I	as possible within the constraints of cost and	I
J	practicality."	J
K	Now, can I take you to that part that you quoted	K
L	about "a guideline value normally represents the	L
M	concentration". C2, tab 18, page 1258.	M
N	A. Chapter 1 of the Guidelines.	N
O	Q. Page 1258, in the "Introduction" chapter.	O
P	A. Yes.	P
Q	Q. It's on the right-hand side of the page, of the	Q
R	print-out, immediately above "Radiological aspects".	R
S	A. Yes.	S
T	Q. "Guideline values are derived for many chemical	T
U	constituents of drinking water. A guideline value	U
V	normally represents the concentration of a constituent	V
	that does not result in any significant risk ...",	

et cetera.

So this is the part quoted.

Can you explain this part about the need for caution, because to a layperson like me, once you see a number, you can be tempted to say, "Right, as long as I don't meet the number, I'm safe"?

A. This is one of the reasons that WHO really say that member states should incorporate guidelines into their standards, into their particular standards, and take into account their particular circumstances.

There are circumstances where in practical terms we cannot recommend a guideline value that relates to the actual health-based value. Lead is a particular case in point.

What that means is we can say this is what you can practically achieve, you should try and get lower, and in due course, as we get better at dealing with this, you will be able to get lower, but in the meantime, you've really got -- this is your minimum -- you've really got to achieve this, and then after that you are looking at gradual improvement.

Q. Paragraph 5 addresses lead in particular, and perhaps that would bring out the point that you are trying to make for lead.

If we look at paragraph 5:

"Lead has been included in all editions of the Guidelines. In the second edition, published in 1993 ..."

We might as well look at that. It's in bundle C21, tab 175-2, page 18941. That is an extract from the 1993 WHO document.

A. Yes.

Q. In fact, it starts at page 18940.

A. It does.

Q. You had a part in this?

A. I did.

Q. Under the heading "Lead":

"Lead is used principally in the production of lead-acid batteries, solder, and alloys. The organolead compounds" -- which I don't try to pronounce -- "have also been used extensively as antiknock and lubricating agents in petrol, although their use for these purposes

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C in many countries is being phased out. Owing to the **C**

D decreasing use of lead-containing additives in petrol **D**

E and of lead-containing solder in the food processing **E**

F industry, concentrations in air and food are declining, **F**

G and intake from drinking water constitutes a greater **G**

H proportion of total intake. **H**

I Lead is present in tap water to some extent as **I**

J a result of its dissolution from natural sources, but **J**

K primarily from household plumbing systems containing **K**

L lead in pipes, solder, fittings, or the service **L**

M connections to homes. The amount of lead dissolved from **M**

N the plumbing system depends on several factors, **N**

O including pH, temperature, water hardness, and standing **O**

P time of the water, with soft, acidic water being the **P**

Q most plumbosolvent. **Q**

R Placental transfer of lead occurs in humans as early **R**

S as the twelfth week of gestation and continues **S**

T throughout development. Young children absorb 4-5 times **T**

U as much lead as adults, and the biological half-life may **U**

V be considerably long, longer in children than in adults. **V**

Lead is a general toxicant that accumulates in the

A	<i>Annex: Realtime English Transcription based on floor / Simultaneous Interpretation</i>	A
B	Commission of Inquiry into Excess Lead Found in Drinking Water	B
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C	skeleton. Infants, children up to six years of age, and	C
D	pregnant women are most susceptible to its adverse	D
E	health effects. Inhibition of the activity of ..."	E
F	Is that gamma? No?	F
G	A. Aminolaevulinic acid.	G
H	Q. Sorry, I won't try to pronounce that.	H
I	"... in children has been observed as blood lead	I
J	levels as low as 5 micrograms per decilitre, although	J
K	adverse effects are not associated with its inhibition	K
L	at this level. Lead also interferes with calcium	L
M	metabolism, both directly and by interfering with	M
N	vitamin D metabolism. These effects have been observed	N
O	in children at blood lead levels ranging from 12 to	O
P	120 ..., with no evidence of a threshold.	P
Q	Lead is toxic to both the central and peripheral	Q
R	nervous systems, inducing" -- I won't try to pronounce	R
S	that -- "neurological and behavioural effects. There is	S
T	electrophysiological evidence of effects on the nervous	T
U	system in children ..."	U
V	I won't read these. I skip straight to the	V
	penultimate paragraph:	

C "In 1986, JECFA established a provisional tolerable
D weekly intake (PTWI) for lead of 25 micrograms per
E kilogram of body weight ... for infants and children on
F the basis that lead is a cumulative poison and that
G there should be no accumulation of body burden of lead.
H Assuming a 50 per cent allocation to drinking water for
I a 5-kilogram bottle-fed infant consuming 0.75 litres of
J drinking water per day, the health-based guideline value
K is 0.01 milligrams per litre ... As infants are
L considered to be the most sensitive subgroup of the
M population, this guideline value will also be protective
N for other age groups.

M Lead is exceptional in that most lead in drinking
N water arises from plumbing in buildings and the remedy
O consists principally of removing plumbing and fittings
P containing lead. This requires much time and money, and
Q it is recognised that not all water will meet the
R guideline immediately. Meanwhile, all other practical
S measures to reduce total exposure to lead, including
T corrosion control, should be implemented."

T This is where the 10 micrograms per litre value was
U first raised.

A *Annex: Realtime English Transcription based on floor / Simultaneous Interpretation* **A**

B Commission of Inquiry into Excess Lead Found in Drinking Water Day 55 **B**

C A. Yes. **C**

D Q. We can see that as translated into 0.01 milligrams per **D**

E litre. **E**

F A. Yes. **F**

G Q. As a matter of interest, this paragraph actually says **G**

H most lead in drinking water arises from plumbing in **H**

I buildings. Just for our general education, you have **I**

J heard about the incident in Flint in America? **J**

K A. I have indeed. **K**

L Q. Does that arise from plumbing in buildings, the lead **L**

M poisoning there? **M**

N A. Service connections and buildings, and I actually refer **N**

O obliquely to this later in my report. **O**

P Q. Yes, I know. So every case is different, so that **P**

Q doesn't concern lead solder? **Q**

R A. It concerns lead fittings and lead service connections, **R**

S the same as we have elsewhere, where there is a lead **S**

T pipe that runs from the water main through to the **T**

U property. These were very commonly applied in the **U**

V 1940s, 1950s and 1960s, because the lead pipe was **V**

V relatively flexible, and there was a feeling that it **V**

C would not result in the lead pipe fracturing if there
D was movement of the ground.

C

D

E In some countries, in France, in Paris, for example,
F the water pipes were run very close to the waste water
G pipe, the sewer, and they were installed because it was
H felt that there would be less chance of leakage from the
I sewer into the water pipe.

E

F

G

H

I

J Q. Right. It says here:

J

K "... most lead in drinking water arises from
L plumbing in buildings and the remedy consists
M principally of removing plumbing and fittings containing
N lead."

K

L

M

N What kinds of countries, what kinds of systems is it
O talking about here? Because we know that in Hong Kong
P lead pipes were actually banned early last century.

N

O

P

Q A. That's right, but in many other countries, the UK, many
R parts of Europe and in the United States, for example,
S lead service connections in fact are still in place,
T a reducing number as they are gradually removed, but
U there were large numbers of them, it wasn't necessarily
V well recorded as to where those service connections

Q

R

S

T

U

V

C were, and one of the requirements, for example, at the
D moment is that when the 10 is exceeded and there is
E an examination of the house, if there is a lead service
F connection, the requirement is that the water supplier
G changes that lead service connection, warns the consumer
H that if they have lead pipes within the house, that they
should consider replacing those lead pipes.

C

D

E

F

G

H

I Q. So, basically, if no symptoms arise, then people just
J continue to live happily, despite the existence of lead
K pipes around?

I

J

K

L A. Yes, generally.

L

M Q. Symptoms, not in the sense of health symptoms, but
N symptoms as the exceedance of the 10 --

M

N

O A. Not all lead pipes will give rise to high levels of
P lead, because in some circumstances they are coated
Q internally with very high levels of lead carbonate, if
R you have very hard water, for example, and there the
S levels of leaching will be considerably lower.

O

P

Q

R

T I do know of one water main that's about 500 years
U old that's lead, and that goes to one of the English
V cathedrals, and the lead levels in the water are

S

T

U

V

C actually very low, because the amount of calcium
D carbonate that's on the surface of that pipe is so
E great, it provides a very thick coating.

F Q. Anyway, each system using lead pipes would have maybe
G its own way of making sure that there's no leaching into
H the water, whether because --

I A. Absolutely.

J Q. -- naturally because of hard water, there's coating
K anyway, or because they use chemicals to reduce the
L plumbosolvency?

M A. Absolutely. One of the other things is that if in
N a particular zone, basically a supply area, there are
O a significant number of exceedances of the 10 micrograms
P per litre, which is used as a trigger value, then

Q there's a requirement for the water supplier to treat
R the water with orthophosphate, and that orthophosphate
S will passivate the surface of the lead, reduce the
T plumbosolvency and reduce the leaching. But you can't
U get much lower than 10 using that technique.

V Q. Right.

CHAIRMAN: Why is that so?

A. It just seems to be one of those practical things.

Nobody is sure exactly why. I suspect that in some cases it's because you get particles breaking off, and so on. It does make it difficult to get down.

In some circumstances you may be able to get below.

For a particular property, it may be okay. But when you look at the round of all the properties, it gets more difficult.

MR SHIEH: Can I then move on to page 92.

A. Yes.

Q. At the top of page 92, you basically set out the PTWI, which I have actually read out in the text of the 1993 document already, but the third line from the top of page 92, you said:

"... this guideline value was retained in the third edition in 2004 and 2008."

2008 is a revision to the 2004 edition; right?

A. It was an addendum.

Q. It's still third?

A. Yes.

Q. "JECFA re-evaluated lead in 2011 and withdrew the PTWI,

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C stating that it was not possible to establish a new PTWI C

D that would be health protective because the D

E of dose-response analyses did not provide any indication E

F a threshold. The fourth edition was published in 2011 F

G and although the guideline value of 10 micrograms per G

H litre was retained, this was because of practicality in H

I dealing with older systems with existing lead pipes, I

J fittings and solder and cannot be considered in the same J

K light as in the previous editions of the Guidelines. K

L Lead solder was identified as a source of lead in L

M drinking water in the second, third and fourth editions M

N of the Guidelines." N

O Can we look at the 2011 version, which is bundle C2, O

P tab 18. Page 1446. P

Q A. Yes. Q

R Q. There might be a typo, because your reference in the R

S report is page 1246, but in the actual text which I am S

T using, it's actually 1446. T

U A. Sorry. U

V Q. At page 1446, do you see the heading "Lead"? V

U A. I do. U

V

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C Q. It should be 1446. C

D

E "Lead is used principally in the production of lead ..."

F

G The earlier part basically repeats the usage of lead, but if you actually look at the bottom, it tells

H you the value. H

I Provisional guideline value is 10 micrograms per

J litre. J

K "The guideline value is provisional on the basis of treatment performance and analytical achievability. K

L

M Occurrence: Concentrations in drinking water are generally below 5 ... although much higher

N concentrations ... have been measured where lead

O fittings are present. The primary source of lead is

P from service connections and plumbing in buildings; P

Q therefore, lead should be measured at the tap. Lead

R concentrations can also vary according to the period in

S which the water has been in contact with the

T lead-containing soldering materials. T

U Basis of guideline value derivation. The guideline

V value was previously based on a JECFA PTWI, which has V

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C been withdrawn, and no new PTWI has been established on C

D the basis that there does not appear to be a threshold D

E for the key effects of lead. However, substantial E

F efforts have been made to reduce lead exposure from F

G a range of sources, including drinking water. Because G

H it is extremely difficult to achieve a lower H

I concentration by central conditioning, such as phosphate I

J dosing, the guideline value is maintained at J

K 10 micrograms per litre which is designated as K

L provisional on the basis of treatment performance and L

M analytical achievability." M

N Now, that basically is the message that you try to N

O capture in paragraph 5. O

P Over the page, at page 1447 of the WHO document. P

Q Under "Additional comments" in the table on top: Q

R "Infants and children are considered to be the most R

S sensitive subgroups of the population. S

T Lead is exceptional compared with other chemical T

U hazards, in that most lead in drinking water arises from U

V plumbing in buildings and the remedy consists V

U principally of removing plumbing and fittings containing

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C lead." C

D Then basically there's a repetition of the part that D

E we have seen in 1993. E

F In the middle of this page, below the table, there's F

G a sentence which starts: G

H "Based on the dose-response analyses, JECFA H

I estimated that the previously established PTWI of I

J 25 micrograms per kilogram body weight is associated J

K with a decrease of at least 3 intelligence quotient K

L points in children and an increase in systolic blood L

M pressure of approximately 3 ..." M

N Millimetre? N

O A. Mercury. O

P Q. "Hg" is mercury, is it? P

Q A. Yes. Q

R Q. "... in adults. These changes are important when viewed R

S as a shift in the distribution of IQ or blood pressure S

T within a population. JECFA therefore concluded that the T

U PTWI could no longer be considered health protective, U

V and it was withdrawn. V

Because the dose-response analyses do not provide

C any indication of a threshold for the key effects of
D lead, JECFA concluded that it was not possible to
E establish a new PTWI that would be considered to be
F health protective. JECFA reaffirmed that because of the
G neurodevelopmental effects, foetuses, infants and
H children are the subgroups that are most sensitive to
lead.

C

D

E

F

G

H

I It needs to be recognised that lead is
J exceptional ..."

I

J

K Again, repeating previous sentences.

K

L Now, a few concepts that I wish you to explain and
elaborate for us.

L

M First, there is this concept called dose-response

M

N analysis. What is that? Because the previous guideline
O was based on a dose-response analysis. What is that?
P

N

O

P

Q A. That is the relationship between the amount ingested and
R the adverse or other effect, so that the increase in the
S amount of the toxicant relates to an increase in the
amount of the effect.

Q

R

S

T So, as you get more, then you are likely to have
U a bigger effect. That's the normal situation.

T

U

V

V

C So, when going down at that analysis, you can often
D determine that there is a point below which there won't
E be any effect. It's a threshold, a point beyond which
F you are not going to get any improvement because that's
G not going to have any more adverse effects below that
H level.

C

D

E

F

G

H In the case of lead, they were not able to determine
I what that threshold was. Now, that doesn't necessarily
J mean there isn't a threshold. It just means we can't
K actually measure it at the moment. It's down below our
L area of measurement. And that provides a rather
M difficult situation in setting health-based standards.
N We don't have a basis for setting a health-based
O standard, or a guideline in this case.

H

I

J

K

L

M

N

O Q. But does it mean that 10 is no longer health-based?

O

P A. It means that 10 is no longer a health-based guideline
Q value.

P

Q

R Q. Because even adopting 10, there is still the adverse
S effect --

R

S

T A. Absolutely.

T

U Q. -- to IQ and blood pressure?

U

V

V

A. Yes. That's what's stated earlier on in that particular section. So it shows that even at the provisional tolerable weekly intake, you will have effects.

Q. So, basically, it means that you could actually do better for health purposes, but you don't know how much better?

A. Yes. You really need to do better, for health purposes, because you should not be accepting that.

Now, that gets a little bit complicated, obviously, because it involves costs and benefits, and this is looking at a population basis rather than an individual basis. So it is recognised that you need to get as low as you practically can, with reasonable cost, but the difficulty is that we can't give you a value about how far you should go. So you get as low as you can reasonably achieve within the practical terms of what you have available.

Q. But knowing that achieving that could still carry the risk of the 3 point IQ shift or whatever?

A. There would be less then of a risk. The risk would reduce as the exposure reduces, as the concentration and

the level of the exposure reduces.

So if we are looking at this in context, in the past, not so long ago actually, before we took lead out of petrol, for example, we had children with average blood lead levels of around about 10 to 15 micrograms per decilitre. The world didn't end, but it was undesirable.

When we took lead out of petrol, there was a significant drop in blood leads. We also dealt with lead from a number of other sources, including improving the situation with drinking water. The consequence is that, for example, in the UK or in the US, we have average child blood lead of 2 micrograms per decilitre or less. So there's been a dramatic reduction.

So the risks from the exposure to lead have been reduced significantly. They haven't been completely removed, but that risk is a lot less now. It's very small. And actually measuring in an individual would be extremely difficult.

Q. Thank you. In the "Lead" section which we have just looked at, there is this concept, in the previous page, 1446:

"... on the basis of treatment, performance and analytical achievability."

Is that used in contradiction with health-based?

It's not based on health considerations, it's based on what you can achieve?

A. No, it's based entirely on practicality. It's nothing to do with the health. It's an indication that we cannot expect to change everything immediately. 2011 was when the JECFA re-evaluation was published. We were privy to that, when we were looking at the development of the fourth edition therefore that was taken into account. It recognises that you cannot overnight deal with that.

What it doesn't say, and perhaps -- and I can assure you it will be in the current addendum that's being prepared for the fourth edition -- it doesn't actually say, "If you don't have any lead to start with, you shouldn't put any in there."

Q. So basically making clearer the message that this really addresses systems --

A. Yes.

Q. -- where you are trying to bring down levels of lead?

A. Absolutely.

CHAIRMAN: Can I ask you, Prof Fawell -- I understand the "treatment, performance", but why is "analytical achievability" mentioned?

A. It's because in many countries their ability to measure accurately or reasonably accurately a value or quantify a value of 10 micrograms per litre is not particularly good. So we recognise that there will be countries where this will be very, very difficult to achieve, at this time.

CHAIRMAN: In the context of Hong Kong, we know the concentration of lead coming from China at a very low level --

A. Yes.

CHAIRMAN: -- 0.001 micrograms per litre or something like that, and we also heard from Prof Lee that the analytical achievabilities of their instruments, either in the university or at the Government Laboratories, is within 0.02 or 0.025 milligrams per litre. So does that mean that in the context of Hong Kong, we can actually

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C set a guideline of, say, 2 micrograms? C

D A. One would argue that in Hong Kong, where lead piping was D

E banned a long time ago, that any standard, E

F Hong Kong standard, developed from the guidelines, would F

G be a lot less than 10 micrograms per litre. G

H CHAIRMAN: Thank you. H

I MR SHIEH: Prof Fawell, there had been some discussion about I

J the default assumption underlying these values, and how J

K much and how long you need to take "contaminated" water, K

L containing about 10 microgram threshold, before any ill L

M effect would manifest itself. You know about the M

N 70-year drinking period -- N

O A. Yes. 70-year, in this particular context, is something O

P of a red herring. P

Q Q. Why? Q

R A. Because we are talking about the most sensitive R

S subgroups, infants and children, and infants and S

T children tend not to stay as infants and children for T

U 70 years. U

V Q. Yes. So coming back also to the point. Because the V

U subgroup which is most sensitive to lead would be

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C infants and children, so in designing any sampling or C

D testing protocol, does it mean that one has to be D

E particularly sensitive to habits associated with this E

F group? F

G A. Absolutely. It's really important, because -- G

H Q. Some people drink, you know, distilled water at work or H

I whatever, but some people are home-bound, like infants? I

J A. Particularly important with bottle-fed infants, who will J

K get most of their intake from water, and who will have K

L a much higher intake of water in relation to their body L

M weight than a breastfed infant. M

N So some people will prepare a bottle or a series of N

O bottles first thing in the morning. They would fill O

P a kettle, boil a kettle, then make up a series of P

Q bottles which are then cooled and be put in the Q

R refrigerator and reheated at later stages. If that R

S happens and they take first-draw water, they will be S

T taking more than 1 litre of water, and they will have T

U the potential for a much higher level of lead under the U

V circumstances, so the infant may actually be getting V

a much higher level of exposure than an adult would get.

So therefore looking at that and providing advice around that is particularly important.

Q. But coming back to 70-year-old -- forgive me.

A. That's me.

Q. Infants don't remain as infants for 70 years. They remain as infants for, let's say, two or three years?

A. We are talking about relatively short periods when there can be an impact, because we know that the measurement is in infants and IQ in infants. So we are talking relatively short-term exposure, months to perhaps a very few years.

Q. But does the 70-year thing mean that you have to keep taking it for 70 years, before any ill effects would manifest, so if people complain after two or three years they are making it up, because they haven't actually taken it for 70 years? I'm playing the devil.

A. At these sorts of levels, you would not expect to see acute effects, because the concentrations are relatively low, so you would not expect to see, unless individuals were doing very strange to increase their exposure significantly, acute poisoning effects in individuals.

C Now, that doesn't necessarily mean that people are
D not under significant stress because they are being
E exposed to a toxin which is an unknown, they did not
F volunteer to be exposed to it, it has not got their
G choice involved. So that can cause a whole range of
H effects.

C

D

E

F

G

H I was reading Prof Bellinger's evidence and he
I actually touches on this and was questioned about it,
J and it is a difficult area. It is not saying that
K people who show effects are making it up, but they can
L be influenced by their knowledge of the fact that they
M are being exposed, and there are other examples of this.

H

I

J

K

L

M Q. Can I move on to paragraph 6.

M

N CHAIRMAN: I think, for lead, it's not so much the acute
O symptoms; it's rather the chronic effects on
P an individual.

N

O

P

Q A. Absolutely. In the past, back in the 19th century
R onwards, there were places where lead concentrations
S were achieving milligrams per litre, and there you could
T see frank lead poisoning in some individuals after
U a relatively short period.

Q

R

S

T

U But in this day and age, unless there are very

U

V

V

extreme circumstances, that should not be the case, and

in Hong Kong that certainly should not be the case.

CHAIRMAN: Thank you.

MR SHIEH: Paragraph 6:

"In spite of the fact that leaded solder is known to be a significant source of lead in drinking water installations in buildings and that lead solder is banned from use for drinking water systems in many countries, incidents in which lead solder has been used in new buildings continue to occur. In 1997 a new housing estate in Scotland was found to have been plumbed with copper piping installed with lead solder ..."

Pausing here, can we look at the relevant reports, in bundle A1, tab 14 and also tab 15.

A. Yes.

Q. These are the reports and documentation flowing from that saga. There is stage 1 and stage 2 --

A. That's correct.

Q. -- in the Scottish saga, stage 1 being the emergency measures; right?

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C A. Yes. **C**

D Q. And stage 2 being the longer-term work being done as **D**

E a result of the explosion of the saga, so to speak? **E**

F A. Yes. **F**

G Q. We have actually been through that with other witnesses **G**

H and therefore I won't be exploring that or taking you **H**

I through them. **I**

J Were you aware of this incident? **J**

K A. I was partly involved in it. **K**

L Q. In what sense? **L**

M A. I was consulted by SCIEH and asked to look at the **M**

N reports and comment on the approaches that they were **N**

O taking. **O**

P Q. Right. For stage 1 or stage 2? **P**

Q A. It was mostly stage 2, but I was aware of stage 1 **Q**

R because they contacted me to say that this had happened. **R**

S Q. So stage 2, the report for stage 2 is the one in tab 15. **S**

T A. Yes. **T**

U Q. 2003, Scottish Centre for Infection and Environmental **U**

V Health. **V**

V A. Yes. **V**

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C Q. That's the entity retaining you? C

D A. Yes. D

E Q. Then, reading on in paragraph 6: E

F "... and in 2001, new properties in Wales were also F

G identified as having lead solder." G

H Look at the same bundle, bundle A1. In tab 13, you H

I can see the relevant journal reporting on that. We I

J don't seem to have any formal report on this. This J

K appeared in a professional journal, the Journal of K

L Environmental Health Research. L

M Did you have any knowledge of this incident at the M

N time it -- N

O A. Yes, I was aware of it. O

P Q. You were aware of it? P

Q A. Because I had reasonably close links with the Chemical Q

R Hazards and Poisons Division of UWIC. R

S Q. I see. You didn't do any work on it but you were aware S

T that -- T

U A. I was aware of this. They contacted me to let me know U

V about it, because it was of note to them. V

U Q. In these incidents, materials containing lead, soldering U

V

C materials, pipings --

C

D A. Yes.

D

E Q. -- were used, in spite of the fact that they ought not
F to have been used?

E

F A. That's correct.

F

G Q. I know it may not be a matter for expert evidence, but

G

H in your experience, how sound is an assumption that

H

I people would just not do things that they are not

I

J supposed to do, in the context of using raw materials?

J

K What kinds of things, in your experience, would

K

L influence --

L

M A. From long-term experience with lead and leaded solder,
N in the United Kingdom and in Europe, I would say that

M

O you simply can't rely on that, unless you have some
P very, very powerful mechanisms in place to stop it

N

Q happening, because --

O

R Q. Why? Why can't you rely on people's self-discipline?

Q

S A. Because half the time, people don't even know the
T difference between different solders. They are sold in

R

U plumbing supplies, and often -- it may not be always but

S

V often -- I know from experience they are not clearly

T

U

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C designated as being different, and there is a price C

D difference, and surprising, people actually will often D

E choose the cheaper of the two, which is the leaded E

F solder. F

G And there is another issue, that leaded solder is G

H actually easier to apply than the unleaded solder. You H

I need more skill to apply the unleaded solder properly, I

J and leaded solder is still allowed in many countries for J

K domestic heating systems. K

L Q. Non-potable water systems. L

M A. Non-potable water systems. Therefore, there is a danger M

N that people will take the wrong material, and also when N

O repairs take place, frequently you take the first solder O

P to hand, particularly if it's an emergency repair. P

Q CHAIRMAN: Are you referring to a normal DIY man or are you Q

R referring to a professional plumber? R

S A. I'm very cautious here, I'm afraid, Chairman. I am S

T largely talking about the normal DIY, but many of these T

U are used by professional plumbers as well. In the UK, U

V we looked at and discussed with the government about V

getting lead solder banned full stop, and the government

C were unwilling to do this because of representations
D from the heating side of the plumbing industry, and so
E they retained the leaded solder.

C

D

E

F We then continued to provide to improve the training
G of plumbers and the certification of plumbers, which
H government again were unwilling to do, for some bizarre
I reason which is totally beyond me.

F

G

H

I The plumbers themselves were trying to get
J a certification system in place, because they saw this
K as important for the reputation of their particular
L industry.

I

J

K

L

M Scotland now has such a system. The first one that
N I can find is Hong Kong.

M

N MR SHIEH: So we are advanced, on paper?

N

O A. On paper, yes.

O

P CHAIRMAN: Let's continue tomorrow. I think we have heard
Q enough for the day. I would be grateful if you can come
R back tomorrow morning at 9.30, Prof Fawell.

P

Q

R

S WITNESS: Thank you to you.

S

T CHAIRMAN: The hearing is now adjourned. Thank you.

T

U (5.01 pm)

U

V

V

C (The hearing adjourned until 9.30 am the following day) C

C

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