

Scottish Hospitals Inquiry

Witness Statement of Questions and Responses

Dennis Kelly

This statement was produced by the process of sending the witness a questionnaire with an introduction followed by a series of questions and spaces for answers. The introduction, questions and answers are produced within the statement.

Personal Details

1. Name, qualifications, chronological professional history, specialism etc – please provide an up-to-date CV to assist with answering this question.
A Dennis Kelly. BSc (Hons) FIHEEM, FWMS, C Biol, MRSB. I am a Chartered Biologist and a member of the Royal Society of Biology as well as a Fellow of the Institute of Healthcare Engineering and Estate Management and a Fellow of the Water Management Society.

Professional Background

2. Professional roles within academia
A None within academia
3. What role did you have before becoming Authorising Engineer for the NHS?
A I work for Pro Lp Consulting Ltd and am contracted to the NHS as an Authorising Engineer. Prior to this I had various management, senior management and technical support roles with various water treatment companies spanning over 40 years. Immediately prior to essentially working for myself in Pro Lp Consulting Ltd, I was the European Business manager for water Hygiene in Nalco Ltd.

4. When were you appointed Authorising Engineer by the NHS?

A I can't remember the exact date but I believe it has been in excess of 10 years since I was appointed for a Board in NHS Scotland. Looking at my records I have had involvement with NHS GGC since around 2014. At that time I was working as an external technical consultant for Legionella Control International Ltd (LCI). I believe that LCI held a contract with NHS GGC for the supply of AE(Water) services

5. What hospitals did you work in as Authorising Engineer?

A I have worked in multiple hospitals in various NHS Boards across Scotland. My files show that I worked initially in NHS Lanarkshire in 2013 in various hospitals in that Board including Monklands. At around the same time I worked for NHS Tayside in Ninewells, Perth Royal Infirmary, Stracathro and many other hospitals and health centres.

6. What were your responsibilities in this role?

A As an outside contractor, and not a direct NHS employee, I would respond to requests to complete work of different sorts in various hospitals. Some of this work would be for technical support. I would also, when asked, complete AE compliance audits, authorised person competency checks and where requested deliver water related training]

7. If had more than one role, what was the work split with different hospitals?

A I delivered various roles to various hospitals depending on what I was asked to do.

8. How many hours per week did you spend in your role at QEUH/RHC?

A I do not recall. I would work in response to request and that might be for 1 hr on a technical issue up to two or three days at times.

9. Who did you report to?

A I would generally report to an Estates Manager or senior estates manager

10. Who reported to you?

A Nobody

11. Describe an average working day in your Authorising Engineer role.

A There is no average day. It would depend on what I was requested to do. It could be any or all of the roles mentioned in the answer to question 6 which would include technical support and advice, training and auditing.

12. Who did you work with most closely at the QEUH/RHC?

A Over the years I have worked with various people and this has been subject to change over time. I would work with hospital estates managers and who this was would depend on the hospital I was working in.

13. What training, if any, did you provide to staff at QEUH/RHC?

A None – I was not requested at the time of the QEUH opening, or prior to or after that, to deliver any training to QEUH/RHC staff, or any staff in NHS GGC.

14. What is your specific expertise?

A I have a biological degree and 48 years' experience of working in the water treatment and water hygiene fields. I believe I have an expertise in the operation of building hot and cold water systems, with a particular regard to microbiological activity in these water systems.

15. What experience, if any, do you have of large scale infection outbreaks?

A I have supported end users and clients in Legionella outbreaks in Glasgow, Hereford and Edinburgh amongst others. I have supported when there have been issues with regard to the Pseudomonas organism. I respond, when asked, to requests for support from the NHS sites.

16. What reports, if any, did you prepare for GGC relating to the QEUH/RHC?

A None until I was asked to complete a compliance audit. Until that point I was not asked for any advice in relation to the QEUH/RHC and I stated this fact in

my Dec 2016 annual report. I also recommended in this report that a compliance audit should be undertaken for the QEUH/RHC hospitals (**DMA Water: Written Scheme for Legionella Control QEUH & RHC: December 2016 Update – Bundle 18, Volume 2**)

17. What advice did you provide to GGC relating to the QEUH/RHC?

A I recommended in the December 2016 annual report that a water compliance audit be undertaken on the QEUH/RHC as I was concerned that the hospital had been operating for some time without an audit having been completed.]

18. What, if any, specific water borne infection concerns were raised with you by GGC relating to the QEUH/RHC?

A None. The annual compliance report looks at the management of the hospital water systems and I raised issues within that report.]

19. If so, when were these concerns raised with you?

A Concerns were not raised with me until after patient infections had occurred but I cannot recall the dates.]

20. If so, who raised these concerns with you?

A I can't remember specifically but I did have contact from Alan Gallagher and Mary-Anne Kane.

21. How did they inform you of their concerns? email? Phone? Face to face?

A Email and telephone

22. What group were you invited to join at the QEUH/RHC?

A The Water Technical Group

23. Why were you invited to join this group?

A I assume because I was an authorising engineer for water and could perhaps assist in the situation given my background and experience.

24. What was the purpose of the group?
- A** As I understood it the purpose of the group was to look at how the QEUH/RHC water systems were being operated.
25. Who else was a member of the group?
- A** When I was first involved, and looking at notes from these meetings, the following people were involved. Ian Powrie, Ian Storrar, Iain Kennedy, Annette Rankin, Colin Purdon, John Hood, Teresa Inkster, John Mallon, Tom Steele, Alan Gallagher, Mary Anne Kane, Karen Connelly, James Cumming, Andrew Wilson and other external support people such as Tom Makin and Tim Wafer.
26. Why did Tom Makin join the Water Technical Group in or around April 2018?
- A** I am unable to answer this question. This is a question for the people that invited him on to the group.
27. Who was your Authorising Engineer predecessor at QEUH/RHC?
- A** I do not know. I am not sure there was an authorising engineer for water prior to my involvement.
28. What involvement, if any, did you have in the design and build of the water system at QEUH/RHC?
- A** None
29. What are the important guidance documents relating to the water system in a hospital?
- A** The HSE ACoP L8 document. The HSE HSG 274 document, The SHTM 04-01 documents, HBN 00-01 (**ACOP L8 3rd Edition**) (**Legionnaires Disease – HSG274 Part 2 – The control of legionella bacteria in hot and cold water systems – Bundle 15**) (**SHTM-04-01 – Bundle 18, Volume 1**) (**397 HBN 00-01 Oct 2014**)

30. What is the commissioning and validation process for the water system of a hospital?

A I am not a commissioning engineer. However, I do know that it involves balancing water systems, disinfection of water systems, ensuring temperatures are correct throughout the water systems and microbiological sampling. There may be other things involved of which I am unaware.]

31. What specific actions would you have expected to have been undertaken relating to the water system before and after handover?

A I would have expected the receiving NHS Board would have a complete understanding of how to operate the water systems. The Board staff should also have been satisfied that the water systems were operating correctly. They should have been satisfied that suitable and sufficient and successful disinfection of the hospital water systems had been completed. During the build phase appropriate measures should have been in place to ensure that microbiological opportunity was kept to a minimum. This should have been overseen by the NHS during the build phase. A risk assessment should have been completed and suitable risk reduction processes and procedures should have been in place at handover.

32. What inspections were carried out in relation to the water system of the QEUH/RHC?

A I assume that this question refers to the time of handover and the opening of the hospital. I do not know what inspections were carried out as I had no involvement at this time.

33. What plans were prepared in relation to the water system of the QEUH/RHC?

A I do not know. I had no involvement.

34. What was contained within the plans relating to the water system of the QEUH/RHC?

A I do not know. I had no involvement.

35. What policy documents did you prepare in relation to the water system of the QEUH/RHC?

A None

36. Who is responsible in GGC for ensuring there is a plan/policy in place at the QEUH/RHC?

A I do not recall at the time of the handover. Normally it would be the nominated responsible person for water

37. Who is responsible in GGC for ensuring that the building and water system is handed over in an acceptable condition?

A At the time of the handover I had no involvement, so I do not know. As I understand it some Boards operate with a separate building project management group for new builds and hospital refurbishments.

38. What are the benefits of having an Authorising Engineer in the project team at the beginning of a project at the design stage until the end of the project?

A Authorising engineers are generally experienced in the operation of building water systems in a way that helps the building owners and operators to operate the water systems in a way which reduces microbiological opportunity in the water systems. This can be applied to new builds, during the construction phase, as well as to existing operating hospitals

39. What technical advice was sought from you by GGC during the construction and handover phases of the project?

A None

40. What recommendations did you make to GGC in relation to the water system?

A None – I was not asked for any recommendations during the build and handover phase nor for some time after the hospital was opened.

41. Who were the recommendations given to?

A I did not make any recommendations as stated above so I cannot answer this question.

42. What water audits, if any, did you undertake for GGC at the QEUH/RHC?

A I completed the first water compliance audit in May 2017. This was the first time I was asked to undertake an audit. I had recommended that an audit be done in the Dec 2016 annual report. Since that time I have been asked to complete compliance audits on a number of occasions.

43. If so, when were the water audits carried out?

A I have completed water audits in May 2017, July 2018, Jan 2020, Feb 2021, Feb 2022, Jan 2023, Jan 2024 (**QEUH 2017 Water AE Audit – Bundle 15**) (**QEUH 2018 Water AE Audit – Bundle 18, Volume 2**) (**QEUH audit 30012020 ver 1 5 – Bundle 18, Volume 2**) (**Doc A for NHS GGC Management QEUH RHC ver 1.1 – Bundle 18, Volume 2**) (**QEUH and RHC Feb 2022 Audit Doc A – Bundle 18, Volume 2**) (**QEUH RHC AE Audit Jan 2023 – Bundle 15**)

44. What were the outcomes of the water audits?

A An audit report was produced and within the report there will have had comments and recommendations made.

45. What does an annual audit involve?

A It involves spending time with the involved NHS employee(s) and reviewing the operational management of the hospital water systems. This would involve examining the risk assessment and the water safety plans for the hospital. Within the water safety plan there will be a review of the competency levels and the levels of task completion of the required risk reduction asks. It also looks at contractor competence and specific items like disinfection procedures.

46. What documentation does the Authorising Engineer need to see during an audit for the water system?

A The risk assessment and all the paperwork contained in the Water Safety Plan records.]

47. What documentation did you see during your audit of the QEUH/RHC's water system?

A I assume this refers to the audit that was carried out in May 2017. This was the first audit completed for the QEUH/RHC. The 2015 DMA Canyon Ltd risk assessment was available. Besides that, I cannot remember the specific detail of what documentation was available but in looking at the audit there were elements of the paperwork that were not available at the time of the audit. It is stated in the audit report that "There is no adequate written scheme, in terms of the requirements as detailed in the HSG 274 document, for the QEUH currently available on site."]

48. What, if any, issues did you identify during your audit?

A As stated in the answer to question 47 above there was no adequate written scheme available. There were also gaps in the records of task completion. I would refer you to the May 2017 audit document which details what was there and what was not there from a documentation point of view.

49. What concerns if any arose as a result of identifying these issues during the audit?

A There were concerns about the lack of training for the involved staff, the need for an up to date risk assessment and the gaps in the records which suggested that not all the required tasks were being completed. I have copied the last paragraph from the executive summary part of the audit document "In summary, there is currently a delivery of many of the perceived required processes and procedures. However, it needs to be reviewed in order to meet the required compliance standards, and to ensure that a reduced level of risk is maintained. The delivery of the processes should be based on a new risk assessment. This will help to define the actual current requirements which will

be defined by the risk assessment. There is also a need to clarify the management structure, and also to ensure that all involved personnel, from both NHS GGC and also contractors staff are trained and have an adequate level of competency in order to deliver the required level of water based risk reduction in the QEUH.”]

50. What was your reaction when you were asked to join the Water Technical Group?

A I wanted to help if I could.

51. How was your workload at the time of the invite? Did you have capacity to also spend time in the Water Technical Group?

A My workload is generally pretty committed but I did have time to help with the Water Technical Group.]

52. How much experience do you have of dealing with the waterborne pathogen, Cupriavidus?

A None. I was asked about Cupriavidus at the time that it was found in the water system. I called some colleagues and friends in the industry and in other hospitals and asked them if they had any experience of Cupriavidus and the answer from all was no. It was not an organism that had ever been mentioned to me in my many years in the water hygiene business area.

53. What input did you provide to the Water Technical Group?

A I joined in all the meetings for which I was available and when asked offered suggestions on such topics as sampling, disinfection procedures and other technical points. I responded where I could to any questions from the NHS GGC staff.

54. How often did the Water Technical Group meet?

A My records indicate that the Water Technical Group was meeting at least once per month and often twice or more.

55. Who, if anyone, was in the Water Technical Group from Infection Control?
A I remember Teresa Inkster attended the meetings. John Hood was also a member of the group in the earlier meetings.
56. What is Clorious 2?
A Clorious 2 was a stabilised chlorine dioxide product. I had heard about from the manufacturer at about the time I was asked to join the Water Technical Group.
57. What, if anything, did you say in the Water Technical Group about Clorious 2?
A I had been contacted by the manufacturer of Clorious 2 and supplied with some information on the product. Other than this contact from the manufacturer I had no experience in using the product. I said it might be worthwhile considering the option of using it a continual dose disinfectant and that it might be worth getting more information on the product. I was not advocating the use of the product and had no previous experience of the product. I considered it might be an option that could be looked at.]
58. What was Tom Makin's view on Clorious 2?
A I don't know
59. Why did you have a difference of opinion on the use of Clorious 2?
A I have no recollection of a difference of opinion with anyone. I raised the possibility of using a product that might help but stated that more information would be needed. I had recently heard about the product from the manufacturer and it was nothing more than that.
60. What was your involvement in the chloride dioxide dosing programme?
A None other than discussing the use of chlorine dioxide in general as a secondary disinfectant.

61. Who provided advice on the chloride dioxide dosing programme?
- A** I understand that Tim Wafer is a chlorine dioxide expert and he was on the Water Technical Group.]
62. To what extent is it accurate to say that there was no proper management system in place for the water system at the QEUH/RHC during the design, build and post-handover stages?
- A** I cannot comment on the management during the design and build stages as I had no involvement at that time. My first involvement was in May 2017 with the first annual compliance audit and I can only comment from that point on.
63. To what extent, if any, were you involved in any water sampling at the QEUH/RHC?
- A** I had no involvement. Sampling was undertaken by a contractor.
64. If so, when did you carry out the water sampling?
- A** I did not undertake any water sampling.
65. What were the results of the water sampling?
- A** I cannot recall the exact results of the water sampling.
66. What is the risk assessment process carried out by the Authorising Engineer for the water system?
- A** The authorising engineer does not complete risk assessments. A risk assessment would be completed by a suitably qualified risk assessment supplier.
67. Would you recommend the use of flexi-hose in a hospital? If not, why not?
- A** I would not recommend the use of flexible hoses in healthcare buildings. Flexible hoses are understood to offer increased levels of microbiological growth opportunity and for that reason I would not advocate that they are used.

68. What is meant by “dead legs” in the context of a water system?
- A** The term dead leg, or dead end, is typically used to describe a run of pipework that is no longer in use or a pipe that has become isolated from the regular flow of water.
69. How many dead legs, if any, did the QEUH/RHC have?
- A** I do not know. I did note in the May 2017 compliance audit document, that the risk assessment, in section 7, had identified some dead legs. I also commented in the May 2017 audit that there was no evidence in the records that any dead legs that had been identified in the 2015 risk assessment had been removed **(QEUH 2017 Water AE Audit – Bundle 15) (Report prepared by DMA Water Treatment Ltd titled “L8 Risk Assessment (Pre-Occupancy) NHS Greater Glasgow and Clyde South Glasgow University Hospital” dated 1 May 2015 relating to site assessment concluding on 29 April 2015 – Bundle 6)**
70. What risks, if any, arise from dead legs in a water system?
- A** Dead legs contain stagnant water. This provides increased opportunity for biofilm development which in turn may provide increased growth opportunities for various bacteria. Additionally, temperatures in the stagnant water in the dead leg may be conducive to bacterial growth. Dead legs may also “reseed” the water system with bacteria from the deadleg.
71. What is the purpose of a water storage tank on the 12th floor of the QEUH?
- A** I believe it is the fire water storage tank for the helipad firefighting system.
72. What discussions, if any, do you recall about the water storage tank’s capacity in the QEUH?
- A** I don’t recall these discussions

73. What are the risks, if any, of having 24 hour storage capacity rather than 12 hour storage capacity?
- A** Increased storage capacity infers slower turnover of water in the tanks. Slower turnover of the water may be conducive to increasing microbiological growth opportunity.
74. To what extent, if any, do single en-suite rooms increase the risk of waterborne infection? If so, why?
- A** There are a number of things to consider with ensuite rooms. If the patient is ambulatory and is using the en suite facilities then water is likely to be utilised and water will be flowing in the pipework to the outlets in the en suite. If the patient is not ambulatory then unless arrangements are made for the water systems to be utilised in some other way, for example by water flushing, they may become little used outlets.
75. How common is it to find *Stenotrophomonas*, *Cupriavidus*, *Enterobacter*, *Serratia marcescens*, and *Pseudomonas* in the water system of a hospital?
- A** I have no data to enable me to give an specific answer. It is my understanding that these bacteria may not be looked for unless there is a clinical prompt to do so, like a patient infection with one of these organisms. So it is difficult to be definitive. I have come occasionally come across all of these named organisms in the question being reported in the water systems.
76. Did you attend the Ward 2A/2B Water Review Results Meeting on 8 February 2022 at 2pm via Microsoft Teams? If so, what was discussed? What, if any concerns, were raised during the meeting? **Refer to Bundle 18, Vol 2 of 2, Document 118.**
- A** I have looked at the document and I recognise some of the data. However, my diary for February 8th, 2022, shows that I was delivering training to a contractor on that day so it is unlikely that I was at the meeting. Consequently I have no knowledge as to what was discussed or what concerns were raised during that meeting.

77. What input, if any, did you have in the Health Protection Scotland report on the QEUH/RHC water contamination incident and recommendations for NHS Scotland? **Refer to Bundle 19, Document 174.**

A None. I note on page 214 of bundle 19 that it states that “NHS GGC has noted that “initial AE audit was postponed by the AE due to site commissioning, migration and site establishment.” This is not true.

78. What advice, if any, relating to the QEUH/RHC water system was sought from you in March 2018 by GGC?

A None that I can recall.]

79. What is meant by “shock dosing”?

A Shock dosing is the use of a disinfectant chemical dosed at an appropriate level to a water system for normally one to two hours, then flushed out of the system. The dose level is usually high enough to effect a kill on the bacterial organisms in the water system.]

80. What is the difference between “continual dosing” and “shock dosing”?

A Continual dosing is the use of a low-level continual background dose of disinfectant chemical. The chemical would normally be applied to the system via an automatic dosing system on a continual basis. Shock dosing of a disinfectant chemical describes the use of a higher dose rate of disinfectant which is dosed for a short period of time, often one or two hours, then flushed from the water system.

81. Why were taps not replaced in September 2018?

A I don't recall

82. What did the bio film mapping results show?

A I don't recall

83. What was discussed at the Water Review Meeting (Technical) on 20 September 2018? **Refer to Bundle 10, Document 24.**
- A** I don't specifically recall from memory. What is in the minutes of the meeting I assume cover what was discussed]
84. Why was it agreed at the above meeting to commence chloride dioxide dosing and replace/clean the drains?
- A** I cannot remember but reading the minutes from the meeting it does look like this was agreed.
85. What was discussed at the Water Review Meeting (Technical) on 20 December 2018? **Refer to Bundle 10, Document 35.**
- A** I do not recall from memory. I assume the minutes in the document cover what was discussed.
86. What automatic flushing devices were discussed? What, if any, literature did you review relating to these automatic flushing devices? Why did you read the literature?
- A** If this question is referring to automatic flushing of taps then I recall a website with information on auto flushing devices. I do not recall the name of any manufacturers. In answer to your question "why did you read the literature", I read literature on water related equipment all the time and if any equipment was being discussed as a possibility of being used, then I would read the literature to try and understand more about the equipment.
87. Why were you concerned about "knee jerk reactions" following the water testing on 13 December 2018? **Refer to Bundle 10, Document 35.**
- A** I don't specifically recall but as it states in the minutes I suggested "we should review the results". This is a recommendation I make in any situation regarding water borne bacteria in that we should understand the issue as fully as possible before deciding on the way forward.

88. What was discussed at the Water Review Meeting (Technical) on 8 March 2019? **Refer to Bundle 10, Document 40.**

A I do not specifically recall. I assume the minutes in the document cover what was discussed.

89. Why did you advise the removal of taps at the above meeting?

A I cannot specifically recall but I note from the minutes that the comment was made in conjunction to a comment on little used outlets. I may therefore have recommended that rather than flushing little used outlets, that the outlets be removed altogether but I cannot recall exactly why I made the comment.

90. What were Ward 2A's test results noted at the above meeting? What is the significance of this result?

A I don't know.

91. What are the disadvantages of using chloride dioxide to patients and the integrity of the QEUH/RHC's water system? Corrosion of water pipes, brass connectors, and other parts of the water system?

A Chlorine dioxide has FDA approval for use in drinking water and is often used as a continual disinfectant in building water systems in the UK and further afield. It is used in many healthcare buildings in Scotland. I have no clinical background and cannot comment on disadvantages for patients. Chlorine dioxide is an oxidising biocide and will have an effect on pipework and water system components over time. At the recommended use levels however any impact on water system components is likely to be limited .

92. What was discussed at the Water Review Meeting (Technical) on 21 June 2019? **Refer to Bundle 10, Document 44.**

A I do not recall specifically. I assume the minutes in the document cover what was discussed.

93. What are the limits the pipework can accommodate with chloride dioxide dosing? How close to the limits was the QEUH/RHC's dosing?
- A** The limit for dosing in the UK is 0.5 ppm total oxidants and chlorine dioxide is included in that figure and well as some other components that arise as a function of the reaction to create the chlorine dioxide. I cannot recall the actual dosing levels that were being found in the water system. I am not a chemist or a metallurgist so I am unable to comment on what the chlorine dioxide limits are for pipework and system components.
94. What was the effect of the chloride dioxide dosing on more resistant bacteria?
- A** I don't understand this question as I am unsure what "resistant" bacteria you are referring to.
95. Why was Plant Room 51 considered to be the worst affected area at the above meeting?
- A** I do not know. I do not recall this.
96. To what extent, if any, was the chloride dioxide dosing causing leaching from metals into the water system?
- A** I do not know. I am not a chemist nor a metallurgist. By way of correction can I state that it is not Chloride dioxide but is in fact chlorine dioxide.
97. What concerns, if any, did you have about the use of flexible piping in the QEUH/RHC's water system at the above meeting?
- A** I do not remember specifically what concerns I had in regard to the QEUH. However, I have concerns in general that the use of flexible connections is minimised as much as possible as it is known that flexible connections may over increased microbiological opportunity.
98. What concerns, if any, were raised at the above meeting about the level of resources to carry out additional water sampling?
- A** I do not recall the specific details other than what is mentioned in the minutes.

99. What is a POUF filter?

A It is a POU filter and not a POUF filter. This is a filter device fitted to a water outlet such as a tap or a shower. It filters water down to 0.2 micron and at this level of filtration is likely to prevent the escape of microbiological organisms.

100. What was discussed at the Water Technical Group Meeting on 6 December 2021? **Refer to WTG Minutes of 06.12.2021**

A I have no specific memory of what was discussed at meetings of nearly 3 years ago but from the minutes of the meeting it states that the purpose of the meeting was to discuss current Ward 2A water issues and review attached proposals and to propose and agree a robust sampling and replacement tap plan.

101. Why were POUF filters fitted to the showers and taps?

A I assume that POU filters were fitted as a safety measure to ensure that if there were any microorganisms in the water, they would not escape from the filtered outlets

102. What were the suspected causes of the high TVCs and gram negative results in Wards 2A and 2B?

A I do not recall

103. Why could the standard disinfection of 50ppm over 1 hour not be carried out?

A I do not recall.

104. What outlets had Cupriavidus?

A I do not recall.

105. What sanitisation and testing regime did you develop?

A I do not recall developing a sanitisation and testing regime.

106. Reference to Document A for GGC Management (Audit dated 4 and 5 2021) – **Bundle 18, Document 126**. Why were the problems during the January 2020 audit finding documentation and evidence that required procedures had been completed?

A The documentation that would allow the audit to be completed was not available. I do not know why the documents were not available. I would suggest that is a question for NHS GCC.

107. Why were there no records of NHS Estates staff having carried out and completed risk reduction tasks?

A I do not know. That is a question for NHS GCC.

108. What recommendations did you make to resolve this issue?

A I reviewed the 2020 audit report. I made recommendations relating to the fact that NHS GCC should make the details of the completion of risk reduction tasks available.

109. Why were there no NHS Estates method statements for cleaning and disinfection procedures?

A I do not know. This is a question for NHS GCC.

110. Reference to emails from Dr Inkster dated 27 September 2019 – To what extent were the minutes of Water Technical Group meetings incomplete?

Refer to Emails from Dr Inkster dated 27 September 2019

A I have no recollection, nor can I offer any comment on this.

111. Reference to Water Technical Group Minutes dated 8 February 2019 - What was your involvement at this meeting? **Refer Bundle 10, Document 38**.

A To make comment and advise, if possible, as and when required. Other than that, I cannot recall any specifics for this meeting.

112. What concerns were there about the drinking water in the QEUH/RHC?

A I don't recall having any concerns.

113. Reference to Legionella Control, Authorising Engineer (Water) Annual Report December 2016 to December 2017 – Why did you consider the Estates staff’s level of understanding to be “mixed”? – **Refer to Legionella Control, Authorising Engineer (Water) Annual Report December 2016 to December 2017.**

A I referred to the Estates staff level of understanding as “mixed”, as a consequence of the findings of the hospital audits. The comment in the annual report states this. It is copied here.

“The levels of understanding of the Estates staff at the various hospitals that were visited by the AE can best be described as mixed. This is the same statement that was made in last year’s annual report. Many of the estates staff have attended training course in the past eighteen months. However, the level of understanding as evidenced by the answer to questions in some of the hospital audits was at times less than would be expected. There is therefore opportunity for improvement in this area”.

114. Why did you consider the QEUH/RHC’s risk control processes and procedures to be “mixed”?

A Because of the findings in the annual audit – if this is referring to the timescale in question 113 above of December 2016 to December 2017.

115. Why was the Authorising Engineer not invited to QEUH/RHC Water Group Meetings?

A I do not know. That is a question for NHS GGC

116. What recommendations did you make in your Annual Report (2016-2017)?

A I have copied the recommendations made here. 13 Appendix Collated Recommendations from the Annual Report. Management Structure/Water Safety Group – Recommended Actions

- Policy and Procedures – confirm the status of the review process on the policy and procedures documents.
- Confirm the circulation and application status of the Policy and Procedures documents throughout the NHSGGC Estate.

- Consider inviting the AE to the Water Management Safety Group Meetings.
- Consider inviting the AE to all, or some of water group meetings at Board and Sector level. Authorising Engineer Workload – Recommended Actions
- Agree the Authorising Engineer workload for the forthcoming 12 months. Written Schemes – Recommended Actions
- Create a HSG 274 and SHTM 04-01 compliant written scheme template and implement throughout the NHS GGC property portfolio.
- Complete a review of the written schemes at the various hospitals based on the requirements of the L8, HSG 274 and SHTM 04-01 documents.
- Once the review is complete put into place written schemes where required. Hospital Audits – Recommended Actions
- Review the use of the audits to assess whether the recommendations are being followed up and completed.
- Ensure that written schemes are in place at all NHSGGC hospitals.
- NHS GGC should decide on whether to follow a paper based or an electronic control and recording format for the operation of the water based risk reduction processes and procedures. Experience in other Boards suggests that an electronic format should be implemented. Risk Assessments – Recommended Actions
- NHS GGC might consider the use of a single supplier, after a suitable tendering process, for the provision of risk assessments to assist in providing a uniform approach to the written schemes.
- A formal decision should be made as to how often the risk assessments should be undertaken and this should be applied across the Estates portfolio of buildings. Training and Authorised Persons – Recommended Actions
- Review the number of AP appointments within NHSGGC and complete the technical competency checks and the subsequent appointments where required Legionella Sampling – Recommended Actions
- Complete the legionella sampling protocol and circulate within the Estates department for use throughout the NHSGGC property portfolio. Monthly Exception Reports – Recommended Actions
- Continue with the creation of the monthly exception reports.

- Define the list of staff who will receive the report on a monthly basis. Include the AE on that list. Training – Recommended Actions
- Any new or promoted members of staff may require training. This should be reviewed annually and training completed as appropriate.
- Complete the Authorised Persons competency checks for the two outstanding staff. Legionella Sampling – Recommended Actions
- Include more detail in the monthly exception reports when a “fail” is listed under the Legionella sampling area of the report. Pseudomonas – Recommended Actions
- Review the current status of the risk reduction processes and procedures, that fall under the remit of the Estates department, and update as necessary.
- Review the overall Pseudomonas based requirements in light of the changes to the NHS GGC property portfolio and contact Infection Control to review and update the list of areas of concern in NHS GGC.]

117. How many of the Estates staff at QEUH had been previously assessed and recommended as technically competent to be an Authorised Person?

A I don't know what timescale is being referred to. It should be noted that AP audits are completed at the request of NHS GGC. I have a record of six staff having been competency checked in August 2018 and a further two staff having been competency assessed in February 2019.

118. Reference to QEUH Legionella Inspection L8 Requirements – What communication issues were highlighted in the document?

A I don't know.

119. Reference to Legionella Control Authorising Engineer Water Systems Management and Compliance Audit of NHS Water Systems dated 23 July 2018 – What are the key concerns highlighted in your audit report? **Refer to Bundle 18, Document 112.**

A Any concerns that I had are covered in the recommendations in the report. Looking again at the report my key concerns were when would NHS GGC review or redo the risk assessment process. There was also a concern that

the documents provided at the time of the audit were not complete. There were concerns about the completion of some of the risk reduction tasks. Flushing of little used outlets was also a key concern. There were other concerns.

120. Reference to QEUH/RHC Potable Water System: Proposed Sanitisation Strategy Paper dated 5 June 2018 – What is the most effective treatment for established biofilm? **Refer to QEUH/RHC Potable Water System: Proposed Sanitisation Strategy Paper dated 5 June 2018.**

A There are varying views on the best biocide for biofilm but Chlorine dioxide is generally held in the water hygiene industry as performing well against biofilm.

121. What solution did you recommend to Ian Powrie in relation to dosing of the pipework?

A I do not recall offering any solutions. I may have offered some possible options.

122. Why was Clorious 2 Care recommended over traditional ClO₂ production methods?

A I do not recall it being “recommended” over traditional ClO₂ production methods. It may have been offered as something that could be considered as a possible option for delivering chlorine dioxide to the water system.

123. How was the general attendance at Water Technical Group Meetings?

A In my opinion it was good.

124. How was your own attendance record at Water Technical Group Meetings?

A I don't recall but I believe I attended most of the meetings.

125. Reference to Dr Inkster email dated 5 July 2019 – To what extent is Dr Inkster’s email statement accurate that atypical mycobacteria infection is not common? **Refer to email chain – Dr Inkster to colleagues regarding Chlorine Dioxide dosing of the water system – 01 July to 05 July 2019**

A I do not know.

126. To what extent is Dr Inkster’s email statement accurate that lower dose chlorine dioxide was possibly allowing mycobacteria to flourish?

A I have not had any experience of this issue elsewhere so am unable to meaningfully comment. In the literature however it is possible to find papers that suggest that Mycobacteria are more difficult to kill.

127. When did you first become aware of the DMA Canyon L8 Pre-Occupancy Water Risk Assessment of the QEUH?

A I cannot recall when I first became aware of this report. It is likely however that I would have first become aware of this report when I undertook the first AE compliance audit.

128. What issues were highlighted in the DMA Canyon Risk Assessment?

A There were a number of issues raised in the risk assessment of 2015 including hot water temperatures at some of the calorifiers, creation of dead legs at flushing points, recommendation that background dosing should be used, recommendation for backflow prevention checks, recommendation for flushing and additional measures amongst other things. Some storage tanks and calorifiers were stated to be “high risk”. It was also stated that there was a lack of a management structure which was a concern. Concerns were raised about water temperatures in both hot and cold

129. What concerns, if any, did you have after reading the DMA Canyon Risk Assessment?

A Having read the audit report I had a concern that there was no evidence that the remedial actions in the risk were being addressed. I was concerned that

despite the fact that this was a new build hospital, there was no apparent water safety plan available at the time of the audit.

130. When should the first water audit have taken place at the QEUH/RHC?

A I would have expected to have been asked to complete a water audit within the first year of operation and this is why I recommended that one should be completed in the 2017 annual report.

131. How confident are you that the QEUH/RHC water system was being adequately managed before your involvement in 2017?

A Given the issues highlighted in the first AE audit it is difficult to be confident that all the required risk reduction tasks were being delivered at the site.]

132. How effective would Sanosil Super 25 disinfectant (at 150ppm and contact time of 1 hour) be at removing all organisms and established biofilm?

A It is difficult to give a clear and precise answer to this question. It is my understanding that at the time Sanosil, through their UK distributor who was Water Treatment Products, recommended a dose rate of 150ppm for 1 hour, but a dose rate of 2000ppm for what they called a “shock disinfection”. It is assumed that a “shock disinfection” would be what is used when a system is heavily microbiologically compromised. The question, as put, therefore has no simple or direct answer.

133. How effective would removal of flow straighteners in taps be at reducing infection risk?

A If the removal of flow straighteners reduced the biofilm growth opportunity then the level of risk posed by the system would likely reduce. The type and design of flow straightener would also have to be considered. It is therefore not possible to give a specific answer to your question without knowing what the flow straighteners in question were like.

134. What report did you prepare in relation to chloride dioxide dosing?

A From memory I didn't prepare a report on chlorine dioxide dosing

135. What was the outcome of the report?

A I do not know.

136. Why did you prepare the report?

A I do not recall preparing a report.

137. What actions were taken to implement the report findings?

A I do not know.

138. What was discussed at a meeting between you, Phyllis Urquhart, and Tommy Romeo?

A The only meeting that I recall having had with Tommy Romeo and Phyllis Urquhart would be the meeting on 4th May 2017 to gather information for the first AE(Water) compliance audit of the QEUH. What would have been discussed would be based on the question set that is used during an AE (Water) audit.

139. How did you obtain the DMA Canyon Risk Assessment 2015 report in advance of the above meeting? **Refer Bundle 6, Document 29.**

A I cannot recall how I obtained a copy of the risk assessment document. A copy of the risk assessment was available and was being used during the audit process but I have no memory of how it was obtained.

Declaration

140. I believe that the facts stated in this witness statement are true. I understand that proceedings for contempt of court may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief in its truth.

141. The witness was provided the following Scottish Hospital Inquiry documents for reference when they completed their questionnaire statement (Appendix A).
142. The witness provided the following documents to the Scottish Hospital Inquiry for reference when they completed their questionnaire statement (Appendix B).

Appendix A

A49360354 – Email Chain – Dr Inkster to colleagues regarding Chlorine Dioxide dosing of the water system – 01 to 05 July 2019

A33795534 – QEUH/RHC Portable Water System: Proposed Sanitisation Strategy paper dated 5 June 2018

A44312312 – NHS Glasgow Annual Report for 2017 ver 1 5

A38352950 – Dr Inkster – M Chelonae WTG – Received 01/06/2022

A44253107 – 5133 Water Technical Group Minutes

A43293438 – Bundle 6 – Miscellaneous Documents

A47395429 – Bundle 10 – Water Technical Group/Water Review Group Minutes

A48245730 – Bundle 18 – Documents referred to in the export report of Dr J.T. Walker

A48408984 – Bundle 19 – Documents referred to in the Quantitative and Qualitative Infection Link export reports of Sid Mookerjee, Sara Mumford and Linda Dempster

Appendix B

A33795533 - DMA Water: Written Scheme for Legionella Control QEUH & RHC: December 2016 – Bundle 18, Volume 2

A46629240 - ACOP L8 3rd Edition

A46126597 - Legionnaires Disease – HSG274 Part 2 – The control of legionella bacteria in hot and cold water systems – Bundle 15

Witness statement of Dennis Kelly - A48577517

A33010716 – SHTM 04-01: The control of Legionella, hygiene, 'safe' hot water, cold water and drinking water systems Part A – Design, installation and testing – December 2008

A33103394 – HFS, Water Safety (SHTM 04-01) Part C – February 2014

A33103400 - HFS, Water Safety (SHTM 04-01) Part D – August 2011 Page 118

A33103404 - HFS, Water Safety (SHTM 04-01) Part F – December 2011

A33662200 - 397 HBN 00-01 Oct 2014

A44312599 - QEUH 2017 Water AE Audit – Bundle 15

A44312600 - QEUH 2018 Water AE Audit – Bundle 18, Volume 2

A44312753 - QEUH audit 30012020 ver 1 5 – Bundle 18, Volume 2

A44311697 - Doc A for NHS GGC Management QEUH RHC ver 1.1 – Bundle 18, Volume 2

A44312707 - QEUH and RHC Feb 2022 Audit Doc A – Bundle 18, Volume 2

A44312832 - QEUH RHC AE Audit Jan 2023 – Bundle 15

A33870103 - Report prepared by DMA Water Treatment Ltd titled “L8 Risk Assessment (Pre-Occupancy) NHS Greater Glasgow and Clyde South Glasgow University Hospital” dated 1 May 2015 relating to site assessment concluding on 29 April 2015 – Bundle 6