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Grenfell Tower Inquiry

Day 169

July 29, 2021

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1 Thursday, 29 July 2021 1 air flow through the door at 2 metres per second was in 2. (10.00 am) 2. a recognised, substantiated code, and, in my view, that SIR MARTIN MOORE-BICK: Good morning, everyone. Welcome to was an acceptable rate of flow for a performance. today's hearing. Today we're going to continue hearing 4 Q. In terms of the proposed system, is it right that, 4 5 evidence from Ms Beryl Menzies, one of the experts 5 whilst it may not have been intended as a full instructed to help the Inquiry. 6 6 depressurisation system that complied with 7 7 BS EN 12101-6, it was a system that created a pressure Would you ask Ms Menzies to come back in please. 8 8 Thank you. differential in the lobby? 9 MS BERYL MENZIES (continued) 9 A. Yes, it did, it created a reduction of pressure in the 10 SIR MARTIN MOORE-BICK: Good morning, Ms Menzies. 10 lobby 11 THE WITNESS: Good morning. 11 Q. And at paragraph 120 of your report, which is page 19 SIR MARTIN MOORE-BICK: All ready to carry on? 12 12 $\{{\rm BMER0000007/19}\},$ for the transcript, you say you do not THE WITNESS: Yes, I am. 13 believe that the intent of the design proposal was full 13 SIR MARTIN MOORE-BICK: Thank you very much. 14 compliance with BS EN 12101-6. 14 15 Yes, Ms Grogan. 15 A. Correct. Questions from COUNSEL TO THE INQUIRY (continued) Q. If we could look at paragraph 123 of your report, which 16 16 17 MS GROGAN: Thank you. 17 is on the same page, $\{BMER0000007/19\}$, you say there: 18 Good morning, Ms Menzies. 18 "No guidance existed to address the Grenfell Tower 19 19 proposal: a partially retained system that was to be A. Good morning. 20 20 Q. We left off vesterday where we'd started to look at the modified. The adoption of any particular guidance is 21 specifics of the design of the system, and I'm just 21 not mandatory to achieve compliance with the 22 going to continue with that topic for a little longer. 22 Building Regulations. As outlined in my main report ... 2.3 In your supplementary report, you explain your view 23 an applicant is at liberty to choose how to achieve 2.4 2.4 that the PSB technical submission for the smoke control compliance. The Building Regulation requirements B1 25 25 system, as conditionally accepted by building control in through to B5 are substantive and not prescriptive. The 1 revision 3, was acceptable in principle. 1 guidance must be appropriate for the situation. No one 2 2 document is subjugated by another but one guidance A. Yes 3 Q. And in paragraph 304 -- we don't have to go to it, but 3 document may be predominantly relevant and form the the reference for the transcript is $\{{\sf BMER0000007/69}\}$ --4 4 basis of a proposal with benefit from others. However, 5 5 you say that by this you mean a performance-based it should be remembered that guidance is based on the 6 strategy was acceptable in the circumstances of 6 assumption that its inter-related measures are adopted 7 an existing building with retained smoke extract shafts. 7 and 'cherry picking' from numerous documents is 8 Can you confirm what you mean when you say 8 unacceptable without justification and can be 9 performance—based? 9 inappropriate." 10 10 A. The system had to achieve a criteria of the air flow It could be said that taking just one aspect of 11 11 through the door, and the system would have to be BS EN 12101-6 was cherry-picking. What's your view on 12 designed to achieve that and to demonstrate that. 12 13 Yesterday I made reference to the air flow through 13 A. In the context I viewed cherry-picking, it was not. It 14 the grilles . That would have a bearing on achieving 14 was a performance that was considered by the BSI as 15 that performance standard, but it would be variable and 15 achieving an appropriate level for means of escape and 16 possibly depend from floor to floor to achieve it, 16 for firefighting, which was required in this instance. 17 because that would have to be, as all part of the 17 The means of achieving that was via equipment and design 18 commissioning, which I'm sure we'll touch on, 18 that was achieving a depressurisation, but not in the 19 demonstrated at each floor level. 19 context of the BS EN 12101-6, inasmuch as I had never 20 Q. When you say a performance—based strategy was 20 seen a depressurisation system in accordance with that 2.1 acceptable, are you saying that this approach was 21 guidance ever proposed in a residential situation . It 2.2 acceptable or is it your view that the specific design 2.2 would not have been appropriate to do so. It would have 23 23 as presented to the BCB was acceptable? taken substantial alterations. 24 A. The approach was acceptable, it's outlined in the 24 Similarly, a pressurisation system, again

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a differential system, would not have been appropriate

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guidance in various documents, and the choice of the

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- 1 at Grenfell Tower or, in my opinion, any other 2 residential situation.
- Q. And why is that?

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A. Depressurisation generally requires extract of the smoke from the fire cell, the room of origin, if you like, of the fire, which would not have been appropriate in

Pressurisation is an excellent form of smoke control, but it requires a very high standard of maintenance. If the doors that are forming the barriers that maintain the pressurisation and the differentials, et cetera, are under frequent use, they become worn. then requiring more maintenance. The testing of it can become quite annoying to residents because of the fans starting up, et cetera, and it's a high level of capital outlay and a high level of ongoing maintenance.

17 Q. In terms of the actual design of the system. Dr Lane has 18 set out her view regarding the system in detail in her 19 Phase 2 report. She concludes that the Grenfell Tower 2.0 smoke control system did not comply with the 21 requirements of schedule 1 of the Building Regulations, 22 B1, B3 and B5, when handed over to the TMO. We'll go to 2.3 the detail of her conclusions in a moment.

Have you had the opportunity to acquaint yourself

with Dr Lane's conclusions in her report?

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- A. I've looked at all 500-odd pages, yes.
- Q. If we could go to a summary of her conclusions, which is at {BLARP20000036/25}. So this is in chapter 10 of her smoke control report.

She concludes there, at 10.13.2, that she has found no evidence that either set of performance standards -and she is referring there to both CP3 1971 and ADB -were considered as a means to derive design objectives, nor were criteria set on that basis.

Do you agree with her conclusion there?

- A. I don't really understand the reference to CP3. There were aspects of Grenfell Tower that complied with CP3. The smoke control in the lobby did not comply with CP3, but had been accepted as a reasonable provision under 15 the legislation at the time by the authorities having iurisdiction .
- 17 Q. What about her criticism that they didn't use ADB to 18 derive any type of design objective?
- 19 A. ADB did not really address mechanical systems. It spoke 2.0 about alternative to natural systems, but didn't give 21 any technical data for the system, other than by 2.2 reference to other documents.
- 23 Q. She goes on to say at 10.13.4 that:
- 2.4 "Mechanical extract only systems are agreed to be 25 inappropriate for the protective purpose of means of

escape ... No consideration was given to this during the Grenfell Tower primary refurbishment."

Do you agree with that?

- A. I think Dr Lane's referring to depressurisation. This was not a full depressurisation system; it was a mechanical extract system that afforded a level of depressurisation in the lobby.
- 8 Q. At 10.13.5, she says that:

9 "RBKC Building Control correctly requested 10 a performance-based design as a route to compliance, by 11 means of the SCA Guide. However, I have not found 12 evidence that PSB's lobby smoke control system was 13 designed on that basis.

14 I do not recollect any disclosure that building control 15 requested a performance—based design. It requested 16 details of the existing system to show that it was 17 a no-worsening situation, or, as an alternative, it 18 requested details of a new system.

> The observations provided by Mr Hanson, the RBKC expert in the field of the smoke control, stated that he based his actual observations, B1 being wider than the smoke control alone, on ADB and BS 9991 as appropriate. He did recommend that the components of the system accorded with the SCA guide, and the SCA guide in turn referred to other documents for standards to be

- 1 attained, et cetera.
 - Q. She also concludes at 10.13.6 that the commissioning process fell below the standard to be expected. She says there that it did not demonstrate compliance with regulation 7 of the Building Regulations.

Do you agree with that?

A. The commissioning process, as I understand the commissioning process, is merely to demonstrate that the system works as intended. The reason building control bodies generally do not attend commissioning processes is that they take so long, they can be very time-consuming, very intense, lots of people involved, particularly when there are a number of floors that need to be addressed at the same time, and the actual standards of the equipment, et cetera, should have been dealt with as they were installed and checked by the installation engineers as being adequate.

The compliance with regulation 7 is basically they are being fit for purpose and are installed in a workmanlike manner, and that should have been addressed all the way through the construction. At the commissioning, it's too late, and as I understand it, commissioning engineers, who may have never seen the site before, are not looking at the standards of the equipment, but making sure that they are literally wired

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Q. She also concludes at 10.13.7 that:

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" ... the fire performance standard for the dampers (most importantly) as well as the newly installed portions of the ductwork did not comply with either the performance standards for a smoke control system, nor the requirements for a protected shaft."

- A. I would agree with that, and from all the disclosures I have seen, there is no evidence that building control sought clarification and sought test certificates or anything associated with establishing the performance of those dampers.
- Q. So does that lead you then to also conclude that there were non-compliances with B1 and B5?
- 16 A. Yes, because there was no conclusion that indicated thatthere was full compliance.
- 18 Q. In those circumstances, should building control have 19 rejected the proposal, or at least not issued a final 20 certificate?
- A. Not issued a final certificate , which I have stated inmy supplementary report.
- Q. In the event that the panel accepts Dr Lane's
 conclusions there that the system did not comply in
 other ways with B1 and B5, is that something that you

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1 think building control ought to have picked up?

A. I would have to know what those particular aspects were. From the regulatory side, the system as installed was not shown to be compliant because it was altered after building control last saw it demonstrated. And I am still confused as to what these additional vents that were requested by building control were, and at what stage they were requested, and whether they had ever been mentioned before, because there is a disclosure that says, "Building control agreed that we didn't need a vent". Then we get the request after the demonstration for the additional vent, and the S2, I believe from memory, annotation by building control on the drawings includes inlet vents to lobby at the lower

So I'm very confused as to what was actually thought to be required and what was actually installed at the final completion.

Q. We will come on to that topic and look at Mr Hanson'sevidence on that slightly later this morning.

Moving on to a new topic now, which is the Smoke Control Association guidance.

At paragraphs 121 and 122 of your report, which are on page 19 $\{BMER0000007/19\}$, you explain that:

"121. The recommendations of the various BS EN 12101

Specifications relating to the installation, components, testing and maintenance were relevant and were similarly referenced in the Smoke Control Association guidance.

"122. In my experience the SCA guidance was generally recognised as authoritative and relevant and was applied to smoke control schemes at the time of the full plans submission. There was no other performance based guidance available. BS 12101—6 provided a performance criteria."

Moving on in your report to page 55 {BMER0000007/55}, paragraph 219, you also say there:

"I consider the SCA guidance was an appropriate reference in the circumstances: there was no other performance related guidance; no guidance that specifically related to existing buildings."

Can you explain to what extent you would have expected building control to consider the proposal against the SCA guidance? So it's acceptable in principle as a starting—off point, but how would you expect them to follow it through?

A. Well, the SCA guidance addressed mechanical extract,
natural inlet as a system of smoke control. It was also
guidance that was more recent in its version, 12101–6 is
getting quite old now, and it was guidance that was
compiled by persons and organisations who were literally

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 $1 \qquad \mbox{ at the coalface dealing with these installations on } \\$

2 a day-to-day basis, and was contributed to by

building control bodies and the fire service, who would

4 be one of the end users.

Q. It's right, though, that the SCA guidance also sets outa process for arriving at your final design.

7 A. It does.

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8 Q. Would you expect the BCB to insist upon that process 9 being followed, so selecting a performance criteria and 10 justifying them?

11 Not insisting, because they can't insist. It would be 12 a case of: if you followed this guidance, that would be 13 something we would be supportive of in our overview and 14 it would make sense for you to do it, particularly in 15 this case where Mr Hanson was actually sitting on the 16 committee. But irrespective of that, it was something 17 that gave a constructive process by which people could 18 relate to a process as submitted to building control.

Q. Mr Hanson's confirmed his view in his witness
 statement — for the transcript the reference is
 {RBK00033894/9}, paragraph 52 — that the new smoke
 control system was designed in accordance with the
 principles of the 2012 revision of the SCA guide.

Mr Mahoney, however, said that the system was not designed in accordance with the SCA guide process, and

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- the reference for that is $\{Day155/135:20\}$. When he was 1 2 asked whether the system was meant to be designed in 3 accordance with the process set out in the SCA guide, he 4 said, "No, because we couldn't follow it".
- A. But --

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- Q. Given the conflict of evidence there, how do you 6 reconcile the fact that Mr Hanson, on the one hand, thought that that was what was being followed, but Mr Mahoney says it wasn't?
- 10 A. The SCA guide puts great emphasis on CFD, which was decided not to be done at Grenfell Tower. Mr Mahoney's 11 12 statement, I believe, related to the fact that he 13 designed it from the basic principle of achieving a flow 14 rate, which the SCA guide then directs you back to 15 12101-6 for pressure differential systems, but the 16 SCA guidance was more akin to what was being proposed.

Mr Mahoney's proposal didn't set out on what it was based, but then neither did the building control documents that have been made available, and the records cannot be found, there is no record of what the discussions were held, what was said between the parties, and why the conclusion was drawn. But looking at it, if you like, as a separate review, it seemed appropriate to me for the purposes of the Building Regulations.

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Q. If we could just look at the SCA guide 2012 and one particular aspect of it, it's clause 5.3.1, which is at {LFB00059241/10}.

It says there, right at the bottom:

"Design conditions and performance criteria should be agreed with the approving authority as part of the approval process, preferably in advance of detailed calculation or modelling.'

Is it clear to you, having looked at the documentation, what design conditions and performance criteria were agreed in advance for Grenfell Tower?

A. Not what was agreed in advance of the submission of revision 03. I do know that a clause was removed from revision 02. where I think there was a typing error anyway because it said it extracted into the staircase. which was obviously totally unacceptable, but the reference saying it wasn't designed to 12101, et cetera, was removed as well. So a correction would have been better, but the whole paragraph was removed.

But the justification for the removal was only a comment by Wrights saying that they had spoken to building control and Mr Hanson said, "This is not what we agreed", but I can't make out from the disclosures whether the extraction into the staircase, which was the question that Mr Hanson was raising, or the whole

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1 paragraph in its entirety, because there is no

explanation from either as to why.

3 Q. Just focusing on the idea that design conditions and 4 performance criteria should be agreed with the approving

5 authority, do you see any evidence that that was

6 positively done?

7 A. Not recorded as such, no. Whether it was discussed and 8 not recorded, I don't know.

9 Q. Are you critical of that failure to record that that 10 process had been carried out?

11 Yes, because it's a record leading up to the decision.

12 But then, as we never had a decision on the overall

project, this standalone aspect is probably the most

14 detailed recording, but it has gaps leading up to why

15 that particular process was adopted.

16 Q. And why would it be important to record what had been 17 agreed?

18 A. Because it's a record that shows what and why it was

19 installed: it's a record that shows that

20 building control had done its due diligence and its job,

21 if you like; and it's also a record for those that come

22 after the installation has been installed and been

23 running for some time.

2.4 If, for instance, a component is no longer 2.5 available, you can look at what's gone before, what was

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1 discussed, why it was achieved, and if the variation

that you're now compelled to incorporate in the system

will have a detrimental effect on it.

MS GROGAN: If we could look now at clause 5.4 --

SIR MARTIN MOORE-BICK: I'm sorry, can I just interrupt you 5

6 for a second to ask this: I can understand that the

7 questions about the design of the system may be

8 interesting, may be important, as may be questions of

9 record—keeping, but from the point of view of compliance

10 with the Building Regulations, does it matter, so long

11 as the air flow was achieved in practice?

12 A. In practice, no.

SIR MARTIN MOORE-BICK: Right. 13

A. But it is always good practice, whether you're on the 14

15 building control side or on the design side, to record

16 the route that you went to achieve what you did.

SIR MARTIN MOORE-BICK: I don't dispute that for a moment, 17

18 I just want to be clear, though, because sometimes one

19 gets confusion between it's not recorded and whether it

2.0 happened.

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2.2 SIR MARTIN MOORE-BICK: And of course we do have the data

23 from the commissioning exercise, which presumably would

2.4 be available subsequently if anyone wanted to know how

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25 it had performed.

A. Yes. Yes. SIR MARTIN MOORE-BICK: So to some extent there is a record 2 2 3 of actual performance, even if not a record of how you 3 4 got to that point. 4 A. The record of the actual performance is indication that 5 5 the system achieved the design, which is what you want 6 6 7 7 SIR MARTIN MOORE-BICK: Well, it's a record, is it not, of 8 8 9 the fact that the system achieved a performance level 9 10 which satisfied the Building Regulations? 10 11 A. Yes. Correct. 11 SIR MARTIN MOORE-BICK: Now, it may also have achieved the 12 12 13 design, if you know what the design was, but that 13 14 doesn't detract from the fact that it achieved what was 14 15 required to satisfy the Building Regulations. 15 16 16 A. Exactly that, because that design criteria was accepted 17 as satisfying the Building Regulations, yes. 17 18 SIR MARTIN MOORE-BICK: All right. Thank you very much. 18 19 Yes, I'm sorry, Ms Grogan. 19 20 MS GROGAN: Thank you. 2.0 2.1 So we were just about to look at clause 5.4 of the 21 22 SCA guide, which is on page 14 of this same document 22 {LFB00059241/14}. 2.3 23 2.4 It's the bottom half of the page there, and we can 2.4 see that the documentation required by the SCA guide to 2.5 17 1 allow relevant parties to assess the analysis undertaken 1 2 in relation to checking and meeting the required 2 3 performance criteria should include at least, and then 3 there is a list: " • A description of the residential area and the 5 5 6 proposed ventilation system. 6 7 7 " • The design criteria and performance objectives of 8 8

there was a description of that at high level, and I think it would be acceptable to assume that, this coming after the main submission of the full plans and plans of the proposed works having been submitted, people involved, including building control, had an awareness of the residential area and the proposed ventilation system. The design criteria was the performance criteria, as was the objective. The analysis leading up to that may be a little vague in the paperwork. "The scenarios investigated", there was only one scenario, and that was a fire in a flat and persons leaving, and the whole concept of stay in place had been described previously. "Details of the techniques used and related information". I'm not quite sure what that would be. That's probably where the reference to modelling. et cetera. by Mr Hanson is. If we can go down the page, the results of the analysis was the calculation that was done by Mr Mahoney, and the aspirational flow that was achieved

residential area and the proposed ventilation system",

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by the commissioning certificate at the time, although

it must be noted that that was not the final system that

- the analysis.
 - The scenarios investigated.

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- " Details of the techniques used and related information.
 - "• The results of the analysis.
- " A statement as to whether the design criteria and objectives have been met."

Mr Hanson, in his evidence, suggested that this list was in relation to modelling a scenario, rather than considering a performance-based criteria. The reference, for the transcript, is $\{Day154/190:2-8\}$.

Can you help us: if one was following the SCA guide in establishing performance criteria, as we've just discussed and as you've just had an exchange with the Chairman about, would you expect that information to have been provided for Grenfell?

A. I think to a level it was provided.

If we can go back a page, "A description of the

Q. When this list of matters that should be addressed was put to Mr Hanson, he acknowledged that it should have been documented better, how the considerations were arrived at, and the reference for that is {Day154/191:3-6}.

was installed.

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In light of his acceptance that things could have been done better, was it right for building control to proceed to approve the system in the absence of proper recording?

10 A. For the purpose of the Building Regulations, I think 11 yes, inasmuch as the Building Regulations were looking 12 for a result to be achieved, and that result was 13 achieved at the time, but not the final system because 14 that was never recorded.

15 Q. So, as you've said in your evidence before, the focus is 16 on what happened at commissioning and was it demonstrated that this flow rate was achieved, rather 17 18 than, when looking at it on paper in advance, whether 19 all of the information was there to permit

2.0 building control to carry out an assessment?

21 A. Yes. The looking at it in advance gives an indication 2.2 that it's viable and will fulfil the function of the

23 Building Regulations. If it showed a total

2.4 non-compliance or something that didn't fulfil or aim to

25 fulfil the function of the Building Regulations, it

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could have been rejected at that point.

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Although this proposal would have been rejected on the basis that it's unacceptable, your full plans application is rejected. In this particular case, the full plans application was never passed or approved, it went outside the time limit. No overall view of building control on the proposed project was ever given.

So it would have been, "This is unacceptable", and if they said, "Oh, well, we're going to proceed with it anyway", then it would have been a case of, "Well, we'll see on site what is produced and whether that is adequate".

- Q. In circumstances where a design criteria or a performance criteria is put forward but, as we've discussed, not explained or justified, and building control looks at it, and then you get to site and something goes wrong, is it not too late by the time you've got to site and the commissioning process?
- you've got to site and the commissioning process?

 A. It is too late. In the case of Grenfell, I would have said, although there was not the detailed analysis and the whole matrix, if you like, of how I arrived at this decision, there was nothing to say, "This will not perform on site". There was nothing to say, "This is totally wrong". I think, as Mr Mahoney said, a lot of it was based on his experience and he didn't put it down

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- on paper, and perhaps Mr Hanson, in his experience, knew that the intent would work, although he suddenly decided towards the end, although the commissioning demonstrated the flow was achieved, that he thought there should be and recommended additional ventilation at ground level.
- Q. At paragraph 183 of your report, which is on page 52 {BMER0000007/52}, you say that the PSB technical submission rev 3 does not state that it's based on, reliant on or has adopted the SCA guidance and the guidance is not quoted anywhere in the document. Should it have done so?
- 12 A. Mr Mahoney said it wasn't based on the SCA guidance. On13 that basis, no, it wouldn't have been.

The conditional approval, if you like of revision 03 stated that it should comply with the components aspect as recommended in SCA guidance. So then, if you like, that almost became conditional of it. But if it was proven that it hadn't followed it, but was adequate in any event, then the system finally would have been accepted.

Q. Moving on in your report to page 54 {BMER0000007/54}, paragraphs 211 and 212, thinking about the proposal as it came across Mr Hanson's desk, you said there are several aspects that you would have expected to be queried by an experienced BCB surveyor, and they are:

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- "(a) did the proposals follow any aspect of the SCA guidance (Mr Hanson having stated that the proposed system was designed in accordance with the guidance); if so why was it not referenced in the Technical Submission:
 - "(b) what was the temperature rating of the smoke extract fans:
- "(c) what was the fire resistance of the proposed dampers to the smoke extract shafts;
- "(d) were the dampers to the smoke extract shafts, the fire and smoke dampers required to maintain compartmentation and deter smoke spread."

Then you go on to say you have seen no disclosure that indicates that these issues were queried at the time of the BCB review.

In light of your view that those matters were not queried, should building control have accepted the proposal in principle?

A. Accepted it in principle, but should have queried those
aspects, and that could have been part of the
conditional approval.

The aspect I highlighted in my main report was the division of Mr Hanson and Mr Hoban, Mr Hanson being a consultant to Mr Hoban. The smoke extract shaft dampers, et cetera, were relevant under requirement B3

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as well, so one of the two should have been looking at them. Mr Hanson said he never carried out any site inspections, so implying, in my view, that Mr Hoban should have been looking at the fire rating of the dampers.

So this is where this confusion arises on several aspects of the Building Regulations review of the whole project, but those are matters which should, in my view, have been queried, and would have been beneficial to both parties to have known at the time prior to installation.

But all the building control body can do is ask for that information. If the scheme proceeds, and that information is not forthcoming, they can't stop it. All they can say at the end is, "Well, basically, we warned you. Now, because we don't know if these dampers are adequate, we need you to prove it or you replace them with something that we both agree is acceptable".

- 19 Q. I think it's right that there is no evidence that that 20 happened.
- 21 A. Correct.
- 22 Q. So there was no querying later on --
- 23 A. Not that I've seen
- Q. of the dampers and no request to install somethingdifferent.

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In those circumstances, should building control at 2 the end of the process have issued its certificate, so 3 in the absence of information that you have listed 4 there? A. No, they should not. I think I said in my main report 5 that the completion certificate should not have been 6 7 issued. The aspect of the smoke control was only one 8 part of that recommendation that they should not have 9 issued it, or conclusion rather. 10 Q. Moving on to a new topic, which is extended travel 11 distances. 12 Can we go to first to ADB, which is 13 {CLG00000224/31}. This is the 2006 edition, incorporating the 2007, 2010 and 2013 amendments. 14 15 If we zoom in on 2.25, which is at the top of the 16 page, it says: 17 "There should therefore be some means of ventilating 18 the common corridors/lobbies to control smoke and so protect the common stairs. This offers additional 19 protection to that provided by the fire doors to the 2.0 21 stair. (The ventilation also affords some protection to 22 the corridors /lobbies.) 2.3 "This can be achieved by either natural means ... 2.4 or ... mechanical ... 25 Is it correct that this is drawing attention to the 25

1 need to ventilate the common lobbies, first of all so as 2 to protect the stairs, but second of all also to provide 3 some protection to the lobbies themselves?

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Q. Is it right that what the guidance is saying there is that you need to think about the escape route in its entirety , so a single $-\mbox{minded}$ focus on the stairs would not be appropriate?

9 A. You would consider the escape from the room within the 10 flat, through the flat hall, through the common 11 horizontal areas, down the stair, right out to somebody 12 standing outside in the fresh air.

13 Q. And that would apply whether or not travel distances are 14 extended?

15 A Correct

> Q. If we go now to the 2015 version of the SCA guide, which is {RBK00002932/6}.

Now, we've heard the evidence, and you've said in your report, that it's the 2012 guide that would have applied to the assessment of the smoke control system, but the 2015 guide expresses the principle as well. which is why I've taken you to it.

It says at the beginning of the section entitled "Primary Objectives":

"Where the travel distances are no more than 7.5m in

distance from the door to the staircase (or sterile lobby) to the most remote apartment entrance door, the primary objective of smoke control in residential buildings is to protect the staircase enclosure by ensuring that the stairway(s) remain relatively free from smoke and heat in the event of a fire within a dwelling."

It goes on to say:

"However, where corridors are extended, the primary objective of the smoke control system is to protect both the common corridor and the staircase enclosure. There are considered to be two forms of extended corridors."

Then it goes on to define extended travel distances of typically no more than 15 metres, and then significantly extended travel distances, which have more than 15 metres travel distance.

So if you keep that in mind, we'll now look at one further standard, which is clause 0.2.3 of BS 9991:2011, and that is $\{BSI00000621/11\}$.

At 0.2.3, it says in the second paragraph:

21 "Smoke can be controlled in the common areas through 22 fitted ventilation systems which are either natural or 23 mechanical. These ventilation systems have two main 2.4 purposes: the first of which is to provide some protection to the stair core and the second of which is

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to aid fire - fighters when tackling a fire . Ventilation systems can also be used to compensate for extended travel distances within the common corridor leading to the stairs and thereby help occupants to escape safely. Where smoke control is used to provide compensation for extended travel distances, it is the responsibility of the designers to demonstrate that the ventilation system can provide tenable conditions (see Annex E) for the occupants using the route with extended travel 10

> Do you agree that, therefore, ADB, the SCA guide 2015 and BS 9991 all anticipate the use of a smoke control system to protect not just the stair but also the common corridor?

15 A. In the context of an extended travel distance, ves.

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A. The smoke ventilation system will also afford some protection to the common lobby, and I say lobby in the context of Grenfell, because it was not a corridor as such, and there is a big debate as to what's a lobby and what's a corridor. In my view, a corridor is longer and bigger than a lobby. You will, by virtue of the smoke control system running, have some degree of protection in that protected lobby, whether the travel distance is 7.5 or longer.

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The whole aspect has to be considered recognising the concept of how these recommendations are compiled on the basis of the stay—in—place protocol and the compartmentation, the fact that the flat on fire will be the initial flat and perhaps, hopefully, the only flat necessary to evacuate. Therefore, when they evacuate, they open the door to the flat, which should be a fire resistant, self—closing, smoke—sealed door. They will come into the common area.

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They have left their flat because they have either seen the fire , noticed smoke or have been warned of fire by virtue of the smoke detection in their flat activating , and that should activate in the early stages of the fire so that they should be leaving the flat in the early stages of the fire . That flat entrance door closes behind them -- should close behind them. If sufficient smoke has escaped from the flat to activate the smoke detector in the common area, that ventilation system, that smoke control system, will activate . They then move into the stair and go down and evacuate the building .

Should anybody else on the floor become aware of a fire and feel the need to evacuate, when they come out into that lobby, that smoke control system may or may not be running. If it's running, it will be pulling air

from the stair, from gaps under the door, et cetera. When the door is opened into the stair, it will boost up and further dilute the smoke in the lobby. But it would be a limited amount of smoke in the common lobby provided the front door to the fire flat had closed.

So there is a level of protection, but it is recognised in guidance and commentary and I think generally known throughout the industry that during firefighting, the only practical way of holding the smoke back from entering the stair to a degree is if the stair is part of a pressurisation system that will hold the smoke back. Otherwise, it is inevitable that smoke will pass into the common stair.

Now, should the Fire Brigade determine that further persons need to evacuate, their decision as to whether to close the door to the stair, close the door to the flat, stop firefighting at that particular time while persons evacuate, is entirely up to them and it's a dynamic decision. Only they can decide.

- Q. But in circumstances where there are extended travel distances, it is right that the guidance points to the fact that the smoke control system should protect the lobby as well as the stair?
- A. Yes, and it should achieve certain levels of tenability,
 temperature, visibility, which is not specified for

a code—compliant distance. So not all new projects adhere strictly to the 7.5 metres travel distance, because 7.5 metres, as probably has been said, will be adequate for Joe Public, but perhaps not somebody who has breathing difficulties, has just come back from skiing and has broken their leg, et cetera, or is of a certain age or has some form of impairment. So a metre/half a metre each way is probably not going to make much difference.

I'm sure the Inquiry has been informed that at one point we had mandatory rules for means of escape, way back from the 1985 regulations. That was done away with. One reason, I believe, was because it was very rigid and did not allow circumstances where a slight extension would be adequate.

But definitely if it goes up towards 15 metres, or perhaps even sort of 10 or so metres, you would then start looking, in an extended travel distance situation, for those tenability criteria to be demonstrated, and that is usually done by a CFD.

In the case of Grenfell, in my view, the travel distances were not extended because they complied with the criteria when it was built. So whilst in the context of modern standards it was extended and it approached the magic 15—metre distance, depending on how

you — or you were permitted under CP3 to go up to 15.

I know that the BRE measured that travel distance,

I know Dr Lane measured it, I have measured it on the

plans from scale, and we've come up with three different

versions of how far that distance is. It's not unusual

in scaling to get an incorrect distance, but it gives

you an indication. And that's what you do, when you do

the plans under building regs, you're doing the review,

So in particular in Grenfell Tower, the distance, which was not 15 metres, it was less, would have been permitted under CP3 at the time.

you're scaling it or you're taking dimensions that are

put on the plan by the architect.

- Q. So just going back to BS 9991, where it says it's the responsibility of designers to demonstrate that the ventilation system can provide tenable conditions for the occupants using the route with extended travel distances, is it your view that, for Grenfell Tower, that piece of guidance didn't apply, so there was no requirement for the designer to demonstrate that tenable conditions in the common lobbies could be achieved?
- A. Had I been looking at it, I wouldn't have raised the
 matter of extended travel distances being a criteria
 which they would now have to address under the new
 proposals, the refurbishment proposals. I readily

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acknowledge another building control officer may have in fact raised it as an issue.

If they were looking at distances of 15 metres, if a building control officer had raised it, they would, if following the guidance at that time, have been looking at putting sprinklers in all the flats, which would not have been viable from the proposals, the building owner's point of view, perhaps. But I personally would not have considered it being an extended travel distance in the context of Grenfell Tower.

- Q. You refer to what you personally would have done; is that a matter that there is a range of reasonable views? So bearing in mind the standard of a reasonably competent BCB, would it be within the range of reasonable responses for a BCB to query the travel distances and ask for a demonstration that, at Grenfell Tower, those extended travel distances could still provide tenable conditions with the smoke control cyctom?
- A. In all honesty, I can't give you a view on that,
 inasmuch as these systems, exactly as per
 Grenfell Tower, I've never seen another one in
 existence, so I couldn't say, in all honesty. It's down
 to personal judgement and interpretation by the
 building control body.

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Q. Mr Hanson's evidence was that, in the context of protecting the common corridor, where there were these extended travel distances but less than 15 metres, he described that as a qualitative decision, not based on any kind of modelling or anything of that nature, and that's at {Day154/168:2–25}.

Does that reflect what you have just said, that it's a matter of professional judgement as to how you approach it as a BCB?

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11 Q. I'm going to ask you now about the shape of the lobbies, 12 the I shape of the lobby.

We've heard evidence in relation to that, and in his evidence Mr Mahoney on $\{Day155/88:4-7\}$, which we don't need to go to, said:

"The system I'm putting forward isn't designed to [deal with the I—shaped lobby], and no system will remove those dead spots, whether it be natural or mechanical, because it's a dead spot."

Is that an issue you would have expected to see considered in the design documentation?

A. Again, ideally it would have been part of a discussion
 recorded or set out in the document. However, in the
 case of the layout of Grenfell Tower, unlike most modern
 layouts that comply with the travel distance or not, you

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were actually extracting in two points, so you were drawing away from two points, some of which were quite near these dead ends.

I'm not convinced that the dead—end situation would have been significant. It would add to my view that, as was usual in these circumstances, you would have requested demonstration of a cold smoke test to show what the situation was with the flow of smoke away from the stair, et cetera.

The layout of the opposing extract and the proximity to the dead ends would, in my view, have likely resulted in some movement, but as to whether it would have been at a level that would have been demonstrated as giving the visibility that one would expect or the guidance gives you, I don't know.

Mr Mahoney's experience as an engineer, a mechanical engineer, dealing with air movement, smoke control systems, far exceeds mine, so I can't say whether or not it would have. If that was his stance, then I would have expected that to have been recorded in the discussions and addressed. But I don't think it played a significant role in the system that he designed. There's nothing to direct me towards saying this was a system that would deal with — well, as he said, it wouldn't deal with the aspects of the dead—end

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1 situations.

- Q. In those circumstances, should the BCB have thought
 about whether or not that affected compliance with B1
 and B5?
- 5 A. You would always consider dead—end situations in the
 6 context of smoke movement, but as the prime concern was
 7 to protect the stair, and in my view there were not
 8 extensive dead ends, I can understand why it was not
 9 apparently considered under the proposals at Grenfell to
 10 any high degree, but it would have been a general aspect
 11 that you would consider as a building control officer in

any project with smoke control. The same would arise

for a natural system as well as a mechanical system.

SIR MARTIN MOORE—BICK: Well, I was going to ask you about that, because the dead ends, if we're going to call them

16 that, were built into the structure, weren't they?

17 A. Yes.

18 SIR MARTIN MOORE—BICK: And because the new system was 19 drawing or designed to draw smoke from two locations in

20 the lobby rather than just one, presumably it was no

21 more unsatisfactory than the original arrangement?

22 A. In my view, it would have been better.

23 SIR MARTIN MOORE-BICK: Well, yes.

24 A. Yes.

25 $\,$ SIR MARTIN MOORE-BICK: In which case there wasn't much that

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1 building control could say about it, was there? conditions now. 2 A. Not really, no. 2 3 SIR MARTIN MOORE-BICK: No, all right. Thank you. 3 4 MS GROGAN: Is that right even in circumstances where they 4 were applying modern standards, so they were seeking 5 5 achievement of B1 and B5? 6 6 7 A. I think the applying modern standards was aspirational, 7 but in an existing building, it would be rare that you 8 8 9 could apply all modern standards. 9 10 10 In this particular case, the size of the vent shafts 11 didn't comply with any guidance at all, and although 11 12 12 I hesitate to raise the Colt system, which has been 13 discussed at length in Dr Lane's -- well, not at length, 13 14 14 but has been addressed in Dr Lane's report, the reason 15 people often go for the Colt system is that the vent 15 16 16 duct is smaller than the recommendation, but it's been 17 shown to work on a certain layout. All the CFD analysis 17 18 has been done, which is expensive and can run for weeks. 18 19 to get an answer. So people sometimes opt for that for 19 2.0 2.0 the smaller size vent shaft.

In this case, I don't think they even added up to the Colt size shaft.

Q. In circumstances where you have the dead end and there
 is a potential for smoke not to be cleared from that
 dead end, how can the BCB satisfy itself that there

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would be an adequate means of escape from the lobby and out to the stair?

A. If the BCB was concerned that there was a dead—end situation where there would be a lack of dilution in that area, in order to request substantiation that it was not a problem, they'd have to establish that there was a problem in the first case.

In the situation of a layout with dead ends, you would consider the escape from the individual flats on the basis of a stay in place, and then I think you would surmise that, had the dead—end situation been an issue, it would have been because it wasn't the fire flat that was escaping — the fire and the smoke should be behind you and you're running ahead of it — it would have been a situation if the fire flat fire had caused an issue within the common lobby and the residents on the same floor were trying to escape through that lobby.

But in the case of an existing situation, it would have been an issue as originally approved at the same time as being the proposed scheme. There was no worsening, if you like, of the situation. And because you were now going from natural to mechanical, you were probably improving the situation in the lobby for that other flat occupants to escape.

Q. Moving on to foreseeable scenarios and door—opening

At paragraph 116 of your report on page 18 $\{BMER0000007/18\}$, you say there:

"SCA guidance makes no specific recommendations relating to firefighting operations."

You have said this in oral evidence today:

"These will be dynamic at each incident but an experienced competent BCB should be aware it is likely fire fighters will approach a fire from a floor or floors below where they have connected hoses to the rising water main and that the hoses will retain open the doors between lobbies and the stair."

Then going forwards in your report to page 65 $\{ BMER0000007/65 \},$ at paragraph 271 it says:

"Whilst neither version of the SCA Guidance specifically stated the stair doors on the lower floors should be considered as being open in addition to those at the level of the fire, a competent building control surveyor familiar with smoke control systems supporting firefighting operations and the particular scenarios associated with a Class B installation would have been aware of the need to consider additional doors being open."

Then at paragraph 275, which is on the same page at the bottom, you say:

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"I have seen no disclosure that suggests the BCB required open doors other than on the fire floor as part of the commissioning of the system or the witnessing of the system. There is no indication that the BCB took these additional doors into consideration when reviewing the smoke control proposal."

Is it right, then, that you would have expected a reasonably competent BCB to have required the commissioning or testing process to address different door—opening scenarios?

11 A. Yes, and in witnessing the demonstration, I would have
12 expected them to have asked for certain doors to be held
13 open on the lower floors to demonstrate the effect. It
14 was not a commissioning matter, inasmuch as it was not
15 part of the design, as I understand it.

16 SIR MARTIN MOORE—BICK: Can you help me with this, because
17 I'm sure it's a lack of understanding on my part, but as
18 I understand it, the system is designed to draw air from
19 the stairway into the lobby and thereafter up the shaft;
20 why does it matter where the air has come from when it
21 emerges from the stair shaft into the lobby?

A. I'm not a mechanical engineer, but my understanding is
 that this whole system works on balancing, and therefore
 it would be just to demonstrate that there was not
 an imbalance of the air flows through from the stair

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1 through the doors. But also it would be an indication 2 of where the likely direction of flow would be. Would 3 this influx of air cause any additional drawing from the 4 fire flat? SIR MARTIN MOORE-BICK: At the moment, I can't see how it 5 could, because effectively you're just drawing air from 6 7 the whole of the stairwell, and the stairwell is open to 8 the atmosphere at the top. So in one sense you're 9 drawing air, on the face of it $\,--\,$ 10 A. From practical —— SIR MARTIN MOORE-BICK: -- from everywhere, and I can't see 11 12 why having a door open on the floor above or the floor 13 below should affect the rate of flow through the door you're concerned about. I thought Mr Mahoney said it 14 15 wouldn't, but I may have misunderstood, which is why 16 I was asking the question. 17 A. From my understanding of the way these systems work, 18 I doubt whether it would have affected it, but it would 19 be a demonstration of what would be happening on the 20 night of the fire with the Fire Brigade holding doors

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It's a bit different in Grenfell, inasmuch as under

current guidance, the Brigade prefer and the guidance is

that the dry riser or the wet riser is in the stair.

SIR MARTIN MOORE-BICK: Yes.

A. Under previous guidance, it asked for it to be in a ventilated protected space, and in this case it was the lobby, as opposed to the stair.

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So the actual performance — that's the wrong word. The operations of the Fire Brigade on the night or at the fire incident would have been different to what would have been set out in the actual guidance.

The guidance changed and the acknowledgement of the two crews was different to the original concept for Grenfell Tower. The two crews followed the 9/11 incident, my understanding is, having spoken to firemen for many, many years, and read the reports post-9/11, in that the temperatures that were reached, the crew that fights the fire is effectively protected by the second crew — and I'm sure this has been explained to the panel — by spraying above their heads so the hot gases don't affect them, because as good as their suits are, temperature—wise, they were, in London anyway, at one time known as boil in the bag suits, because they don't wick the temperature from the body and the perspiration.

So post-9/11 it was established that probably the maximum a firefighter at the face of a fire could withstand from a durability point of view, not only from heat but exhaustion as well, was about 17 minutes. So obviously the crews need to be given additional

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1 protection, et cetera.

Sorry, I've gone off on a tangent.

3 SIR MARTIN MOORE-BICK: It's all right, I invited you to.

4 A. But, yes —

5 SIR MARTIN MOORE—BICK: I think I understand. I think what
6 you're telling me is that it would have been good
7 practice for building control to have asked for
8 a demonstration with other doors open, even though you
9 don't think it was likely to have made any difference?

 $10\,$ $\,$ A. I thought, but I wouldn't categorically say no.

The other aspect that is in my mind, when you're adopting a flow criteria taken from that particular BS, is that that recommends that you do consider other doors being opened.

So whether or not it would have a practical effect, others more qualified should give the definitive answer. But I did note, when looking at the draft document which is in the BS EN 12101—6 series, which I think is 13, which reflects this type of system, there was, in my reading of it —— and it was only a draft —— no recommendation for additional doors on other levels being open to be considered.

23 SIR MARTIN MOORE-BICK: Thank you very much.

24 Yes, Ms Grogan.

25 MS GROGAN: Yes. For the transcript, I'll just give you the

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reference: it's clause 12.2.3.3 of BS EN 12101-6, which is {RBK00045054/73}. There is a list there of the different door—opening scenarios that should be open during the test.

5 A. For a pressurisation system, yes.

6 Q. For a pressurisation system.

I just want to ask you about one particular scenario.

So where a door to the fire flat is open, and a window in that flat is broken or is otherwise open, can you help us on whether the exposure of the system to outside air through the window would negatively affect the 2 metres per second flow rate at the stair door?

14 A. No, I can't help you. I'm not qualified to make that15 judgement.

Q. Would you expect a reasonably competent BCB to have required the commissioning process to have demonstrated that, in that scenario, the 2 metres per second was still achieved?

A. A competent BCB with a basic knowledge of fire would,
 I think, be expected to know that a window to a flat
 could be open, or that the fire may — and it doesn't
 happen in every case — cause a window to fail.

In the context of the door being open, the safety of the residents, that would have been a transient risk

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1 because that door should have closed after them, and 2 therefore protected everybody else using that same 3 level. It may have marginally, if the window was open 4 or failed, been another leakage path, but it would have 5 been directing the fire and the heat out of the window. So it would have been a balance, I would imagine. 6 7 I'm not qualified to give you the full scientific 8 facts on that 9 Q. Mr Hanson said in his oral evidence that he expected 10 that door testing would be done to the British Standard, 11 which is the standard we've just discussed, which refers 12 to the different door-opening scenarios. For the 13 transcript, that was $\{Day154/197:12-15\}$. 14 Was it reasonable for Mr Hanson to make that 15 assumption without seeing positive evidence that it had 16 in fact been done? 17 A. No. A wise man once said to me it's unsafe to assume 18 anvthing. SIR MARTIN MOORE—BICK: When you say that guidance to which 19 20 we've just been referred refers to a pressurisation 2.1 system, are we to think of pressurising the staircase in 22 this context? 2.3 A. A pressurisation system is different to what was 2.4 proposed. 25 SIR MARTIN MOORE-BICK: Quite. 45

1 A. You would pressurise the stair, you would pressurise the 2 lobby and you would pressurise the lift .

3 SIR MARTIN MOORE-BICK: Right.

A. And, as I hope I've illustrated, it's a very delicately 5 balanced system. Therefore, if you open doors on other levels, then it's going to affect it. 6

SIR MARTIN MOORE-BICK: Well, that's what I was wondering, you see, because if BS EN 12101 is concerned with pressurisation systems and you're applying it to a staircase and pressurising the staircase, then it would not strike me as surprising that if you open doors in several places on the staircase, you're likely to affect the pressurisation, because you're offering --

14 A. Yes

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15 SIR MARTIN MOORE-BICK: -- exit paths for the pressure, so 16 to speak.

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18 SIR MARTIN MOORE-BICK: I put that rather crudely, but 19 I think you'll understand. But that wouldn't apply to 2.0 the system that we are considering, would it?

21 A. In my understanding of the system, no. it wouldn't.

> To be quite honest, it's something, because we know that the doors will be propped open by the Brigade's hoses, that we generally look to demonstrate. I can't honestly say I've ever seen a system fail because of it.

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I know anecdotally of a pressurisation system that

failed when somebody cut a socket for the cleaner's

3 Hoover in the actual wall of a protected shaft. It's

4 that finely balanced.

SIR MARTIN MOORE-BICK: All right. Thank you very much. 5

MS GROGAN: So we know that 2 metres per second was the 6 7 performance criteria for this system, so focusing on 8 that rather than pressurisation/depressurisation for 9 a moment, and that was proposed on the basis that it 10 would have ensured an adequate means of escape.

How is it that the BCB would know that that adequate means of escape in the form of that flow rate would always be achieved depending on all these different scenarios unless it was tested?

15 A. They wouldn't. The design engineer would have carried 16 out his calculations on the basis of the information 17 given to him and what he observed on site, et cetera.

18 That design is then given to others to build, to

19 formulate. Tolerances, et cetera, may not have been 20 maintained. Until that system is up and running, whilst

21 everybody's fingers are crossed it will follow the

22 design intent, until it's actually tested and it's shown 23

at the commissioning that everything is literally joined 2.4 up and doing what it's supposed to do in the various

2.5 scenarios it's required to address, then nobody knows

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1 that it's actually working and achieving that particular 2 flow rate.

3 Q. So it would then be important to check whether the 2 metres per second was maintained with other doors on 5 the floor below, for example, open to the stair? Even

6 if in principle you are sceptical that it would make

a difference, it's important to test it to make sure?

8 A. Yes. It's best practice, shall we say.

9 Q. On the issue of the force of the door, you note at 10 paragraph 257 of your supplementary report 11 $\{\mathsf{BMER0000007/64}\}$ that there is no record of Mr Hanson

12 measuring the door—opening force.

A Correct 13

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14 Q. In his evidence he said that the commissioning report 15 didn't include the readings of door-opening forces and 16 said that building control were relying on the 17 professionalism of the installer and designer.

18 Was that a reasonable approach for the

19 building control to take?

2.0 A. If he hadn't seen any records that the force on the 21 doors had been tested, no. it wouldn't.

2.2 Did not somebody from JS Wright say that they, with 23 Mr Hanson -- no, they tested them and recorded them, and 2.4 it was no more than 85 newtons, and that Mr Hanson

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25 relied on his being able to open the door without any

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- undue force, I think was the way it was phrased.
 I think that was in Mr Whyte's oral evidence.
- 3 Q. Yes. So where that had happened, was that sufficient for building control's assessment of whether the system was adequate and compliant?
- 6 A. I'll be quite blunt, it was fine until you get found
 7 out. That's just a fact. That is why you should record
 8 these things, or get somebody to record them and submit
 9 that detail to you, or get them to perform the test and
 10 you witness it and get them to record it and copy it to
- Q. Moving on to the topic of dampers, in his evidence,
 Mr Hanson said that he just considered B1 and B5, and
 did not consider how the system would in any way affect
 internal fire spread or building compartmentation.

Was that, in your view, a reasonable approach for him to take?

- 18 A. No, it was not. B1 and B5 rely on all other aspects,
 19 all other requirements of the Building Regulations under
 20 part B.
- Q. And does that feed into your overall conclusion that the final certificate should not have been issued?
- 23 A. Correct.

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Q. Mr Hanson said that he considered the basic
 specification for the dampers to make sure that they

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were appropriate, and he told the Inquiry that the type of damper being used was a smoke control damper because it was being used to control smoke and it did, he said he believed, and the references for the transcript are {Day154/204:2} to {Day154/205:7}.

Was that level of scrutiny of the dampers by building control appropriate, in your view?

- A. No, the damper required fire resistance to perform the function of the protected shaft, a firefighting shaft. It was critical, particularly in the context of B5, as I've said in my report. It's the last way a firefighter at risk can evacuate the building. It's the point of retreat for them, they fall back to it, and they evacuate people via the shaft if they need to by rescuing them.
- 16 Q. The Inquiry heard evidence from Mr Jones of the damper 17 supplier, Gilberts, to the effect that the Series 54 18 dampers were not intended to be nor were described as 19 being smoke control dampers. The Inquiry also has seen 2.0 product documentation that references test standards 21 applicable to fire and fire/smoke dampers, not smoke 2.2 control dampers. Mr Jones also acknowledged that the 23 Series 54 damper had no formal certification at all.

Would you have expected a reasonably competent BCB, without the benefit of a mechanical and electrical

1 engineer, to recognise that the dampers were not a smoke 2 control damper?

- A. Yes, because they should have asked for full details of
 the damper and should have asked for the test results
 for the damper.
 - Q. So was it reasonable, then, for Mr Hanson to conclude that the damper being used was a "smoke control damper", just because it was being used to control smoke?
- 9 A. No, because it had two functions: fire resistance and
- 11 MS GROGAN: Can we just look now at a change in the design 12 after --
- SIR MARTIN MOORE—BICK: Can I just intervene to ask you how you're getting on?
- $\begin{array}{ll} {\rm 15} & {\rm MS~GROGAN:~I~was~going~to~ask~this~question~and~then} \\ {\rm 16} & {\rm propose~a~break,~because~I'm~not~going~to~reach~the~end} \\ {\rm 17} & {\rm of~my~questions~before~--} \end{array}$
- 18 $\,$ SIR MARTIN MOORE—BICK: No, no. Yes, you take your course.

19 MS GROGAN: -- the transcriber needs a break.

So I'm just asking you about this change to the
design which we can see described in Mr Mahoney's first
witness statement, which is {PSB00001329/11}. It's
subparagraph 3 there.

In this part of his statement, Mr Mahoney is explaining some of the key changes in the design that

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occurred as the technical submission progressed through the project, and as we know, there were six revisions to that technical submission.

He savs there that:

"As well as the configuration of the extended smoke shafts, another detail which was finalised after the initial design work recorded in revision 1 of the Technical Submission was the specification and location of the fan sets used in the System."

Just to summarise what he says there, it's that initially it was envisaged that the north and south smoke shafts would be connected at roof level. That design then changed, and a new arrangement was reflected in revision 5 of the technical submission onwards, which he also confirmed with JS Wright.

Was that change in design something that should have been considered by building control, given that it postdated the rev 3 technical submission?

A. Yes, I would have expected building control to have been advised of a change in the design, even if it was simply to allow them to check it out on site when they were conducting their inspections. You could turn up, look at something and say, "Well, that was what we approved and that's what you've got on site, what happened in

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MS GROGAN: Thank you, Mr Chairman, that would be 1 2 an appropriate moment for a break. 3 SIR MARTIN MOORE-BICK: That's a good point? All right, 4 thank you very much. 5 Well, Ms Menzies, time for a break for the morning. We'll stop now, we'll resume at 11.35, please, and as 6 7 with everyone else, please don't talk to anyone about your evidence while you're away. All right? 8 9 THE WITNESS: Okay, thank you. 10 SIR MARTIN MOORE-BICK: Thank you very much. 11 (Pause) 12 Thank you. 11.35, thank you. 13 (11.21 am) 14 (A short break) 15 (11.35 am) SIR MARTIN MOORE—BICK: All right, Ms Menzies, ready to 16 17 18 THE WITNESS: Thank you. SIR MARTIN MOORE-BICK: Good, thank you. 19 20 Yes, Ms Grogan. 2.1 MS GROGAN: Thank you. 22 We're moving on to commissioning now. 2.3 In his evidence, Mr Hanson explained that he looked 2.4 at the system's commissioning certificate as best he could, but that not being a mechanical and electrical

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engineer, the commissioning certificate is not something that he could interrogate as well as a mechanical and electrical engineer could do.

He also explained that "with the loss of the [mechanical] engineer, we weren't expected to go down a witness commissioning or any kind of inspection", and the references for the transcript for that are $\{Day154/49:25\}$ and $\{Day154/147:11-13\}$.

How common was it for building control bodies to employ an M&E engineer at that time, so the 2012 to 2016 period?

A. Probably not common. I think, as Mr Hanson alluded to, when the GLC was disbanded, the BREG, the Building Regulations Electrical Engineers Group, were dispersed, as were we surveyors, and various ones went to all the London boroughs, and as time went by, they either moved on or they retired, and due to mostly cost—cutting, their positions were not replaced.

Also, sorry, if I may add, with the loss of the section 20, a role disappeared. Now, that went into the Building Regulations to an extent, but whereas under the protocol that was adopted by the GLC for section 20, when BREG went out and periodically witnessed the testing, et cetera, of fireman's lifts, firefighting lifts, whatever you want to call them, and safety

lighting, smoke control systems and the like, that was no longer done.

The Government was at great pains to lift the burden, deregulate the legislation, and put the onus on the person carrying out the work to achieve and display compliance.

Q. So against that background, would you expect a reasonable BCB to be able to consider a commissioning report without the assistance of an M&E engineer?

A. Yes, a reasonably experienced one, inasmuch as what you don't gather from the commissioning that you expect to see, you ask. That's the role of building control, is to question and to check things are as they would expect to demonstrate compliance.

Q. Could you just expand on that? So in the absence of
 an M&E engineer, what would you expect a BCB such as
 Mr Hanson to do when it came to inspection and
 commissioning of the system?

A. If he wasn't — the reason building control generally do not accept invites to go to commissioning is because it's a very lengthy process, as I said before, and all they're really interested in is the results, not how if you balance damper 55 and then tweak damper 62, you'll end up with what you want. They're not interested in that, they're just interested in the end results.

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1 But looking at the commissioning certificate, you would expect all the smoke detectors to have been 2 3 tested, inasmuch as they were activated by artificial smoke to run to make sure that, when they activated, 5 they opened the vents that they were required to open, 6 to close vents that they were required to open, 7 et cetera. You wouldn't be looking for anything as 8 regards the wiring other than to the commissioning 9 certificate to say it was installed as required.

Q. So would it follow, then, that you would expect the
 commissioning documentation to lay out in a fair bit of
 detail that all of the relevant things had been carried
 out?

A. Yes. What I would have expected is what was given to building control in the form of, I think, four separate documents, ie it was the partial commissioning certificate, as they termed it, which was for floors 4 and above, because the lower floors weren't completed at the time; there was then a commissioning certificate that related to the building as a whole, but it didn't say whether it tested all the floors at the same time; and then there was the separate sheet without heading that established the flow rate readings; and another sheet that was the environmental flow rate readings.

So I would have expected a proper commissioning

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- 1 certificate to have incorporated all that information 2 and not be a few A4 sheets stapled together, shall we 3
- 4 Q. And on receipt of the A4 sheets stapled together, as you 5 describe it, is there anything you would have expected Mr Hanson to do? 6
- 7 A. Either say, "Thank you very much, I note the content and am satisfied", or, "This is inadequate, I expect to 8 9 see X, Y and Z", neither of which I understand was the 10 response
- 11 MS GROGAN: At paragraph 291 of your report, which is on page 68 {BMER0000007/68}, you say that in your 12 13 experience, systems are generally demonstrated on site 14 using -

15 SIR MARTIN MOORE-BICK: Do you want this up on the screen? MS GROGAN: No, it doesn't need to come up on the screen. 16

17 They're generally demonstrated on site using a cold 18 smoke test, and that's something you mentioned earlier 19 in your evidence, and that while that wouldn't fully 2.0 replicate a fire situation, it would be indicative, and 21 you say that this doesn't appear to have been suggested

> Can you explain to us exactly how it would work in practice in a building such as Grenfell which was occupied?

> > 57

1 A A cold smoke test?

or undertaken.

2. Q. Yes

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A. You would gain permission from one of the residents to access their flat, and then you would set off a cold smoke machine. It's a theatrical smoke machine, generally smells of baby talcum powder, really, and it's just thick white smoke which is discharged from a small electrical canister, electrical device. Then you would open the front door, that would activate the smoke detection, and then you would observe what happened to the smoke as the system did what it's supposed to do, and it would give you an idea of the direction of flow towards the grilles, into the shaft, away from the staircase. It would in that particular case, if you left it running long enough to fill the lobby, or you could purposely fill the lobby with smoke, see what was the situation in the dead ends that have been mentioned, and just to give an overall impression of what the system would do.

It doesn't reflect fully, obviously, the energised smoke from a fire, but it will give you in fact, because it's cooler smoke and not as buoyant, not as active, it will give you a better indication of the way that the system is pulling the smoke.

SIR MARTIN MOORE-BICK: Do you know what is the nature of 58

1 the smoke that is generated?

2 A. Off the top of my head, no, it's just what they use in

3 theatres

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4 SIR MARTIN MOORE-BICK: I ask the question because I wonder

whether it contains very fine particulate matter, which

- is sometimes the way in which smoke detectors operate, 6
- 7 I believe, and if so, where does all the particulate

8 matter end up?

- 9 A. You can breathe it, it's safe to be in and breathe,
- 10 because it's used in theatres, and then the smoke
- 11 detection would generally work on obscuration.
- 12 Ionisation smoke detectors are frowned upon because they
- 13 have a radioactive element in them.
- 14 SIR MARTIN MOORE-BICK: Right.
- 15 A. So as soon as that beam in the head is obscured by the
- 16 smoke, the white smoke in this case, then it will

17 activate

- 18 SIR MARTIN MOORE-BICK: All right. Thank you.
- 19 A. As far as I'm aware, the particulates can't be large
- 20 because you don't walk away covered in white --
- 2.1 SIR MARTIN MOORE-BICK: That's rather what I was wondering,
- 22 particularly if you were going to fill the whole lobby
- 23 with smoke.
- 2.4 A. No, it gets extracted away. What is the best thing you 2.5

can do is do a hot smoke test, but obviously nobody

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- 1 wants to do one of those and set fire to it. You could
- 2 demonstrate a proposal in a derelict building by doing
- 3 a hot smoke test, and there are descriptions of doing
- hot smoke tests, but I'd say they're never done these
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- 6 SIR MARTIN MOORE-BICK: Thank you.
- 7 MS GROGAN: If a cold smoke test had been carried out, would
- one have been able to look at the different door—opening 8
- 9 scenarios that we discussed before the break to see what
- 10 the effect on the flow direction or the flow rate might
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- 12 A. Yes, I don't see why not. It would demonstrate what
- 13 would be happening with smoke, yes.
- 14 Q. And could it help to identify whether there were
- 15 breaches in compartmentation up through the dampers in
- 16 the shaft?
- 17 A. It would have been a good way to observe it. What has
- 18 been done in the past, if you suspect there is a failure 19 in compartmentation, you would put coloured smoke in
- 2.0 an area and see if you could see it on the other side of
- 21 the compartmentation. That's been done. That's to
- 2.2 demonstrate whether it's good or bad compartmentation.
- 23 Mr Hanson said that he was not aware that carrying out
- 2.4 a cold smoke test is important in any system where there

2.5 are extended travel distances, although he accepted it

1 could be a useful guide. Mr Partlow said that he would 1 a change to the system, what further commissioning would 2 have considered a cold smoke test to be dangerous in 2 you expect to have been undertaken after that? 3 an occupied building. 3 A. The whole system, to see that everything had -- any 4 In light of that evidence, are you still of the view 4 additional connections to other parts that already had 5 that a cold smoke test should have been considered and 5 been commissioned had been dealt with. It may not have undertaken? been to the depth of the original, but as the lower 6 6 7 A. I think it would have been reasonable to consider it. 7 floors had not had an in-depth commissioning undertaken, I have never heard of it being an issue in an occupied 8 8 because the available commissioning report only related building. 9 9 to the floors above the lower levels, there was no 10 SIR MARTIN MOORE-BICK: I think the question is not whether 10 overall commissioning report that related to the 11 it would have been reasonable to do it, but whether it 11 building as completed. 12 12 was unreasonable not to have done it. Can we go to Mr Hanson's evidence on this in the 13 A. I think in this particular case it would have been 13 transcript, which is {Day154/160:15}. 14 14 reasonable, because you had an existing situation, He is asked: 15 existing layout and construction of which you did not 15 "Question: But do you want to just clarify exactly 16 know all the intricacies and the voids, et cetera. 16 what was being requested by building control? 17 MS GROGAN: Did the failure to carry it out fall below the 17 "Answer: Yeah, yeah. Okay, so after our witnessing 18 standard that you would expect of a reasonable BCB? The 18 of what I call the sequence testing [and he explains 19 failure to request that it was carried out. 19 what that is] ... there was a lobby there that, as existing, didn't have any ventilation at all. 2.0 20 A. I think I'm going to say yes, in this particular case, 2.1 yes, particularly with an experienced BCB. 21 "So just a little bit of background to this. 2.2 Q. One of Dr Lane's concerns about the system is that it 22 Generally speaking, if I see something that could have been improved in the building, I mention it to the 2.3 23 may have drawn smoke from the fire flat into the lobby. 2.4 2.4 Should that issue have been considered by the BCB? design team." 25 A. Yes. However, I would say that in my view it's 2.5 Then we see that again -- sorry, I think the 1 inevitable, if you extract from the lobby, you will at 1 reference I've got for this is wrong, but what 2 some point draw smoke from the fire flat. The cold 2 Mr Hanson's evidence was, if I can summarise, is that 3 smoke test would have indicated whether that was 3 this wasn't something that he could legitimately ask for excessive or not. as a matter of relevant to compliance, it was 5 Q. Moving on to a topic that you have already mentioned, 5 an improvement that he was suggesting, $\{Day154/163:5-25\}$ which is the makeup air and the additional vent proposed 6 and $\{Day154/164:1-19\}$. 6 7 7 by Mr Hanson. In light of that evidence, is it still your view If we go to your report at page 68 {BMER0000007/68}, 8 8 that an additional commissioning process should have 9 9 paragraphs 296 and 297, you say there that: been carried out? 10 "296. I am not satisfied that the issue of the 10 Yes, because although it may have been a suggestion on 11 makeup/input air in the ground floor entrance was 11 his part, it was adopted and therefore affected the 12 resolved 12 system as finalised. "297. I have concluded that the commissioning report 13 13 Q. We have just two topics left. 14 did not relate to the system as installed. As such the 14 The first one is the involvement of the London 15 15 commissioning report should not have been accepted as Fire Brigade, again on the commissioning, 16 part of the evidence of compliance that resulted in the 16 We've covered the consultation with the London 17 17 BCB issuing a Building Regulations Completion Fire Brigade in Module 1. These questions relate 18 Certificate dated 7 July 2016." 18 specifically to the commissioning and testing. 19 This relates to, as you've identified, the 19 If we could first go to the 2015 SCA guide at 20 page 56, which is {RBK00002932/56} suggestion by Mr Hanson that an additional vent be added 2.0 21 21 after the commissioning had been undertaken. Under 9.1. "Introduction". the text says: 2.2 A. Yes 2.2 "As smoke control systems are primarily life safety 23 Q. And then no additional commissioning process was carried 23 systems and/or for assistance to the fire and rescue

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service it is imperative that the smoke control system

is tested by the installer and then offered for witness

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In those circumstances, where the BCB suggests

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testing to the authority having jurisdiction ... to prove its compliance with the project specification and the approved design criteria."

Authority having jurisdiction is defined on page 9 of that guidance $\{RBK00002932/9\}$, so if we go there, you will see it's the first one:

"Organisation, office or individual responsible for enforcing the requirements of legislation or standards, or for approving equipment, materials, an installation, or a procedure."

I just want to understand what your understanding of that guidance is $\!.\!$

Is the authority having jurisdiction the LFB, the BCB, both, neither?

They're the ones that are going to turn up and fight the fire. It's in your interests for them to know how that particular system works.

Q. Does the fact that the LFB witnessed the commissioning
 of the smoke system on 28 April 2016 have any bearing on
 your views about RBKC's approach to the commissioning

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1 process?

2 A. No.

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Q. So would it have been reasonable for the BCB to rely on the fact that the LFB had been there and hadn't raised any objections?

A. I wouldn't have expected the LFB to make any comment on
 their witnessing the commissioning unless it was their
 opinion that there was something wrong with the system
 from their operational point of view, or otherwise.

Q. The final topic that we have to cover is the gas works
 in 2017, so we're moving on now from the refurbishment
 to the gas works.

You covered these in your first report, and for the transcript that reference is $\{BMER0000004/156\}$ onwards.

I want to look at the advice given by Mr Allen to $\mbox{ Janice Wray of the TMO about whether the gas works were controllable under the Building Regulations. }$

So if we could go to $\{TMO10016546/3\}$, which is the beginning of an email chain on the matter.

You see at the bottom there, Ms Wray tells Mr Allen that National Grid is fitting a new riser to Grenfell, and they've told her that Building Regulations approval is not required. She asks him to confirm that this is correct, and if we go further up the page we see that, on the basis of the information she gives him, he agrees

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that the work is a repair, providing that no changes to fire safety implications are there, and so no application would be required.

So he says:

" ... I am content that this work would be regarded as a repair $\ \dots$ "

With that caveat.

8 It's right that you agree with the initial advice he 9 gave, based on the information he received from 10 Janice Wray?

A. On the basis it was a repair of an existinginstallation , yes.

 $\begin{array}{lll} 13 & Q. & \mbox{Going up to page 2 of the same document } \{\mbox{TMO10016546/2}\}, \\ 14 & \mbox{we see another email.} & \mbox{You can't see the date on that} \end{array}$

page, because it's on page 1, but the date of the email is 24 March 2020, so we've moved forward in time

is 24 March 2020, so we've moved forward in time

17 a little . Ms Wray tells Mr Allen that the new riser h

a little . Ms Wray tells Mr Allen that the new riser has been installed in a new location.

If we go up page 1 {TMO10016546/1}, we see an email at the top on 3 April 2017 from Mr Allen, where he advises that they do not usually take a Building Regulation application for this type of work and he would still regard it as a repair.

In your report, your view is that the installation of a gas riser in a new location was controllable under

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 $1 \qquad \quad \text{the Building Regulations.}$

2 A. Yes

Q. And that's because the venting of the gas pipe duct into
 the stair was detrimental to escape and affected the
 integrity of the stair as a firefighting stair.

6 Yes, the riser had been moved in its position, it had 7 been installed within the stair. By virtue of it being a gas riser, it would be in a position whereby it would 8 9 ventilate any leak that emanated from the steel conduit 10 that it was made of. The purpose, I understand, from 11 speaking to gas engineers prior to this Inquiry and 12 subsequently, is that they want people to be able to 13 smell the gas.

Positioning it in the only escape stair from a tall building, by any stretch of the imagination, I don't think would be acceptable. The fact that it is the intention that it is for people to sniff the gas basically underwrites the fact that it's expected that it will at some stage leak, and to have a combustible gas in the only escape route and the firefighting shaft is very bad practice.

It is also governed, in my view, under the Building Regulations in that this is an adverse effect on the existing arrangements and is therefore a material alteration.

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- 1 Q. And potentially falls foul of the non-worsening 2 principle?
- 3 A. It does, yes
- 4 SIR MARTIN MOORE-BICK: So what you're saying is the 5 Building Regulations, which impose legal requirements, would be inconsistent with putting the riser where it 6 7 was relocated?
- A. The building --8

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- 9 SIR MARTIN MOORE-BICK: Ultimately that's a question of law, 10 I suppose, but ...
- 11 A. Well, in my view, the works as undertaken made the 12 situation worse in respect of fire safety. That invoked 13 the Building Regulations by a worsening of the situation. That meant that the building control body 15 would require an application with proposals that would 16 justify it where it was, if you like, this is after the 17 event, because it was put in, and then you would look at 18 the guidance in relation to gas installations in 19 buildings, having regard to the fact this was an escape 2.0 stair and that it was a firefighting shaft.

Now, ADB is not the most straightforward as regards the installation of gas in a stair, and it effectively says you can install it if you have it in a conduit, a gas pipe, that complies with the gas safety regs, X, Y and Z. It then says if you enclose it for aesthetic or

other reasons, you have to vent it top and bottom.

Positioned in the stair, it was not ventilated top and bottom, and it was enclosed. It was only ventilated at the top, as I understand it, unless it was ventilated into another escape route, ie the escape route from the stair at the bottom.

But also, all the guidance in relation to a firefighting shaft says: you shall not have any service within that shaft that is not related to the functioning of the firefighting shaft.

If you enclose the gas riser, you effectively, in practice or otherwise, take it out of the firefighting shaft, but you would have to take it out by construction that was imperforate and attained two hours fire resistance

Now, the TMO was informed by the gas undertaker that they were going to enclose it. When I went down to site, it was partially enclosed, because I think the fire occurred in the interim, but the protection was side, where you would not expect the attack of fire to inside of the stud that was separating the gas riser from the stair.

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 ${\sf SIR\ MARTIN\ MOORE-BICK:\ All\ right.\ Thank\ you.}$

actually on the firefighting shaft side, on the stair come from. It should have been, in my view, on the

1 MS GROGAN: So, in effect, to summarise your view, what

2 Mr Allen ought to have done was say, "This is

3 controllable under the Building Regulations and

4 therefore I need to see justification as to why these 5 proposals are compliant or no worse"?

A. Yes. I mean, I think one of the first things he should 6 7 have said to her, "Yes, it is controllable and I can 8 tell you now it won't be acceptable if you're siting it 9 in a firefighting shaft, or it has been sited in

a firefighting shaft". 11 Then I would imagine -- and this is just to 12 illustrate it -- she would have said, "But it's already 13 in there", and then I think Mr Allen should have been 14 saying words to the effect, "Well, in that basis, if 15 you're not going to move it, then we expect it to be 16 separated to the required two-hour standard from the 17 stair"

18 Q. The Inquiry's gas expert. Mr Hancox, gave evidence that 19 Mr Allen's advice as contained in that email was 20 a common position taken by BCBs, and the reference for 2.1 that is {Day161/21:18}.

22 Is this an issue, then, on which there might be 23 a range of reasonable expert opinion from the

2.4 building control side of things?

25 A. I don't know if Mr Hancox is actually referring to

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1 buildings of this height that contain firefighting shafts, but a reasonably competent building control 2 3 surveyor should have known that a firefighting shaft, by virtue of the recommended standard, shouldn't have 5 anything in it that did not support the functioning of 6 the firefighting shaft.

7 Q. If we perhaps just go to his evidence so you can see what he was asked and what his response was. It's, as I said, {Day161/21:18}:

> "Question: In 2016, would a gas engineer have expected their work on a replacement riser to be controllable work under the Building Regulations and subject to building control approval?

"Answer: No."

15 A. Does he mean by replacement like-for-like, ie same 16 service, in the same position?

17 Q. We can check that to see the basis on which the question 18 was put to him.

19 Are you aware that this issue $\,--\,$ so the works that 2.0 we're actually looking at, so the installation in 21 a stair in a tall building -- would have prompted 2.2 a different range of responses from different BCBs?

23 I know it should have prompted: it is controllable

2.4 I suspect there are some that would not have had that 2.5

reaction on the basis that it is permitted, if you like,

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under the guidance within ADB, subject to certain conditions. But where you have a firefighting shaft, you have that additional consideration.

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It is an issue, this aspect of venting gas supplies. Just by way of illustration , I was carrying out a fire risk assessment in a conversion from the 1980s of a rather large, in its day very grand house that had been converted into small flats in the 1970s, and the time had come to replace the gas supply. One staircase, the gas engineer, when I got the place, was in fact venting the gas supply into the main entrance hall in the ground floor, taking the pipes then into a riser and up to the top, venting at the top, and venting into the hall below, which was obviously, in my view -- well, in my view, was unacceptable and so the arrangement was changed

But I think there is a belief that if an accredited gas contractor undertakes the work, everything will be fine. People are, quite rightly, somewhat scared of gas, because it goes bang on occasion, but in the context of fire safety under the Building Regulations, it is a recognised phenomena, we know it occurs, we know it goes into stairs, we have standards that go with that. If you deviate from those standards or you want to enclose it aesthetically, there are further

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- 1 standards, but there are additional standards that 2 relate to a firefighting shaft.
- 3 Q. So would it have been reasonable for the BCB to take any comfort from the fact that the gas transporter, in this 5 case Cadent, was ultimately responsible for those works?
- 6 A. Not on the basis that they were not compliant with the 7 standard required at the time. The actual installation 8 of the gas may have been perfectly okay. Its location 9 within the firefighting shaft was unacceptable. Did 10 Cadent know it was a firefighting shaft? I don't know.
- 11 Q. You say you considered that a building notice would have 12 been reasonable but that some authorities would have 13 required a full plans application.
- A. Yes, the reason for that is that the Building 14 15 Regulations and the RRO legislation require that where 16 a building is or will be subject on completion to the 17 RRO, then a full plans application is the only route 18 under the Building Regulations, and that is to ensure 19 that the necessary consultation takes place in quite 2.0 a formal manner. However, that requires guite 21

A building notice with a simple description would have achieved the same function, because in my opinion the answer would have been, "No, you can't put it there". So effectively there was no need to consult the

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- fire service, because the answer from the building regs aspect, the BCB enforces the building regs, was, "No, it shouldn't be there".
- 4 But I can quite understand any other building control body saying, "No, we require a full plans 5 application". 6
- 7 Q. And strictly as a matter of the regulations, because 8 this was a building that would be subject to the RRO, it 9 should have been a full plans application?
- 10 A. Yes, in the context it was adversely affecting the 11 existing fire safety arrangements, yes, and it was 12 a material alteration . ves.
- 13 MS GROGAN: Thank you, Ms Menzies, that's the end of my 14 prepared questions for you, so now would be the time for 15 a break to see if anything else has come in.
- 16 SIR MARTIN MOORE-BICK: Right. Well, as you already know. 17 I'm sure. Ms Menzies, we have to have a break now to
- enable counsel to check that nothing has been left out, 19 and to enable others who are not present in the room to 2.0 suggest questions that perhaps we should put to you.
- 21 So we'll break now. We'll come back at 12.25, and 22 we'll see if there are any further questions. All 23 right?
- 2.4 THE WITNESS: All right, thank you.
- SIR MARTIN MOORE-BICK: Thank you very much. Would you like

75

1 to go with the usher.

(Pause)

All right, 12.25, please.

MS GROGAN: Thank you.

5 (12.12 pm)

(A short break) 6

7 (12.25 pm)

SIR MARTIN MOORE-BICK: Right. Well, let's see if there are 8 9 any more questions, shall we?

10 Yes. Ms Grogan.

11 MS GROGAN: Thank you. We do not think there are any 12 further questions that we need to ask at this stage.

13 SIR MARTIN MOORE-BICK: Right. Good. All right, thank you 14 very much.

15 Well. Ms Menzies, it really just remains for me to 16 thank you very much yet again on behalf of the panel and

17 the Inquiry as a whole for all the work you have put in 18 to your expert reports, and of course coming here today 19 and yesterday to give us your oral evidence. I need

2.0 hardly say we're very grateful to you.

21 THE WITNESS: It's been a pleasure.

2.2 SIR MARTIN MOORE-BICK: It's been very helpful and very

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23 interesting, and we're going to profit greatly from what 2.4 you have told us.

THE WITNESS: I hope so. 2.5

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SIR MARTIN MOORE-BICK: Thank you very much indeed.
 2
     THE WITNESS: Thank you. Bye bye.
     SIR MARTIN MOORE—BICK: You're free to go, of course.
 3
 4
        Thank you.
 5
                      (The witness withdrew)
     SIR MARTIN MOORE—BICK: Thank you very much, Ms Grogan.
 6
        That was our last witness for the day, so we're going to
 7
 8
         call a halt at that stage.
 9
            That will complete the Inquiry's hearings for this
10
        month. We shall not be sitting during August, but we
         shall resume at 10 o'clock on 6 September.
11
     MS GRANGE: Thank you.
12
13
     SIR MARTIN MOORE-BICK: Thank you very much.
14
     (12.30 pm)
15
                (The hearing adjourned until 10~\mathrm{am}
16
                   on Monday, 6 September 2021)
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