Tuesday, 19 February 2013

(10.00 am)

Housekeeping

THE CORONER: Thank you, good morning. Do sit down. Have you between you had a chance to consider the juror's question from yesterday? Has that been discussed?

MR MAXWELL-SCOTT: I don't think it's been discussed. It's been distributed this morning, so everybody now should have a copy of it.

THE CORONER: All right. In that case, shall we delay with that until everyone's had a chance to have a look, or are there suggestions now?

MS AL TAI: Madam, if I could just address it briefly. It was something that I had considered yesterday afternoon. Perhaps it might be useful to have some of the Rule 37 witnesses -- I think it's principally Kay Broom and her colleagues -- read before any further expert evidence is elicited. I'm not sure of the other statements, so I can't give you exact details, but I'm certain Kay Broom and one other. I think it might be useful from the jury's perspective to have a location or at least hear evidence in respect of where Catherine was found from the individuals who found her.

THE CORONER: I see. When you say "before any further evidence is heard", you're not suggesting that we

interrupt Mr Crowder?

MS AL TAI: I don't know whether that might be a possibility -- I apologise. I don't know whether this is picking me up. I don't know whether it might be a possibility. Given we've heard evidence about the location of the flames and how the fire distributed through the flats, it might be useful. Of course it presents difficulties, I understand, but I think as it's in the jurors' minds, it's quite pertinent.

THE CORONER: All right. Would anyone like to add to that?

MR HENDY: Madam, there might be a way of not disturbing the timetable. In fact, I was going to raise with Mr Crowder where Catherine was in the flat, and I was going to put it to him on the assumption, shall I say, that her body was found in the east-facing lounge with her head facing towards the east. I wasn't going to put it more precisely than that. So if I make that suggestion to Mr Crowder in the course of evidence and make clear that there will be evidence to be heard about that -- because I don't think the issue is controversial in any way -- that may give the jury some help.

THE CORONER: I think it's a question of clarification for them, isn't it?

MR HENDY: Yes, and then it means we don't have to interrupt Mr Crowder's evidence. I am sure Ms Al Tai's right that

we should hear that evidence sooner rather than later, but there are logistics to consider.

MS AL TAI: I think that's very sensible, given that it's not a controversial matter, just a point of clarity. Thank you.

THE CORONER: All right. Does anyone want to add to any of that? Well, thank you very much. That seems to me to be a sensible way forward, so let's leave it that Mr Hendy will ask his questions as he's outlined and see whether that deals with that.

All right, anything else that anyone wants to raise? All right, then might we invite the jurors to come in? Thank you.

Mr Crowder, would you like to come back to the witness desk please, thank you. Good morning. If you'd switch the microphones on that would be useful. If you could please keep your voice up as much as you can, that would be helpful. Please help yourself to a glass of water. If you could remember you're giving your evidence on oath.

(In the presence of the Jury)

THE CORONER: Members of the jury, good morning. We're going to continue with the evidence of Mr Crowder this morning. Thank you.

Yes, Mr Maxwell-Scott, I think you'd finished the

questions you wanted to put to Mr Crowder?

MR MAXWELL-SCOTT: Yes, that's correct.

THE CORONER: Thank you very much. Mr Hendy then.

DAVID CROWDER (continued)

Questions by MR HENDY

MR HENDY: Thank you, madam. Mr Crowder, I represent some of the bereaved families. Mr Crowder, I'm sure it's not on your bedside table but we have a copy of The Architects' Journal of 7 January 1960, and I wonder if I could ask you to have a look at it.

Madam, we've produced copies -- insufficient copies, I'm afraid, but Mr Atkins has supplied the deficit -- of this journal. I'm sure it's not something the jury are going to want to keep in their bundle but I have copies for them here. I wonder if I could ask Mr Clark to give the copies to the jury.

THE CORONER: Thank you. May I see one, please. (Handed)

MR HENDY: Perhaps Mr Edwards would be kind enough to distribute them to the witness box and to the other advocates.

Mr Crowder, please be assured, this is not by way of ambush.

A. No.

Q. There are just some points of interest that I wonder if I could invite you to comment on.

A. Yes, certainly. Can I say I have seen this document before, so it's not new to me.

Q. Right. But not on your bedside table?

A. Not on my bedside table, no.

Q. I wonder if we could just pick out a few points as we go through. As I say, this is The Architects' Journal for January 1960, and on the first page, which is page 23, we see that it says:

"The Sceaux Gardens estate, now nearing completion for Camberwell Borough Council, is the most interesting housing scheme to have come from the metropolitan borough architects department ..."

And so on. I think your original estimate was that the building was finished in 1958. If The Architects' Journal is correct, it looks as if it probably finished in 1960, doesn't it?

A. Yes.

Q. If we could go to page 24, there's a little plan at the top of the page and a photograph at the bottom. Do we see on the plan that -- sorry, let me start again. In the photograph, we're looking from the east side with the north end to our right and the south end to our left. At ground level, below the eastern side, we can see an area of concrete slabs which is subsequently described as being in yellow and red alternate

chessboard-like effect. Can we also see that there are no obstructions to anything coming onto the area below the east side as this building was originally built?

A. As far as I can see from the photograph, then yes, that is the case.

Q. That's duplicated on the plan. There's no trees or bollards or any other obstacle?

A. Yes, that appears to be the case.

Q. If we go to page 25, there's a description towards the bottom of the page in the paragraph beginning:

"The entrance door of each maisonette opens into a small hall which gives access to the two bedrooms and internal bathroom and from which a staircase leads up to the living room and kitchen above."

Then there's a sentence about the heating and LCC by-laws for ventilation and so forth. But if you go down half way through that paragraph, there's a line which begins "Entrance hall", semicolon. Do you have that?

A. Yes, I have that.

Q. And it reads on:

"... the bedroom and lobby doors are fire-resisting, although there are clear glass fanlights over the bedroom doors."

Now, the fact that the bedroom and the lobby doors

were fire-resisting -- of course, in your inspection of flat 79, the bedroom door to bedroom 1 was not present because the wall had been removed; am I right?

A. Well, the door was present, but yes, the wall had been removed, so its effect was negated, although the door had also been changed, as I understand it, from the original.

Q. Yes, and likewise the lobby door had also gone or been changed?

A. Sorry, which lobby door do you ...?

Q. Well, just working it out from here, it looks to me as if it's the lobby to the anteroom to the bathroom.

A. Yes, as I understand it, that's also been removed.

Q. Yes. If we can just flick over to page 76, and in the middle of the page, there's a paragraph which begins:

"The aluminium-faced plasterboard ..."

Do you have that?

A. Yes, I have that.

Q. It says:

"The aluminium-faced plasterboard backing to the glazed panels beneath the windows is one of the doubtful elements of the scheme, as this material gives considerable glare even without sunshine and it imparts a metallic effect to the block with little colour to give relief. Moreover, many of the panels are

disfigured by what appears to be crazing of the aluminium."

Well, we don't need the reasons for that, but after that it says -- the last sentence in that paragraph:

"These panels, together with the rigid window design, are used throughout the scheme but are perhaps more acceptable in the lower blocks."

Which we're obviously not concerned with.

Now, those panels, aluminium-faced with plasterboard backing, had been all removed by the time you made your inspection?

A. Yes, that's correct.

Q. But if it becomes a legal issue as to whether a better degree of fire-proofing had replaced the original or a worse degree of fire-proofing, I ought to ask you the question as to whether aluminium-faced plasterboard is flammable or not, combustible or not?

A. I would consider them both to be non-combustible.

Q. Of course we don't know whether the aluminium-faced plasterboard had been replaced long ago or at a more recent time?

A. I think yesterday we mentioned a refurbishment in the 70s, possibly '79, but I'm not clear to what extent the windows may or may not have been replaced. That was presented to me after I completed my expert report.

Q. Understood. I think we can pass over pages 27 and 28, which provide some photographs, and go, please, to page 29. On page 29, we have some photographs. The top one is of the kitchen looking through the top of the stairs into the lounge, where we can see a half open door. The photograph below that is the one which may be of interest to the jury. This appears to show an internal corridor shortly after the time of construction, and the ceiling appears to have 45-degree panels running down each cornice; do you agree?

A. Yes, I agree.

Q. And the lights are triangular lights, casting what would appear to be a down-lighting onto the floor?

A. Yes, I would agree with that.

Q. Those triangular lights look very much to me -- and obviously it's only guesswork -- rather like the triangular lights which were found when you did your inspection.

A. I'm not sure I would agree with that. I mean, the lights that we found were also triangular, but their orientation was different and therefore the fixings they would have required would have been different, so I would have thought that the lights that were present at the time of the fire were different.

Q. Well, I don't think anything turns on it, but the jury

might be interested to look in their jury bundle at tab 13, photograph 17, where one sees the triangular lights that were present at the time of the fire in 2009. Because they're put now into a right-angled corner they give an illumination at an angle of 45 degrees.

Anyway, it's purely speculative. But our understanding is -- and I don't know whether you can comment on this -- that the 45-degree coving along each cornice of the corridor shown in the Architects' Journal at page 29 concealed heating pipes for the original heating system, which, at the time, were covered in asbestos, and it was some time in the 1980s -- I think Mr Tony Morgan told the jury some few weeks ago now that the heating system was changed in the 1980s, and the heating pipes were removed, and that's when the suspended ceiling was erected.

A. Okay, that sounds consistent with the information I have.

Q. Thank you. I think we can pass over 30 and 31, which show photographs of low rise buildings, and since this article is primarily about costings, I'd like to take you, please, to page 32. If you look in the right-hand column, under the heading of "Structural elements", the first heading is "Frame or load-bearing element", the

second heading is "External walls" and the third heading is "Windows". We see that it says the window is mild steel, galvanised, painted, fixed to glazed softwood-framed panels. Does that indicate to you that as built these windows were made of steel?

A. Yes, that would indicate to me that -- well, certainly the frames were made of steel.

Q. Whereas I think in your inspections they were aluminium?

A. Yes, that's correct.

Q. Finally, can we go to page 34, please. At the bottom of the left-hand column, under "Other elements", we have refuse disposal, salt-glazed earthenware sheets and then balcony balustrades:

"Galvanised MS angles and softwood framing with quarter-inch Georgian wire-cast infilling."

I understand "MS" to be mild steel. Would that be sensible?

A. Yes, that would be a sensible interpretation.

Q. So it looks as if the balustrades, as originally built, were galvanised steel with quarter-inch glass with wire inside it. That's the mesh, wire mesh?

A. Yes.

Q. Although it's difficult to see because of the fact that this journal was reproduced electronically from an archive and then has been photocopied again for this

inquest, if one goes back to page 27, it looks to me as if -- and it's a matter obviously for the jury, but it looks as if the balconies there seen are in fact of frosted glass, because you can just make out in some places some of the uprights, the shadow of the uprights showing through, particularly on what I think is the fourth floor at this end.

A. Yes, I would agree with that.

Q. Again, I put the question to you: presumably steel with Georgian quarter-inch wire glass is not combustible?

A. No, it's not combustible.

Q. Thank you. Now I want to ask you about something else, your reconstruction. I wonder if I can ask Mr Maxwell-Scott whether he would be kind enough just to put up onto the screen the opening shot of the video sequence. Perhaps we could look at it at, say, two minutes in, when the flames have caught. Is that possible? Just freeze it there. It's not terribly clear, but since the jury have seen it they know what they're looking at.

Can I ask you this about it: you were conducting there two experiments, essentially, if I'm right. The first experiment is to see how the fire burned in the bedrooms of flat 79, and that's on the lower floor?

A. Yes, in bedroom 1 of flat 79, yes.

Q. In bedroom 1. And the second experiment is to see how flames from a lower floor, kitchen or a lounge, could pass over the underneath of a balcony to strike bedrooms above?
A. Yes, that's correct.
Q. So there are really two separate experiments going on here at the same time?
A. Yes, there are.
Q. For the purposes of the second experiment, we have the overhanging mock bedroom above the seat of the fire in that reconstruction. What we don't have, of course, is the balustrades which would have been below.
A. Yes, that's correct.
Q. I just wanted to ask whether the balustrades, knowing that, as we've seen from the photographs, they were actually burned, whether that would have contributed anything significant or nothing at all, perhaps, to the force of the fire in the bedrooms above?
A. I assume you're referring to the balustrades that were in place at the time of the fire?
Q. I was, yes.
A. By virtue of their being combustible, they would have contributed to some extent. However, I don't think that would have been to a significant extent, because by the time you have flaming that is sufficient to actually

pass up to the floor above, that has actually reached a stage where the flames are against the underside of the ceiling before they pass up and impinge upon the panels above, so the -- no, I don't think the balustrades would have had a significant impact at that stage.

Q. And that's presumably why you didn't feel the need to try and reproduce them?

A. Well that, plus it would have had a significant impact on the ventilation available for the fire in the lower floor, so it would have had quite a compromising effect on the lower experiment.

Q. And that was the primary purpose of the exercise really?

A. Yes, that's correct.

Q. Can I now ask you about the fire in 1997. If the jury would be kind enough to open at divider 18, tab number 3, and I could invite you, Mr Crowder, to take up the advocates' bundle and open the third volume at page 1090. (Handed) If we could have the lower picture, please, Mr Maxwell-Scott, slightly enlarged. I'm grateful.

Now, in the jury bundle, divider 18, page 3, we have your description of the lounge as found. So we have a block-work wall, number 4, either side of the door, and the door is made of composite panels with

an insulated core?

A. Yes, that's correct.

Q. That we're going to hear a lot about. Can we just compare that with the situation in the 1997 fire, of which this is a picture. There we have the block-work wall either side of the door, but the door itself -- it may or may not be aluminium backed with plaster, but whatever it's made of has not burned. Am I right?

A. That would actually not be my interpretation. My interpretation of this image is that yes, you have the block-work wall on either side. What you can see through the doorway, in my opinion, is actually the balustrade, the balcony panel. The reason why I reach that opinion is because at the ends of the block-work walls around the opening where the door was, you have a very clear, defined line, and then you have a smoke pattern that you can see that has emerged, and it's my opinion that that smoke pattern is as a result of the fire emitting through the open doorway and leaving soot on the balcony panel. If the door was still in situ at this time, I wouldn't expect there to be such a clear line, visible on the picture, between the ends of the wall and what you can see beyond the wall. Does that make sense?

Q. It does, but I just wonder whether that's consistent

with the fact that the cross members of the door are, although charred, still in place.

A. Again, I would be of the opinion that that cross member is potentially that of the balcony and not the door itself. It's a difficult picture to interpret, but again, it rests really on the very well-defined lines at the ends of the walls.

Q. Okay. There we are. Let's take other comparison if we may. Can I invite the jury to go back to page 2 of divider 18, where we're now looking at the kitchen. Let's see if we can compare that to those pictures that we have in 1997 to see what the effect is. We looked at this yesterday with Mr Maxwell-Scott, but it's page 1089 in the lower picture. There we can see the remains of the block-work wall below the window, yes?

A. Yes, that's correct.

Q. And to the left of it, as you pointed out yesterday, behind the remains of the fridge, we can see the door, which has not burned through, clearly?

A. Yes, that's correct.

Q. So whatever it was made of was sufficient to resist the fire, and to the left of the door there's a panel which also appears to have resisted the fire?

A. Yes, that's correct. Can I elaborate on the relationship between what's in place in the kitchen and

what's in place in the living room?

Q. Of course.

A. It's my understanding that at the time when Lakanal was constructed there were far fewer combustible material in the home generally. With the advent of modern plastics and so on, those kinds of things have dramatically increased in the last few years. However, at the time of Lakanal's construction, the principal areas where you would have fire-loading that you would need to protect against were in the kitchen, because even at that stage there were appliances and fridge freezers and so on which did contribute significantly to the fuel load in that area and therefore they were considered the higher risk and had to have this kind of protection separating the kitchen, in the case of Lakanal, from the balconies and the escape routes.

In the living room, the fuel load would have been certainly perceived to be far lower. That may not have been the case if someone had introduced lots of furniture, but the perception was that there was a lesser need to provide that level of protection between the living room and the escape route than between the kitchen and the escape route.

Q. Right. So you think there may be a difference in the composition of the door to the balcony in 1997 and the

door in the kitchen and the panel next to it in 1997?
A. Yes, that's correct.
Q. Now can we look, please, to see if we can do a comparison with the bedrooms. If you and the jury would be kind enough to go to page 1 of tab 18, we see the situation as it was in 2009, with the glazing above and the composite panels below. If Mr Maxwell-Scott would be kind enough to bring up the lower photo on 1092, we see a view through from the camera person, who is obviously standing near the front door, looking through to bedroom 2 and a firefighter looking over the parapet.
A. Yes, that's correct.
Q. That parapet there was of block-work in 1997; am I right?
A. No, in the bedrooms that would have been whatever was in place. I think what the original construction referred to was plasterboard and aluminium, and whether or not that may have been changed -- but it would have been of that original or 1970s non-combustible construction and survived this fire.
Q. And that's the point, isn't it, that whatever it was made of, it resisted the fire?
A. Yes.
Q. Even though the fire was of sufficient heat to entirely

gut the maisonette, bring down the plaster from the ceiling, and shatter and blow out all the windows?

A. Yes.

Q. Mr Tony Morgan, a resident for some 30 years, gave evidence to the jury, as I say, a couple of weeks ago now. He spoke of a refurbishment in the 1980s when he says the suspended ceilings were put in and another major refurbishment in the 2000s. In the 2000s, he says, panels were systematically taken down from the suspended ceiling. Obviously that's a matter of history that you can't comment on, but I wanted to ask you about the phone system which gives the occupant of each flat the means to hear a caller at the ground floor and press a buzzer to let them in. We don't know -- well, I think we probably do, but it doesn't matter. When that system was put in, do you agree with me that it would have been necessary to have removed the panels on the suspended ceiling on every floor to put that wiring in?

A. Well, I mean, there's an assumption that you have to make about where the wires have to go, but I agree you would have to install wires and the suspended ceiling would be the most obvious place to pass those wires.

Q. Let's just see if we can see some of the wires. If you and the jury would be good enough to go to divider 13 at page 20. In this particular flat, we can see the door

phone entry system on the right-hand side of the door as we look at it. Do you agree?

A. Yes.

Q. And we can see the wire leading from that going up the side of the door aperture, across what I think has been referred to as the fanlight and going somewhere to a hole in the corner. Now, the suspended ceiling in the corridor was level with the bottom of that fanlight, wasn't it?

A. Yes, it was.

Q. We can also see wires on the left-hand side of the door, which presumably are telephone wires. Is that a sensible assumption to make?

A. Yes, that would seem sensible.

Q. Then if we look at photograph 19, which is the other side of that door, from the corridor, can we see white cables going -- it looks as if -- into a similar position where the wire for the entry phone had come out on the other side of the door?

A. Yes, that appears to be the case.

Q. Right. If this guess is right, then the wires for the entry phone system were situated in the void above the suspended ceiling?

A. Yes, I would agree with that.

Q. There's another photograph that may cast some light on

this. If you look in divider 26 of the jury bundle, after the diagram of the cameras in your experiment, there's a set of photographs showing what the cameras saw. If you look at the bottom left, we can see a number of --

THE CORONER: Sorry, can you just give the jurors time to find the page.

MR HENDY: Forgive me, I'm so sorry. This is divider 26, the second page, which has a series of photographs showing what all your cameras could see. In the bottom left-hand corner, we can see, running along the supports for the suspended ceiling, a bunch of white wires, which again, if the guess is right, may well be the phone entry system for the telephone system?

A. Yes, I agree with that.

Q. So if that surmise is correct, the installation of the phone entry system would have necessitated removals of panels from every corridor on every floor in order to be put in?

A. Yes, it would have done.

Q. The final thing I wanted to ask you about, Mr Crowder, was the timeline. In order to do this, can I invite the jury to be good enough to take out the single page that they have at page 23 in order that we can compare it to Catherine Hickman's phonecall, which the jury have at

tab 17. So if we open the bundle at tab 17 and have next to it the single sheet of tab 23. I wonder if I could also ask Mr Maxwell-Scott or Mr Atkins whether they would be kind enough to put onto the screen your report numbered 259449 at page 169.

First of all, Mr Crowder, can I ask you to identify that page 169, which the jury can see on their screens, is a timetable, a chronology, which you have constructed in your report, based on your experiments, information from the Fire Brigade, photographs and other materials, to try and draw up a full chronology of the events of this fire?

A. Yes, that's correct.

Q. Just to set the scene, can I ask you about the layout of flat 79. Sorry, the jury are going to have to forgive me. We can close tab 17 for a moment and just open tab 13. We'll come back to 17 in a minute. In tab 13, if we can just go to pages 6 and 7, page 6 first. Sorry, I have the wrong tab. Just give me one moment. Sorry, it's tab 11, page 6. This is a 3D diagram of Lakanal House. Flat 79, do you agree, would have been immediately to the left of the central stairwell with bedroom B1 immediately next to the lift shaft and bedroom B2 immediately to the left of it?

A. Yes.

Q. If we turn over the page to 7, we can see the kitchen and the lounge of flat 79, which are both adjacent to the stairwell/lift shaft and so forth.
A. Yes.
Q. So that the kitchen was facing west immediately above bedroom 1.
A. Yes.
Q. Agreed? And the lounge was facing east, immediately above the bedroom of flat 79's opposite neighbour?
A. Yes, that's correct, yes.
Q. We will hear evidence about this subsequently, and I know the jury have asked a question about it, but can we proceed on the assumption that Catherine Hickman was found in the lounge, which is easterly facing, with her head towards the east, and she was on the floor? We'll have a more accurate picture of that from later witnesses, but for --
A. Yes, I can confirm that I've seen photos to that effect.
Q. Right. Okay, having set the scene, can I ask the jury to go back, then, to have tab 17 open at Catherine's call. What I wanted to do, Mr Crowder, was to try and identify what Catherine was describing to the operator in the Fire Brigade control with some of the events that you have identified and Mr Maxwell Scott has prepared in this timeline which we've taken from tab 23.

So again, let's just set the base for this. The first phonecall from Jade Spence to her partner was at 16.15, 4.15 pm, and I think your evidence is that the fire -- it may be agreed evidence -- most likely started two or three minutes earlier than that?

A. I think we estimated that the fire started at around 16.15, so it would have been around the same time as that phonecall.

Q. Around 16.15, okay.

A. Sorry, let me just clarify. We state that the fire was established at 16.15, so whatever spark or event that actually started that fire may have been a couple of minutes earlier, but as best as we could -- the best estimate we could put, based on our analysis and interpretation, was 16.15 was the time when the fire was reasonably well established.

Q. Okay. In the timeline for fire reconstruction at tab 23, we have time of ignition, minutes and seconds. I had thought that we had to add ten seconds to that; is that right? Ten minutes to that?

A. Sorry, yes. So at 16.25, I think we consider that the fire has broken into flat 79. So at 16.25, you have -- sorry, not broken into flat 79. At 16.25, you have the flashover in the upper floor of flat 65, which then leads to the extended flames emitting out of the upper

windows of flat 65 being equivalent to us igniting the wood cribs on the outside of the reconstruction, and then the fire breaking into flat 79 follows from that.

Q. Okay. So fire breaks into Catherine Hickman's flat at about 16.25. Let's just see --

A. No, sorry, fire breaks into Catherine Hickman's flat at around 16.30, but the time 0 for the reconstruction relates to 16.25.

Q. Okay. Well, let's assume 16.25. Let's just see how that correlates with what Catherine Hickman was describing. If we look at tab 17, let's start at 16.21.33. We're going from the very left-hand column, which is headed "True time". There she says:

"Yes, I'm at -- I'm at flat 79, and the flat below me -- there's flames coming out of the window."

That's exactly as you would surmise, is it not?

A. Yes. That may not correlate with flashover at 16.25; that could simply be flames emitting from bedroom 1 of flat 65.

Q. Absolutely.

A. But yes, I would agree with that being entirely reasonable.

Q. What you have just said also correlates with what Catherine said at 16.21.46, when she said:

"Yes, but the fire's below me in the flat below."

A. Yes.
Q. If we go on to 23 minutes and 40 seconds -- sorry, I can't read my own handwriting. At 16.23.05, or just below that, the operator says:

"Is the smoke coming in anywhere in your flat?"

And Catherine says:

"No, I shut all the windows."

That again correlates, doesn't it? The fire has not entered her flat as yet?

A. Yes, that's correct.
Q. And therefore there's no smoke in her flat?
A. That's correct.
Q. Over the page on page 3 at 16.23.20, she says:

"There's black smoke coming right up outside my window."

Again, that's exactly what you would expect?

A. Yes, that is.
Q. At 23.35, she says:

"Yeah, but there's fire coming through my floorboards now."

And I think we've all agreed that it's more likely that she said, "I mean smoke." So smoke coming through her floorboards at 23.35. Would that be about right?

A. Yes, that sounds about right. Do you want me to explain how the smoke might have got there?

Q. Yes, if you would. We've heard about the wooden floor laid onto concrete, suspended on concrete.
A. Yes.
Q. Just explain to us how the smoke would get in.
A. So as you said, the wooden floor is actually floating above the concrete. So there are batons underneath it and some sort of cavity or void beneath the floor that you actually walk on, and that would have communicated with whatever join there was between the window frame and the concrete structure of the building. So with smoke passing up the outside and the wind, as I mentioned yesterday, pushing against the side of the building, it's entirely plausible that some smoke would have been forced around the gaps between the window frame and the concrete, entered the void beneath the timber floorboards, and would then have been seen by Catherine permeating through the floorboards and up into the flat.
Q. Now, you put the time that the fire enters Catherine's flat at 16.25. If we look on page 4 to see what Catherine says about this, towards the bottom of the page, at 16.25.02, she says:
"Yeah, the room downstairs full of smoke."
A. Yes.
Q. Is that consistent with 16.25 being the time of entry of

the fire?

A. That is, and the fire may well have been entering at that point to the extent that we saw on the video yesterday, but she may not have been able to see it as a result of it being full of smoke and therefore the visibility being severely hindered, but I think at that stage you could see on the reconstruction video how smoke-logged the room was actually getting. So that is consistent.

Q. If we go to page 6 and look at the top of the page, at 16.26.16, she says she hear it crackling. Would that be consistent as well?

A. Yes, that is consistent.

Q. Madam, I wonder if I can just point out to you and the jury that I've noticed that a number of the entries under the true time have "16.21" when it's clearly 16.26. If you look at the second entry, 16.26.25, the next entry is 16.21.27. I think that's just a typographical error and whoever typed this out has reverted to 16.21 in many pages over the course of many pages subsequently, but you can work out what the true number of minutes is.

THE CORONER: Yes. Thank you for pointing that out, yes.

MR HENDY: Just in case anybody was confused by that.

Can we just go on to page 7 and pick it up at

16.27.20. Fourth entry down, Catherine says:

"The flat's filling up with quite a lot of smoke."

That, again, appears to be entirely consistent with what you demonstrated?

A. Yes, that is entirely consistent.

Q. Now, page 8, at 16.28.50, six lines down, the operator says:

"Get to the part of the flat where there isn't any smoke."

And Catherine says:

"Yeah, I'm on the balcony."

And we can see that she describes smoke coming upwards and blowing towards Havil Street, and a few seconds later, there's raging smoke on the other side of the building. All that is as one would expect, is it not?

A. Yes, that is.

Q. At 16.30.43, which is on page 9 -- by 16.30, as I understand it, the outer pane of glass of one bedroom window had failed? Sorry, I'm looking at your tab 23. If our starting point is 16.25, then the composite panels catch alight at 16.25 plus one minute, 27 seconds, then the outer pane of glass of one of the bedroom windows fails, then the fire starts to involve the curtains inside the bedroom. All that's happened by

16.30, yes?

A. Yes, that's correct.

Q. At 16.30.26, the first bedroom window fails?

A. Yes, that's correct.

Q. And that has an effect because it allows more air into the room?

A. Yes.

Q. And wind?

A. Yes, although I would add that as I mentioned yesterday there is unpredictability with glazing, so to put these down to the second I think would be trying to be unreasonably accurate. There's variability in there.

Q. Of course. Between 16.30 and a bit and 16.35, which you have as 9.18, we have the third bedroom window failing as well?

A. Yes, that's correct.

Q. Let's just see what Catherine was doing. So going back to page 9 of the transcript, at 16.30.43, she says:

"Well, I'm in the flat because outside it's smokey and inside smokey."

That we think is "also". The operator says:

"Is it coming through the floorboards?"

Catherine says:

"Yeah, like downstairs it's really, really smokey now."

And that would be consistent with the fire having caught downstairs?

A. Yes, that would be consistent.

Q. Over the page at page 10, at the top of the page, she describes the maisonette with the kitchen and living room upstairs, and then at 16.31.02, she says:

"... and the bedrooms downstairs and the bedroom on the -- the bedroom and bathroom downstairs where the front door is is really smokey."

Then we see, one entry later, 16.31.11, she says:

"I'm in the -- I'm in the lounge, kitchen, upstairs."

At 16.31.44, at the bottom of the page, the operator says:

"Right, okay. Listen, you're doing really well. Is smoke in the kitchen?"

Catherine:

"Yeah, yes."

Is that what one would expect? The smoke's now gone from the bedrooms up to the kitchen level?

A. Yes, I would have expected smoke to fill the entire flat.

Q. Over the page at 16.31.54, she says:

"Well, no, I'm in the [obviously 'lounge']. Hello? Kitchen now. It's really bad."

Is that what one would expect, that the kitchen would be worse than the lounge at that stage, or is that not possible to say?

A. I don't think that's possible to say. It's not implausible, and there's no reason to dispute what Catherine is describing, but I couldn't accurately put an explanation as to why that is the case.

Q. Catherine describes that as being obviously west, and she says, a couple of lines down, that she's facing east, which would be the direction of the lounge, yes?

A. Yes.

Q. She asked where to go and the operator says:

"You need to stay where you are. You can't go back downstairs. There's too much smoke."

At 16.32.40, Catherine says:

"Will they come on the balcony where the fire escape is? Oh God, it's really -- it's, like, orange."

Now, 16.32 -- say if you can't deal with the question, and we can all understand, but what would have been visibly orange for somebody standing in the lounge at that stage?

A. Given the fire development that we understood occurred in flat 65 and the wind from the west driving everything in flat 65 throughout the eastward side, had the windows failed on the eastward side of flat 65, which I would

have expected they would have done at that stage, then you would have seen flames extending out from flat 65 and visible up around the eastern balcony at the level of flat 79.

Q. We can see that she goes on a few seconds later to say:

"No, I didn't. It's orange, it's orange everywhere. No, I can't open any windows."

The operator says:

"You can't open any windows. Can you get on the mini [it must have been 'balcony']? Is there any balcony you can go back to or is there too much smoke to go through?"

And Catherine says:

"Well, there's a -- I can go into the stairwell, because I'm right next to the stairwell."

"I don't want you going out on the landing because there's -- we don't know what's on the other side of the door."

Obviously there's an ambiguity about whether that's the stairwell in her own flat or the stairwell in the block of flats.

A. Yeah, there appears to be an ambiguity there.

Q. At the bottom of the page we see the operator says:

"Is it in the kitchen? What room are you in?"

Catherine says:

"I'm in the lounge, facing east near Peckham."

The operator says:

"Is the smoke still coming up?"

"Yes, both sides."

"Is it still in all the rooms?"

And Catherine says at 16.33.32:

"It's coming up through the floorboards downstairs, but it's outside on the balcony."

"Is it coming up through the floorboards where you are, or is it just downstairs?"

"No, just downstairs, but coming."

And then, a moment later:

"It's really smokey now."

Again, is that what one would have expected at this stage?

A. Yes, that is.

Q. Then the operator tells her to get down on the floor, which she does. On page 13, after a discussion about somebody banging on the front door, if you look at 16.35.18, three lines up from the bottom, the operator says:

"Can you hear them banging on your door?"

Catherine:

"Where? Coming through the door? What shall I do? Try to let them in? Shall I let them in?"

Operator:

"Can you get through the door without going through smoke or not?"

Catherine:

"Yes, I'm crawling out."

Operator:

"I don't want you to go through smoke, Catherine. Catherine, are you there?"

Catherine:

"I can't open the door."

Now, there's ambiguity about what door she's talking about, but if it's right that she's on the floor of the lounge, the obvious door would be the door to the balcony from the lounge, wouldn't it?

A. That would be the obvious door. I couldn't definitively say which door she went to.

Q. No, well let's see if we get a clue from the lines that follow:

"Don't worry. Go back to where you were. We'll get them to break it open."

Catherine:

"Oh, oh, I can't open the door."

Operator:

"Catherine, go back to the lounge where you were."

Catherine:

"Right, I'm on the landing, 'cos they could come up on the landing."

Operator:

"Right."

Catherine:

"I'm on the landing."

Operator:

"Catherine, go back to where you were."

"Yeah, I'm outside now."

Operator:

"Go back to the lounge."

Now, perhaps it's going to be said you're not the witness to put that to, but that is consistent with her having managed to get the door open and go onto the balcony, isn't it?

A. As far as I can tell, yes, but there might be a more appropriate witness to go into the detail.

Q. Of course.

A. But I have no reason to disagree with what you've proposed.

Q. Then at 16.36.30, Catherine says:

"It's upstairs now."

"I want you to get back down to the floor, Catherine."

At 16.36.45:

"There's a lot of smoke in here now."

At 16.36.45, when she says, "There's a lot of smoke in there now", if we look at your tab 23, that is after the third bedroom window had failed but prior to the internal staircase coming alight?

A. Yes.

Q. There is, however, a photograph which you refer to in your timetable, and if Mr Maxwell-Scott would be kind enough to put page 173 on the screen, there's an entry in the middle of the page for 16.47.34, which refers to a photograph in which you say that the flames are visible at the back of bedroom 1; is that right?

A. Yes, that's correct.

Q. I haven't been able to identify that photograph, but your description is good enough for my purposes. So that's at 16.47.34. Can we assume, therefore, that at 16.36.45, which I appreciate is 11 minutes earlier, the fire would be well established in bedroom 1?

A. It would be, but it would be burning the materials towards the facade end of that bedroom.

Q. Right.

A. We didn't go through all of the reconstruction, but during the course of the reconstruction, we found that there was an initial peak of burning when the fire was located closer towards the facade end, and it consumed

all of the combustible materials at that end of the bedroom. Then there was a decline to a certain extent of the amount of burning and the temperatures in the room, and then the stairs ignited and there was a second peak in the burning in the room.

Q. Right. Can we go to page 16 in Catherine's transcript. At the top of the page, 16.38.04, Catherine says:

"I can get to a door, but it's really hot."

Operator:

"Don't other open the door. It's too hot. Can you get to a window?"

Catherine says:

"Oh my God, no. Listen, I can see flames at the door."

Once again, we don't know which door that is, but if she's in the lounge, whether she can see the external door to the kitchen or not, she can certainly see the external door from the lounge to the balcony. But what I want to ask you is: flames at the level of the lounge, or alternatively the kitchen, is that consistent with your ...?

A. Yes, so that would be associated with the burning in flat 65, I would expect, and given the wind driving the flames through that flat and out the other end, you would get something akin to a blowtorch effect, which

would lengthen the flames at the far end and could make them long enough to be visible at the upper floor of flat 79.

Q. Right. In your report, I wonder if I could ask Mr Maxwell-Scott to go to page 135, please. There's a temperature chart there. I don't think Mr Maxwell-Scott took you to it for flat 79, but if I read it right -- and you'll tell me if I have it wrong because you put the timings there in seconds from ignition -- but if I'm right, at about 16.38, the temperature would be something between 50 and 100 degrees in the living area of flat 79?

A. I'm sorry, bear with me one second. Time 0 on this is simulation time. It's not reconstruction time. That relates to the fire entering flat 79, so time 0 would be about 16.30.

Q. Yes.

A. So -- sorry, which time were you referring to?

Q. I was looking at 16.38, because that's when Catherine says, "It's really hot"?

A. So that would be 480 seconds in, and I have a temperature of 150/200 degrees, that sort of region.

Q. Yes. You've divided it between the floor, the centre of the room and the ceiling?

A. Yes.

Q. So that would be, well, extremely not, would it not?
A. Yes, it would have been an extremely uncomfortable environment to be in.
Q. Yes. I've nearly finished, Mr Crowder, so just bear with me a moment. If we go on to page 17 at 16.39.35, Catherine says:

"It's getting really hot in here."

And we can see the incline of your graph showing the temperatures rising. There are various comments by Catherine about the difficulty in breathing and there's a further reference to it being really hot at 16.43.30, which is at the foot of page 20. We're now within, what, two minutes of the staircase catching alight?
A. Yes.
Q. Then at page 21, at 16.44.00, something falls down on Catherine. She doesn't know what it is. Would it be reasonable for the jury to assume that that's plaster falling from the ceiling?
A. Yes. I can elaborate on that, if it's helpful.
Q. Please do.
A. During the course of the computer modelling, as you can see on the screen, we estimated -- using the fire in the lower floor of flat 79 as data, we estimated the temperature rise within the upper floor, as you can see, and in particular the ceiling temperature. What we

found during the course of the computer modelling was that the -- well, let me go back, sorry. During the reconstruction, the pieces of plaster which I think were actually seen in court falling outside of the room as the cribs were initially ignited -- that plaster that was within the room actually started to fall down when the ceiling reached approximately 400 degrees. When the computer modelling reached a prediction of 400 degrees, which coincides with Catherine reporting something hot falling on her, then we would have expected that to occur, and actually there was very good correlation between her observation of something hot falling on top of her and when our computer modelling predictions would have found the ceiling on the upper floor of flat 79 to have reached that temperature.

Q. Right. So the temperature of the ceiling at that stage is likely to be around the 400-degree mark?

A. Yes, that's correct.

Q. Then if we go down to 16.44.30, Catherine says:

"No way. It's black in there."

Mr Edwards thinks it may be "In here", but whether there means the kitchen or whether it means here, the lounge, perhaps doesn't matter. At 16.44.34, Catherine says:

"But they'll come? Oh, it's so black in there.

I can't see anything."

We're now within one minute of the stairs catching alight; am I right?

A. Yes, that's correct.

Q. Is that exactly what one would expect, that it's so black with smoke, even at the floor level of the lounge of flat 79, that a person couldn't see anything?

A. Yes, that's correct, and that's supported by -- the fact that we know that none of the windows or doors ever failed in the upper floor would have kept that a closed environment and all the smoke would have collected in there, and that's further supported by photographic evidence after the fire, which showed very thick tarry deposits on the surfaces in the upper floor, which would have been the result of very thick black smoke and those particles eventually settling onto those surfaces.

Q. Then finally, on page 22, at the bottom, 16.45.34. This is now more or less at the moment when the internal stairs catch alight, yes?

A. Yes.

Q. Again, something hot falls on her.

A. Yes.

Q. And she explains it's falling from the ceiling, and then tragically we know four minutes later she was unable to say any more. Her last recorded moment is at 16.49.09,

which is at page 26 of the transcript, and that is, if I'm right, 24 minutes after ignition of the fire in her flat?

A. Yes, that's correct.

Q. Thank you very much, Mr Crowder.

Questions by the Coroner

THE CORONER: Thank you. Mr Crowder, before we go on to the next person to ask you questions, can I just ask you something? At the beginning of his questions, Mr Hendy took to you The Architects' Journal. Do you have that?

A. Yes, I do, somewhere. Yes, I have it in front of me.

THE CORONER: Thank you. Mr Hendy, I think, took you to the second page in of the article, which is internal page number 24, yes?

A. Yes.

THE CORONER: And he drew your attention to the open area in front of the high rise building that we can see in the photograph.

A. Yes, he did, yes.

THE CORONER: Can I just ask you this -- and if it's not something within your experience or area of expertise, then do say: are you familiar at all with the concept of bollards which are removable?

A. I'm familiar with the concept, but I don't have any particular expertise in their design or where they might

be situated.

THE CORONER: Well, can you just tell us, given the scope of the scenarios and knowledge that you do have, just very briefly, what your understanding of them is.

A. Those that are removable tend to be used in places where you want to protect access for those that have the tools and equipment necessary to remove them. In relation to a building such as Lakanal, we have a part of the requirements within the building regulations -- and indeed the recommendations --

THE CORONER: Well I don't want you to go into building regulations, because we'll be dealing with that with others. So not in terms of requirement, but just in terms of what sort of device we're talking about and how they're used and that sort of thing.

A. Right, okay. Well, they're very similar -- I mean, they can range from quite elaborate mechanically operated devices that you might use a key or a controller to electronically raise or lower them, or they can be as simple as a length of metal with a suitable fixing at their base which, when connected to the ground, will prevent vehicles passing across them, but they allow people to walk around them. And again, they're removable by people with the relevant tools and equipment to do so.

THE CORONER: Thank you very much. That's very helpful. Thank you.

Further questions by MR HENDY

MR HENDY: Madam, I'm so sorry, there's just one mother I omitted. May I just deal with it?

THE CORONER: Yes, of course.

MR HENDY: Yes, thank you.

Mr Crowder, it was just this: obviously once the internal stairs had caught alight, nobody in their right mind would try and walk down them?

A. No.

Q. But a few minutes before they caught alight, do you agree with me that anybody thinking about going down those stairs and facing what was then -- how shall we describe it? A raging blaze in the bedroom below?

A. Yes, we can cover that by reference to a figure from the reconstruction report if that's useful.

Q. That would be very useful, thank you.

A. So figure 66 from the reconstruction.

Q. On page?

A. It's on page 81 of the reconstruction report. That's the figure. This shows temperature data from a column of thermocouples that was actually passing through the staircase. So there were thermocouples that were below the staircase and actually then the column passed

through the staircase and up to the very top of the head space that we had above the staircase, and you can see that around 15 minutes in, although this is prior to the stairs actually becoming alight, there are maximum temperatures of 650/700 degrees.

Q. Right. That's what somebody would feel if they attempted to go down the stairs, but of course visually what they'd see is an entire room alight?

A. Yes, well, assuming they could see through the thick black smoke at the time, then yes, they would see the entire room alight.

Q. Thank you very much.

THE CORONER: Thank you. Mr Dowden? No questions. Ms Al Tai?

MS AL TAI: Madam, I might have a few questions, but I wonder, given the time, whether it might be appropriate -- and I would welcome a few minutes as well -- to take a break at this opportunity.

THE CORONER: All right. Well, in that case we'll have a break now. Shall we break until 11.30? Thank you.

Members of the jury, do leave your papers behind if you would like to, thank you.

Mr Crowder, we'll have a break until 11.30, so please remember that during the break you mustn't talk to anyone about your evidence.

(11.21 am)

(A short break)

(11.33 am)

(In the presence of the Jury)

THE CORONER: Thank you. Yes, Ms Al Tai, are you going to ask some questions?

Questions by MS AL TAI

MS AL TAI: Good morning, Mr Crowder. I act on behalf of Mark Bailey.

A. Good morning.

Q. I just have one matter to clarify with you. It's in respect of a question you were asked a little earlier by my learned friend Mr Hendy. You were taken to some pictures earlier this morning in comparison to the fire in 1997 in respect of the fire we're dealing with as the subject of today. You were asked questions about your opinion on how the frames and the window panels of the 1997 fire had withstood the fire at the time.

Could you please put report 278607 on the screens, if you wouldn't mind, and specifically page 23.

Mr Crowder, I'm looking at paragraph 96, which I believe is one of your many --

THE CORONER: Sorry, would it be possible, please, to bring that up a little larger? Thank you.

MS AL TAI: This is paragraph 96. This is one of your many

reports, I understand, Mr Crowder?

A. Yes.

Q. I just wanted to clarify the matter, because it appears as though you give an opinion here on the point. If I read aloud, you state here that:

"During the reconstruction modelling, it was demonstrated that under direct flame impingement the panels in the window sets of flat 79 that were installed during the 2006 to 2007 refurbishment could have burnt through and allowed the fire to enter the flat within five minutes."

Which is what we understand from the evidence you've given this morning and yesterday?

A. Yes.

Q. And:

"Following the fire at Lakanal in 1997, the window frames and panels were still in situ despite severe damage having been sustained by the flat. Whilst information regarding the 1997 incident is scant, damage on photographs in my opinion indicate that it is highly likely that these panels were able to survive a fully flashed over fire for some time, possibly 30 minutes or more."

And that's your evidence, Mr Crowder, is it?

A. Yes, it is.

Q. Thank you.

THE CORONER: Mr Walsh?

Questions by MR WALSH

MR WALSH: Thank you, madam. I'm not sure if this is working actually. Oh, it seems to be working now.

Just three areas I want to ask you about, from the perspective of those who have to deal with the fire, fight the fire and carry out rescue. Am I right, Mr Crowder, in saying that the development of the various fires on the relevant day was not the result of a single phenomenon or event but a multiplicity of factors which combined together?

A. Yes, there were a great number of factors that were brought together on this day to lead to this particular incident.

Q. Yes. You gave evidence about them yesterday and I'm not going to go through them all again, but key factors among them were the climatic conditions, in particular the wind on the day?

A. Yes.

Q. The ignition of the composite panels?

A. Yes.

Q. And the fact that according to the tests which you told us about yesterday, that having ignited, they were capable, at least from the tests, of falling away and

remaining burning for a period of time after they'd fallen away?

A. Yes, that's correct.

Q. And that would apply in relation to the ignited panels both in flat 79 and also flat 65?

A. Yes, that's correct.

Q. Obviously there were other issues later in the fire which you've told us about, which included the boxing in and of course the smoke-logging, which I'm going to ask you about in a moment, but can I ask you specifically about the effects of the ignition of the composite panels on the fire in flat 79. Would you agree with this: that there were four contributory factors. I'm going to list them all, and tell me if you disagree with any of them. First of all, that the panels were alight, which caused flames to impinge upon the windows? I've changed my mind now, actually; I think I'd better let you deal with them each in turn rather than listing them all. Is that right, the fact that the panels were alight impinged upon the windows themselves in flat 79?

A. Yes. Whereas normally the position of flames would have been subject to them emitting from a flat below, and therefore their position would be variable depending on the wind conditions that you've already mentioned, the ignition of the panels meant that the source of those

flames was no longer in the flat below, it was directly beneath the windows, and those flames were therefore brought into closer contact with those windows.

Q. Thank you very much. The second contributory factor I'm going to put to you is that the failure of the panels -- not just their ignition, but the failure of the panels -- caused flame to impinge on the windows both from the external aspect and the internal aspect.

Does that work? That's better. Thank you very much. I'll ask that question again in case you didn't hear it. The failure of the panels --

THE CORONER: Mr Walsh, just to make it absolutely easy, use both of them. It seems to work with Mr Crowder. Have them both switched on.

MR WALSH: I don't know whether it's my voice.

THE CORONER: I'm not quite sure why sometimes they pick up and sometimes they don't.

MR WALSH: I'll try them both. Thank you very much.

The second point, then, if I may. You may have heard it already but I'll do it again. The failure of the panels caused flames to impinge on the windows both internally and externally, because we had internal burning?

A. That's correct, yes.

Q. And quite apart from the flame, there was an impact by

the heat which the ignition of the panels themselves generated?

A. Yes, that's correct.

Q. Then finally, of course, perhaps it's not so relevant on the impingement on the windows, but the reality is that the failure of the panels caused a source of combustion potentially to other items within the flat?

A. Yes, that's correct.

Q. What I'm going to ask you about now is the extent to which the windows, from a firefighting point of view, might have remained intact in the absence of the ignition of the panels below the windows in flat 79. If they had not ignited -- that is the panels had not -- the effective way to prevent the fire from spreading from flat 65 to flat 79 is to put out the fire, or to address the fire, in flat 65?

A. Yes, that's correct.

Q. And would you agree that had the panels in flat 79 not ignited, the flame extension from the fire in flat 65 may not have broken the glass and therefore not have entered flat 79 if the fire in flat 65 was put out in a timely fashion?

A. Yes, subject to the fire being put out in a timely fashion. As I think I mentioned yesterday, fire spread from one floor to another is all about time. It's

always a question of time. Eventually -- it's widely accepted that a fire in any given storey on a building will be in a position where it can spread to a storey above, but there is -- in the design of buildings, there is a time lag that is built in to allow for the activities of fire and rescue personnel to do their job.

Q. Yes, and that would include the extent to which windows might be impacted by a fire below?

A. Yes.

Q. Just windows alone?

A. Yes.

Q. All right. The second area of the three that I wanted to ask you about relatively briefly is the assertion that you have made -- and I won't put up the page of your report unless you want me to, but you assert that there is a difference between the reconstruction of the fire in flat 79 and the actual fire. Can I put this to you without worrying about putting up the page: is it right that the fire from flat 79 spread less rapidly during the reconstruction than during the fire itself, according to your assessment?

A. That would be our assessment, yes. The reconstruction was always intended to be a conservative representation of what occurred during the incident.

Q. Thank you. And hot fire gasses, as you put it, were not

directed towards the corridor as much as they were during the incident?

A. That's correct.

Q. That is the corridor outside flat 79.

Now, you listed the various factors which were relevant to the actual fire yesterday, which I won't take you to again, but I'm just going to ask you about this: when one looks at the fire in the corridor outside flat 79, once flat 79 was breached, there were various factors which you told us about, but I think that there were tests carried out as well to the paint layers that were lining the corridor in that area?

A. Yes, as I understand it, Bureau Veritas carried out a number of tests on that paint.

Q. Yes, and among the things that your reconstruction could not reproduce -- apart from the fact that it didn't produce the contents of the suspended ceiling and all the pipework and the wadding, you weren't able to reconstruct the 12 doors that there would have been along that corridor?

A. That's correct.

Q. So that was another combustible source. Can you tell us about what additional fire-loading the paint layers would have had actually on the actual fire?

A. I can do, as that was dealt with through calculations in

the computer modelling within the computer modelling report, if I can just find the page.

Q. It's page 167, if you wanted to look at it.

A. That's the page, yes.

Q. It may not be necessary to put it up but if you could just consider it. It's only a very brief answer I want to this question.

A. So we -- I mean, in very simple terms, we came to the conclusion that between the paint, the doors, the suspended ceiling and the contents of the suspended ceiling, there was enough fuel present in the corridor that actually there would be potentially so much material available to burn that actually the rate of burning would be limited by the amount of air that was passing through the corridor.

Q. Right. That is why I'd like you, please, if you wouldn't mind, to turn up the jury bundle and just have a look again -- I think you've been taken to it already -- behind divider 12. The sequence of events at pages 25 and 26, 25 first, if you would.

You can see from the photograph at page 25 at 17.19.50 there is a plume of smoke emitting from the end of the grill at the end of the north corridor?

A. Yes.

Q. Help us with this if you would: looking at that plume of

smoke, I'd like you to tell us if that indicates to you a fully developed fire in that corridor or heavy smoke-logging.

A. That to me would indicate certainly heavy smoke-logging. It's difficult to say absolutely whether there is -- it's difficult to say whether there's a fire in the 11th floor corridor, but I don't think there's a fully developed fire.

Q. What could have generated that level of smoke that's being forced out of that grill at that stage if it wasn't a fully developed fire? I'm just interested to know.

A. Well, that -- again, not necessarily a fully developed fire in the 11th floor corridor. So at that stage what you may be seeing the results of is the door having failed onto flat 79 and fire starting to establish itself in the 11th floor corridor.

Q. Thank you very much.

A. Once the corridor was fully involved in fire, then I would expect potentially to be able to see flame tips emerging from the end of that corridor as well, which -- I believe there are other photographs that show that. At this stage, yes, there may well be a fire in the 11th floor corridor. There may be a severe fire in the 11th floor corridor, but I couldn't consider it to be fully

involved.

Q. Thank you. If you just look over the page at 17.21.22, you can see that level of smoke and the colour of it. Would that indicate to you that there is certainly a fire in the corridor?

A. Yes.

Q. And whether it is to use the term "fully developed" or not is a matter of supposition, I suppose?

A. Yes, it would be a matter of supposition, but whether it's fully involved or not, there certainly appears to be a severe fire in the 11th floor corridor.

Q. Yes. The reason why I ask you that is that you were asked yesterday to do your very best, based upon the reconstruction evidence, to estimate the time at which the door to flat 79 would have failed and there would then have been a significant fire in the corridor itself.

A. Yes.

Q. And the estimate that you gave us was about 17.19.

A. Yes.

Q. On the basis that your view is that the reconstruction of the fire in flat 79 spread less rapidly during the reconstruction than the actual fire, and that hot fire gasses were not directed towards the corridor as much as there were during the incident, is it right to say that

that estimate of 17.19 may be subject to a margin of error which may have meant that the door failed much earlier?

A. I would agree that it's subject to a margin of error. How you would define "much earlier" -- I would say a few minutes. I wouldn't be talking about tens of minutes, but it's certainly possible that it could have failed earlier.

Q. We're not talking about tens of minutes. Are we talking about a margin of error of potentially ten minutes, more than ten minutes?

A. I would put ten minutes as the upper limit. I would be disinclined to go for 17.15 for the failure of that door.

Q. All right.

A. That's based on both the reconstruction but also the photographic evidence from the incident.

Q. Thank you very much indeed. 17.15 you'd be disinclined to go for?

A. I would, but you know, the further forward you move that, the more evidence there is to actually disagree with it rather than agree with it.

Q. It's subject to all sorts of uncertainties. I understand.

A. Absolutely.

Q. But in any event, whether there was a fully developed fire at 17.19 or just before that in the corridor, there was clear substantial smoke-logging which was pushing out smoke at a pretty substantial pressure, if one looks at those photographs?
A. Yes.
Q. The inevitable consequence of that is that if smoke-logging as heavy as that is pushing that pressure out of the end of the north end grill, then it is applying a similar form of pressure to the sorts of access routes into flat 81 that you were telling us about yesterday?
A. Yes, that's correct.
Q. Right. Now, the final question I want to ask you about -- it's a short one. It concerns smoke-logging, which you told us all about yesterday and you explained the principle of cross-ventilation within the building. I want to ask you about the ignition of fires in flats 37 and 53 in relation to smoke-logging. It is right, is it not, that the ignition of those fires on the lower floors contributed to the general position of smoke-logging in the central stairwell?
A. Yes, that's correct.
Q. To what extent would they have contributed to it?
A. To the extent that -- so the wind that was impinging on

the face of the building was, to a limited extent, driving the plumes -- plumes of smoke that were emitting from each of the flats. If you were looking directly at the west face of the building you'd see the plumes moving slightly towards the right and actually passing across the fronts of the ventilation grills that communicate with the lift lobbies, and I think we saw a photograph yesterday that actually showed the level of soot staining on those ventilation grills.

Q. Yes, we did.

A. At the early stages of the fire, say when only flats 65 and 79 were involved, then that position, where smoke is entering the lift lobby, would be quite high up the building. When someone opened a door in particular from one of those lobbies into the stairwell, then smoke would enter that stairwell and start passing down the building. However, at every level, as I mentioned yesterday, there is a certain amount of air that is passing around the gaps of doors, even when they're closed, and that would have had a certain diluting effect as smoke passed down the building in these clouds and plugs I spoke about yesterday.

If you introduce the fires at flats 37 and 53, then you -- well, initially you simply add more smoke that's impacting on the ventilation grills on these lift

lobbies and you decrease the proportion of those ventilation grills which is adding fresh air to the building in favour of ventilation grills which are adding smoke. That being the case, you then have anyone opening those doors introducing potentially quite thick smoke that's only emerged from a burning flat quite recently and therefore hasn't been diluted by any air just through natural mixing. That gets introduced into the stairwell at a much lower level and therefore has a more significant effect on the smoke-logging at the level of, for instance, the bridgehead, which was on the 7th floor, and even lower down.

Q. Yes.

A. Some of the modelling that was carried out in report number 266862 actually contains figures that show that concept. If you'd like to see those, we can do.

Q. I don't need to take to you it at the moment, but in short, the ignition of the fires in flats 53 and 37 created the potential for an actual level of smoke-logging which was significant in the central stairwell?

A. Yes.

Q. It was obviously important to address those fires and to fight them -- obviously to prevent the same happening in those fires, in relation to any potential fire above or

adjacent, as occurred on upper floors -- but your assessment of this incident, I think, looked at the positive impact of fighting those fires and dampening them down on the day upon smoke-logging which took place thereafter?

A. Yes.

Q. So there was a positive effect by reduction in smoke-logging by dealing with those fires?

A. Yes, there was.

Q. Yes. Yes, all right. Thank you very much indeed.

THE CORONER: Thank you. Mr Matthews?

MR MATTHEWS: No thank you.

THE CORONER: Yes, Mr Compton.

Questions by MR COMPTON

MR COMPTON: Mr Crowder, just one or two matters, please. I act for Apollo Property Services. Can we firstly just go back to the basics of your investigation, and can I take you to paragraph 5.1 of your report. This is report number 259449.

A. Sorry, which paragraph number?

Q. It's the main paragraph, 5.1, "Accuracy", and it's paragraph 28. It's at page 20 of 237.

A. Yes.

Q. Can I make this clear: no part of my questioning is to doubt your experience or those at BRE who have served

the public over many years in trying to assist and understand the tragedies that flow from fires, but you very fairly in this report said this -- and I'd be grateful if you would just confirm that this is the position:

"Unlike some applications of computer modelling, simulating real fires is not very precise and it is difficult to generate errors no greater than about 20 per cent."

A. Yes.

Q. Would you agree with that?

A. Yes, I would.

Q. And is that how you, as experts, view your reconstructions when you're carrying out the matters at BRE?

A. Well, that's the purpose of carrying out the reconstructions and indeed standard tests and dealing with evidence supplied to us by the London Fire Brigade, the Metropolitan Police and so on, is that we recognise that computer modelling is a tool, and it's a very useful tool but we recognise that it has limitations.

Q. Thank you. I think this point's already been made but you go on to say:

"This is due to a large number of random factors that will occur, such as the composition and location of

fuel items, moisture content [I don't think we're concerned with that], breaking of windows and the areas of openings when pieces of glass fall out of a frame."

Breaking of windows is, of course, very important, isn't it?

A. Yes.

Q. Because once a window goes, it can have a massive impact on the extent and the spread of fire when a building becomes exposed to the elements?

A. Yes.

Q. And that very much depends on the extent of the wind on the particular day?

A. Yes.

Q. Thank you. Can I next just take you through to 7.2, which is at page 33 of that report, where, again, you are at pains to refer to the limitations of this particular exercise. If we go down to the bottom of that page, paragraph 57:

"It was not possible to fully recreate the wind conditions around Lakanal House on [the day]."

You've given evidence about that. The only matter I would ask you to confirm is that you deal with your report as your evidence yesterday about the wind and upward and downward movements, and I think if we go back to page 31, back one page, at paragraph 51 at the bottom

of that page, do you agree that it was -- I simply repeat what you said:

"Since the flow across the west face of flat 65 may have been either up or down, both conditions need to be considered in the fire simulations."

A. Yes.

Q. So the jury have this impression of a hot day and a reasonably light wind but with gusting periods.

A. Yes.

Q. We've heard that from the witnesses. Thank you. Now I want to ask you, with that in mind, in particular about glazing. When you were giving evidence yesterday -- and for everyone's benefit, I think it was at page 77 of the transcript -- you said this. You were being asked by Mr Maxwell-Scott about glazing and glass and when it goes, when it can break:

"There is a difficulty in estimating times when glazing will fail because it's a very unpredictable phenomenon."

A. Yes.

Q. "Glazing fails in fires as a result of themal stress."

A. Yes.

Q. And I think we understand that. From rapid or substantial changes in temperature; would that be correct?

A. Yes, that's correct.
Q. Thank you. You went on to say that:
"So you have a hot side of a piece of glass and you have a cold side of a piece of glass, and any sudden change in that in a fire condition can lead to expansion, which -- because glass is very brittle [it can break]."
A. Yes.
Q. So that's the background, and that, as an expert, is your view on the unpredictabilities of trying to ascertain or predict when glass will break?
A. Yes.
Q. Can I just ask you to look at another report, your report 278607, and page 22 of that report. So that the jury can understand this, you carried out various tests on the fire panels that we know were present?
A. Yes.
Q. Composite panels, and panels that were more fire-resistant?
A. We did not carry out tests on panels other than those which were installed in Lakanal. This document refers to calculations which were carried out.
Q. Well, on the calculations, assist if you can, and if I'm taking a bad point, please say. But you say this at paragraph 94:

"The results indicate that despite the reduction in burning rate, there is no reduction in flame length as a result of installing panels of the correct fire resistance."

A. Yes, that's correct.

Q. You go on to say:

"The reduced ventilation causes a lengthening of the flames which is actually more significant than the reduction that might be expected as a result of the reduced burning rate."

A. Yes.

Q. Can you just explain that, and try and put it in simple language so we can all follow that, please?

A. In terms of why flames would be longer with less ventilation?

Q. Yes.

A. Okay. At the base of a flame that's on a burning material, you have fuel gasses that are being generated by the heating of whatever material is on fire. So if the surface of this desk was on fire, the heat of the flame above would actually be radiating down onto that surface, causing the molecules of the wood, the wood fibres, to break down and generate combustible gasses, which are things like propane, ethane, but also far more complicated gasses than that.

That amount of gas that's being produced for things to then go on and burn within the flame is, to a certain extent, fixed by the amount of heat that is being introduced onto the surface of the fuel. If there is not enough ventilation for the flame to burn all of that fuel within a given volume -- so you have the size of a flame that you would normally expect for this area of wood to be burning, and if you suddenly -- say you halved the ventilation, so instead of this being an open area of burning, you're now against a wall and air is only available to arrive from one side, then you have less area for the air that's being introduced to react with the fuel but you still have the same amount of fuel that ultimately needs to burn, and what happens is the fuel is able to travel up further due to the buoyancy of the flame -- so things that are hot go up, or hot gasses go up -- and therefore your flame becomes longer because the reaction is taking longer to occur. And what you actually see -- so the yellow of a flame is the result of partially burnt and unburnt -- particularly carbon atoms that were glowing and are visible at that point, and if the reaction's taking longer to occur then the flame visibly becomes longer. Does that make sense?

Q. Well, it's a lot to take in, but I hope the jury will follow. Can I try and approach this in a slightly

different way? I appreciate that you're just there at the reconstruction. You have this wind gusting onto the west side of that building, onto the bedroom.

A. Yes.

Q. Catherine Hickman's bedroom, or the floor below and coming up from 65. Is it perfectly feasible, in fact, that what the wind is doing is as the flames are emanating and emitting from that building, 65, it's fuelling those flames and pushing them up the building?

A. Yes.

Q. Onto the glazing?

A. Yes.

Q. And given the unpredictability of when glazing can pop, break, is it in fact really an impossible job to try and really estimate, guestimate or say when the glazing will have gone?

A. It's impossible to put a fixed time. It's possible to put a range, and we can -- and we have -- talked in terms of whether that range would be brought forward or brought back as a result of contributing factors.

Q. Yes. I mean, we know, for example, from what you told us yesterday, that one of the frames went earlier than the others; is that right?

A. Yes, that's right.

Q. Is it perfectly possible in fact that the frames went

early on, before the panels had failed?

A. It is possible, but there's a "but", and that is that the -- even if the glazing had failed, you would still have had -- and this is assuming that we have panels that are non-combustible below -- you would have had flame that would have been some way away from the building as a result of its trajectory from the flat below and as a result of the -- well, the gusting wind. So with panels that are able to ignite, what you effectively do is have ignition of those panels which then -- rather than having a flame some way off the outside of the envelope of the building, you've introduced a flame initially on the surface of the building, and then when they burn through you then have a flame introduced within the room.

Q. But the idea of the flame, as it is emitted from the building, being caught by the wind and taken up against the glazing, would one need actually the panels to be alight or not for that to happen?

A. Not for it to happen eventually, but again, this is the issue of how long these things take to occur, and the time delay that is inherent in the way we design buildings or hope to design buildings, and whether or not what's actually in place meets the criteria for that time delay to occur or whether it actually brings that

time delay forward, it reduces the time delay between one storey being alight and the next storey being ignited.

Q. So the short point then is that once the flames are up against that glazing, it would not be possible for an expert to say at what stage they would break?

A. No, you could not put a specific time and minute on --

Q. Its just down to convective --

A. A mixture of convective and radiative and the radiation from the flames would also heat the glazing to an extent and contribute to that.

Q. Yes. Thank you very much.

THE CORONER: Thank you. Mr Leonard.

Questions by MR LEONARD

MR LEONARD: Yes, can I just pick up on that line of questioning and finish off what you said yesterday, to some extent, about the panels, and pick up on what Mr Walsh said and the answers you give to him this morning. As I understand it, you were being asked about the difference between a panel that was burning, (Inaudible) burned, and one that wasn't alight during this process, and what you said yesterday was that if the panels were not burning, as I understood it, the glass would still have failed. It may have been later, but -- and I quote -- "not significantly so".

A. Yes, that's correct.
Q. Do you agree with that?
A. Yes.
Q. And that, as I understood the reason, was because the main heat source for this event came from the burning of 65 below rather than heat from the panels themselves?
A. That's more difficult to assess accurately. The main heat source -- the biggest fire was flat 65 but there is this issue about what the relationship is between the heat source and the glazing, and if you introduce even a smaller heat source directly beneath the glazing, then there is potential for that smaller heat source to have a greater impact than the larger heat source some way away.
Q. Understood, but that doesn't change the position as to the difference it would make being impossible to tell, as I understand it?
A. Oh yes, absolutely, and glazing, as I've said -- and I'm happy to reiterate: glazing is an unpredictable thing in fire.
Q. As I also you understand -- correct me if I am wrong -- the heat that is coming from 65 is a result of the flashover and the intensive burning in that flat at that moment which pushes the flames up the side of the building?

A. Well, it's the wind that would have had the greatest impact of pushing it up the side of the building.
Q. And the wind, of course.
A. With the overhang between the kitchen and living room of flat 65, and having an overhang up above the top of the balcony before you get to flat 79, you would have expected a certain increase in the horizontal projection of flame just through momentum. So you have a flame that's travelling horizontally and there's going to be a certain amount of time before buoyancy takes over, once it's passed the edge of the ceiling and then starts to move up again. So with a still air condition, then those flames could be some way away from the panels and the glazing and it's the wind that's actually pushing the flames against the side of the building.
Q. As far as the fire in 79 was concerned, you told us yesterday that it was not particularly severe from your perspective or onerous for the fire precautions within the building to deal about. That remains the position, does it? However it was constituted, that remains the position?
A. Yes.
Q. Thank you.
THE CORONER: Thank you. Ms Canby? Miss Petherbridge? Members of the jury, do you have any questions?

Questions by the Jury

THE FOREMAN OF THE JURY: Thank you, Madam Coroner, we have quite a few. I'll try and keep them along topics, but forgive me if I jump around a bit.

We've heard a lot about when the windows and the panels burnt through and that sort of thing. We've also heard that Catherine wouldn't open her door. It's perhaps not that clear which door she was referring to. We're wondering how long it would take for the windows and doors to get too hot to touch, whether that's radiant heat or actually touching the thing on purpose. So you might need to be a meter back and not be able to reach them because of the radiant heat, or you would know that it was glowing so you shouldn't touch it.

A. Right. I think I can answer that by referring to a report, which -- if you'll just bear with me. If we start with page 23 of report number 259449. What you see there is a plot which relates to the BS476 part 7 test, which is the test that was carried out on the window panels, although it's not necessarily -- the fact that that test was used for that purpose isn't relevant to the answer to your question. What we have here is a plot of distance away from a radiating heat source which runs approximately 1,000/1200 degrees, and what you have up the left-hand side is heat flux, which is

effectively the radiant heat you mentioned, which is measures in kilowatts per square metre, starting at around 32/33 kilowatts per square metre quite close to the panel, and as you get to around a metre away, that drops off to around 5 kilowatts per square metre.

I'm trying to find -- there are references to pain thresholds that will be experienced by someone when they are exposed to radiant heat. I can tell that you they appear in a British standard document, which is PD7974 part 6 but I am struggling to remember the figures at hand. But I think we're talking single figures of radiant heat in kilowatts per square metre for a person to start experiencing pain within a few seconds. That's from memory and it might be worth -- it's something I could double check during the lunch break and return back to afterwards if that's helpful. But that's for 1,000 degrees or so.

There's also temperature criteria that relate to -- so the temperature of an atmosphere through which a person will or will not be prepared to walk, those also appear in the same published document. Would it be more helpful if I provide an answer after lunch?

THE CORONER: Can you give an indication of the level of heat by reference, for example, to what you get from a single bar electric fire or something of that sort?

A. Yes, okay. Well, a single bar electric fire, again, that's probably a temperature of around 5/600 degrees, and the relationship between radiant heat and temperature is -- in equation forms, it's T to the power of four, so if you increase -- if you double the temperature, so you go from 50 degrees to 100 degrees, then the amount of radiation that will be emitted will be two to the power of four, which is 16 times greater.

So radiant heat that a person will experience increases dramatically over quite a small temperature increase once you start getting to the point that a person can sense that.

THE FOREMAN OF THE JURY: Okay, sorry to interrupt. I think it might help if I clarify myself. I'm just trying to pin down the time at which Catherine would not have been able to go near the doors or windows or use them.

MR MAXWELL-SCOTT: Maybe a passage at page 184 in this report may assist.

THE CORONER: Thank you very much.

A. Ah, right, yes. Thank you for that.

THE CORONER: Does that help you?

A. Yes, it does. So in terms of radiant heat flux, then a person would start experiencing pain at around 10 kilowatts per square metre after a few seconds.

Somewhere else, I do have a temperature threshold. In terms of temperatures of atmospheres, you're talking a couple of hundred degrees before a person starts experiencing pain.

Now, I'm not sure -- in terms of your question, I am suddenly wondering whether you're referring to radiant heat from the flames that are coming up the outside of the building or whether it's the environment itself that's becoming hotter, because -- well, my opinion would be that the heating of the doors and the door handle that she was trying -- or might have been trying to use would have been as a result of the hot atmosphere heating up those doors, rather than heat from the outside of the building radiating onto the outside of those doors and them the heat conducting through.

THE FOREMAN OF THE JURY: Yes, that's precisely what I mean as far as -- because other question that I have is the difference in conductivity between aluminium and steel. So it is probably the heat coming from outside, how that affects the metal structure of the door and window frames, and again how close you could get to one necessarily.

A. I mean, that's extremely difficult to pinpoint for the flames that were coming up the outside of the building. I would have expected that actually the most significant

factor in terms of Catherine being able or not to use that door would have actually been the environment inside of the room. Any radiation that would have come from the flames below would have been shielded by the balcony panel, which -- I forget whether that balcony panel ignited or not, but I would have expected it still to have been in situ at that time, not least because the flames were being driven through flat 65 by the wind and were therefore projecting some way away from the building and weren't directly against it.

So the presence of the balcony panel would have shielded the radiation. Therefore there wouldn't have been that much radiation impacting on the outside of that door and the overriding factor would have been the temperatures inside and then any conduction of heat from the atmosphere onto the door handle.

THE FOREMAN OF THE JURY: I think that covers that one. Thank you.

THE CORONER: Yes, and in reply to questions from Mr Hendy you gave an indication of how the temperature who have been rising on that upper floor.

A. Yes.

THE CORONER: Thank you, yes.

THE FOREMAN OF THE JURY: Thank you. Just looking at the timeline that we saw earlier as far as what happened

when in your fire reconstruction -- and it was put forward by Mr Hendy, I think, that that lines up with about 16.25 as your 0 time -- if we have a look at when the bedroom windows failed -- and I should assume that they would probably go with a fair bang -- do you think that it's possible that the banging that Catherine heard at about 16.35 was actually the windows going rather than anything else?

A. It could have been. It could equally have been plaster downstairs falling off the ceiling onto the floor, or items of furniture falling over, as things like table legs give way. There were some heavy sewing machines on tables that were next to the window facade sets, so they might have fallen on the floor and given rise to banging.

THE FOREMAN OF THE JURY: So it really could have been a number of things within the flat?

A. Yes, there were a whole host of things that could have done that.

THE FOREMAN OF THE JURY: With the windows themselves, I know that they did go altogether, and you've said how glazing is quite variable. I was just wondering: in your experience, is there any significant difference between the way that single and double glazing react in a fire?

A. Yes, there is. Double glazing has two layers of glass, and you will -- well, invariably the first layer of glass -- although glass is clear, it does absorb frequencies of light that are related to infra red, and therefore they do absorb heat. So what that means is the first layer of glass will provide a certain amount of shielding effect to the second layer, so the first sheet will fail and then once the heat gets to the second layer that's behind that, then that will start to heat up and then go through a process of thermal shock until it fails.

THE CORONER: So in simple terms, double glazing will last a little longer.

A. Yes. I don't think it would necessarily last twice as long but it will last a little longer.

THE CORONER: But we're dealing with double glazing here?

A. Yes.

THE CORONER: Yes.

THE FOREMAN OF THE JURY: Thank you. We've heard throughout the transcriptions of Catherine's phonecall with the operator that she had closed doors, windows, things like that, upstairs. We also know that she was out on the balcony at some stage, so of course had opened a door. How much effect on sucking the fire upstairs, the smoke upstairs, would opened or closed doors upstairs actually

have on that?

A. Right. So what our understanding is of the upper floor is -- well, firstly, I should point out that after she closed the doors, none of them appeared -- none of the windows or the doors appeared to have failed. So when we went to the scene afterwards we saw that everything was still intact. One may have been broken but by firefighting activity.

What that meant was that the upper floor of flat 79 remained a sealed box throughout the duration of the incident. That meant that this space was firstly able to become highly oxygen depleted, so what burning that there was going on on the stairs was taking all the oxygen out of that atmosphere and it was introducing an awful lot of smoke, as we discussed in relation to the transcript of Catherine's phonecall.

That atmosphere, in the first instance, is not particularly suitable for burning to go on. So even though there's an awful lot of heat that's being generated up the stairs, due to the reduced oxygen in the atmosphere, it's actually not particularly easy for a fire to ignite those materials, and that's again evidenced by the fact that we saw burning that was local around the stairs but didn't go further than that.

The next effect is that that whole upper floor,

partly as a result of the introduction of gasses from the fire but also partly from the wind that's impacting on the lower floor of -- or the facade of the building, and in particular the facade of bedroom 1 of flat 79, that pressurises the upper floor in relation to what's going on below, and that would have had an impact on, once the doors failed and the panels failed, the fire being driven along the 11th floor corridor rather than being able to go up and use the upper floor of flat 79 as an exit route. That was covered in some level of detail in my report, but I won't go into that now.

THE CORONER: Thank you.

THE FOREMAN OF THE JURY: Thank you. We've seen that flat 79 was actually remodelled at an earlier stage. I think some of the notes mention that it was done in 1994 or something like that. What sort of difference do you feel it would have made to the development of the fire if the wall of bedroom 81 had actually been intact, the one against the stairs?

THE CORONER: Sorry, the wall in 79?

THE FOREMAN OF THE JURY: Yes, sorry, the fact that it had been converted to an open plan layout between the stairs and bedroom 1 of flat 79, the exposed staircase.

A. I'm happy to deal with that. Do you want me to leave that for the next time I give evidence? Because that

relates to what was there in relation to what ...

THE CORONER: Yes. Do you want to just deal briefly with the effect on the development of the fire and then we'll deal with the rest of it when you come back.

A. Okay.

THE CORONER: Just briefly with the question of development of the fire.

A. So had the -- well, we need to make two assumptions at this point. If the wall had been in place between bedroom 1 and the stairs and the door to bedroom 1 had also been closed, then what I would have expected was for the fire to develop within bedroom 1 -- the fire obviously was drawing its ventilation from the windows and the panels that had fallen away, so it wasn't going to run out of ventilation as a result of those things being closed. The wall and the door would have provided protection to the remainder of the flat for a period which I think we estimated at around 20 minutes or so from the ignition of bedroom 1 of flat 79.

However, what would have happened at 20 minutes is that the door and/or the wall would have failed and -- well, let me just take a step back before I continue with that. In the incident as it occurred, the fire developed in bedroom 1 of flat 79 and this had an immediate effect on the atmosphere of the upper

floor. So there was a relatively gradual temperature rise, as we saw on one of the figures earlier, in the upper floor of flat 79 from ambient up to -- I think the plot went as far as 350 degrees, and that was a gradual process.

Had the wall and door been in place, then the failure at 20 minutes would have been associated -- well, the fire would have already been well developed within the bedroom, then there would have been this failure and that would have led to a sudden change of conditions in the upper floor of flat 79. We've already talked about the unpredictability of glazing, but in my opinion, in those conditions, it would be far more likely that the sudden change in temperatures would have led to the glazing in the upper floor failing and as a result you would have had the fire being able to ventilate out of the upper floor of flat 79 and flames emitting out of the upper floor of flat 79.

THE CORONER: Sorry, can I just stop you there. In very brief terms, the answer is yes, there would have been an effect.

A. Yes, there would.

THE CORONER: And we'll look at that in detail at a later stage. Sorry to cut you off, but if we leave it at that for the moment and we'll come back to that question.

THE FOREMAN OF THE JURY: Yes. We've heard from you -- I think it was yesterday -- that the suspended ceiling cavity actually ran the length of the building without partitions. You also mentioned that it crossed the lift lobby.

A. Yes.

THE FOREMAN OF THE JURY: If the fire was left unattended at an earlier stage, is it feasible that gasses, smoke and possibly even flame could have travelled the entire length of the building through that cavity?

A. Yes. So the cavity -- the cavity didn't communicate with any ventilation in the building, so the grills that you see at the ends of the corridors stop at the level of the suspended ceiling and there is no ventilation to that cavity. Therefore the cavity was not influenced by wind and the fire would simply have propagated throughout that cavity. At the point of enough burning going on that the ceiling would have started to fail on the south side of the lobby, then it's possible -- and likely, you know, with enough time -- that the fire would have obviously been involved in the south corridor and the wind could have started driving the fire down the south corridor in the same way it did in the north corridor.

THE CORONER: Thank you.

THE FOREMAN OF THE JURY: Thank you, okay. Just a couple more. I'll need to clarify that one with my fellow juror first.

On our visit to Lakanal much earlier in the case, we've noticed that there was a vent or grill in the communal corridor that went from that corridor into the bathroom. We were hoping you might be able to clarify, considering you're working in both of those spaces, what the purpose of that vent might be. It's vented at approximately head height and we're trying to clarify whether it added to the smoke in the bathroom, and perhaps somebody can inform us whether there was one in flat 81.

THE CORONER: Might we be able to find a photograph of that? I'm just trying to remember if we have a photograph of that.

A. Sorry, so this is a vent that passes through the wall between the corridor and the bathroom?

THE CORONER: Do we see it on photograph 17? I think that's the one.

A. I have one in the reconstruction and modelling report, so 259449. It's figure 128.

THE CORONER: Lovely, thank you. Can we put that on the screen and see if that's the one we're looking at.

A. I think page 158, the lower image.

THE FOREMAN OF THE JURY: It's hard to tell, sorry. Just a moment while we confer, sorry.
THE CORONER: Yes. (Pause)
THE FOREMAN OF THE JURY: Okay. It sounds like what we're talking about was actually inside the flat, but once you open the door and you have the bathroom on your right, I believe what we're referring to is a vent in the housing of the boiler, for want of a better word.
A. Oh right, okay, I am with you. Okay, that's not relevant to figure 128. Can we have a plan from the Metropolitan Police animation of one of the flats? Just the ground floor.
THE CORONER: Is that the figure you were looking for?
A. No, but it will suffice.
THE CORONER: Will that help?
A. These vents, I should say, I don't think were present in flat 81, although this is a diagram of flat 81. In the original design of Lakanal, there was what's called a hot air heating system, and we've mentioned that this system was removed during the 1980s. What would have originally been the case is that the pipes from the boiler house of the building would have passed along the ceiling of the communal corridor and entered into the space where you now see the cupboard with the water tank. That then would have gone to some panels, similar

to radiator panels, and that would have been the principal source of heat for the occupants of the flat. So the vents allow for cool air to enter that space, pass through these effectively radiator panels, and then the hot air would come back out and that would be the main source heat for the flats.

THE CORONER: So the pipes for that system you're describing, were they led from the flats out under the suspended ceiling?

A. Yes. In fact I think they were the pipes that were capped off, so in figure 126, so just two pages on in this, at the lower end of that image you can just see that there's an L-shaped section of pipe that's been capped, it's my understanding that that relates to the original communal heating system.

THE CORONER: And that photograph is behind tab 26 in the jurors' bundle.

A. Yes, it is.

THE FOREMAN OF THE JURY: Would it actually be okay if my fellow juror asked this?

THE CORONER: Of course, that's fine.

A JUROR: The vent was in the communal corridor and it was just outside the bathroom, and where we visited, it was outside every single flat, so I just wanted to know whether that vent had actually been blocked off or

anything, or could smoke from the corridor actually go into the bathroom? I think the actual vent went into the airing cupboard.

A. Yes, so that is actually the -- it looks different in the picture, but that is actually the vent then in figure 128. As I understood it, they were disused vents, they had been simply plastered over on one or other side of the wall, and therefore no smoke was able to pass through there, certainly not in the case of flat 81. This photograph is taken along the 11th floor corridor, where in this section you can see that the plastering that was covering the vent has fallen away, but as I remember it, that was still in place on the relevant vent to flat 81.

THE CORONER: So you're saying that whilst you would have seen it as an apparent vent from the corridor, when you went inside the flat that would have been plastered over?

A. Well not on the 11th floor, on the 11th floor it looked as though they'd been plastered over on the corridor side.

THE CORONER: Right, okay, but where the jurors saw one apparent vent on the floor that we looked at?

A. Yes, and that would have been --

THE CORONER: Just to clarify, what do you say the position

was on the 11th floor, just so that's clear?

A. So the position on the 11th floor is that these vents were still in the wall but were covered over, and in the case of flat 81 that survived for the duration of the fire and did not contribute to the smoke spread into the bathroom of flat 81.

THE CORONER: Thank you.

THE FOREMAN OF THE JURY: Thank you, just one more. In your expertise of having studied fire spread and that sort of thing, could you please help clarify what may have contributed to the vertical fire spread that we've heard of from earlier evidence?

A. Sorry, what sort of fire spread?

THE FOREMAN OF THE JURY: Vertical, up and down the building, perhaps my fellow juror means the fire dropping down and going sideways.

THE CORONER: Sorry, is the focus of the question on the fire dropping from one floor down to a lower floor? Yes. All right, perhaps you could just take us briefly through that.

A. Yes. So the fire spread down to flats 37 and 53 was a result of burning material that fell from the fires in flats 65 and/or 79. They would have been -- they wouldn't have fallen straight down because they would have been caught by the wind, which was strong on the

day, and that would account for their movement along the length of the building as well as falling down. But in simple terms it was the burning material that managed to enter those flats, where I think -- well, I have seen either photos or video that prove that the windows on those flats were open, so the burning material fell in through the windows and ignited combustible materials within those flats.

THE CORONER: In your experience, is that unusual, or does that happen?

A. That is unusual.

THE CORONER: Thank you.

THE FOREMAN OF THE JURY: Okay, that's all of our questions, thank you very much.

THE CORONER: Thank you very much.

Mr Crowder, thank you very much for coming and thank you for the help that you've given us so far, and as we've heard you're due to come back at a later stage, but thank you very much for the help you've given us so far. You're free to go if you would like.

A. Thank you.

THE CORONER: Yes.

MR MAXWELL-SCOTT: Madam, there are no other witnesses scheduled for today.

THE CORONER: Members of the jury, if you would like to come

back tomorrow for 10 o'clock. Thank you very much.

(In the absence of the Jury)

THE CORONER: Yes, Mr Crowder, you are free to go if you would like, thank you very much.

(The witness withdrew)

Housekeeping

THE CORONER: Yes, Mr Maxwell-Scott, so the proposal for tomorrow is Mr Aveling, is that right?

A. Mr Aveling and Mr Smettem.

THE CORONER: Okay. Does anyone want to raise any issues before we finish today?

MR HENDY: Madam, can I just raise a matter that I mentioned to Mr Maxwell-Scott yesterday when he was up to his ears in other things, and I don't suppose he's had time to reflect upon it, and it may be other advocates will want to think about it. Can I just offer it up now, rather than demand an answer from you, madam, and that is that having listened again to the tape recording of the telephone call between Catherine Hickman and the operator, Mr Edwards and I strongly feel that the jury ought to hear that tape, because the voices actually convey more than the words written down do. Every advocate's familiar with that, reading transcripts of their cross-examinations. We do feel that it would be useful for the jury to hear.

When the matter was originally mooted, we were rather uncomfortable with the thought that it should be played in public, because it is such a distressing call, but what I said to Mr Maxwell-Scott was that it may not be necessary for it to be played in public, it could be heard in the jury's room, because the transcript is already a public document, therefore nothing is being kept from the public, and we think that that may be an elegant solution.

In some ways of course I wish I'd raised it yesterday, because this afternoon would have been a good moment, but it's only right that other advocates should have the opportunity to reflect on whether they think this is a good idea or not, and you, too, madam, might want to take a moment to think of the implications of it.

So can I just raise it there and leave it for the moment and come back to it whenever's suitable for you and other advocates.

THE CORONER: All right, well thank you for raising that. Can I suggest that everyone gives some thought to that perhaps for the rest of the day and then we can maybe look at that first thing tomorrow morning, if everybody's had a chance to consider it. All right, thank you for that. Any other points to be raised?

All right, well until 10 o'clock tomorrow then, thank you.

(12.44 pm)

(The Court adjourned until 10 o'clock the following day)

DAY 25 OF TRANSCRIPTION OF THE Lakanal House Fire Inquest(CORRECTED)19/02/13