

1

Monday, 16th November 2009

2 (Afternoon session)

3 (1.42 pm)

4

DR STEPHEN MARK BLEAY, sworn

5

Examined by MR MOYNIHAN

6 THE CHAIRMAN: Your full names?

7 A. Stephen Mark Bleay.

8 THE CHAIRMAN: Take a seat, please.

9 MR MOYNIHAN: You have been assisting us very patiently for
10 a number of months on this Inquiry.

11 A. Yes.

12 Q. This is an opportunity, in fact, just to bring out at
13 the public hearing the assistance you have given and the
14 advice that you have tendered to us in relation to a
15 number of matters.

16 As I mentioned to you just before lunch, the most
17 obvious omission is that we haven't recovered from you a
18 copy of your CV so if you could indicate, please, what
19 your qualifications and background are.

20 A. Certainly. I'm 43 years old. I was born in London. I
21 went to the University of Bath and studied material
22 science. I got a BSC in 1988. I stayed on at the
23 University of Bath to do some postgraduate research. I
24 obtained a PhD in 1981 which was on the
25 electron-microscopy of materials for gas turbine

1 engines. I did a further two years post doctoral
2 research at the University of Bath and left there in
3 1993 to join the Defence Research Agency at Farnborough.
4 I was there for about ten years studying stealth
5 materials for aircraft, also spinning of hollow carbon
6 fibres.

7 In May 2003 I joined what was then the Police
8 Scientific Development Branch and since then I've
9 carried out a number of studies relating to fingerprint
10 development imaging, including recovery of fingerprints
11 from arson scenes, vacuum metal deposition, imaging of
12 fingerprints outside the visible spectrum and digital
13 imaging.

14 Q. The Home Office department for which you now work,
15 generally, what is its function?

16 A. Its function is primarily to support the Home Office
17 with scientific research that supports the decisions the
18 Home Office make. In particular the group I work in is
19 trying to provide best practice for fingerprint recovery
20 from scenes, maximising the evidence, primarily
21 fingerprints but increasingly footwear and other types
22 of forensic evidence.

23 Q. So do you give scientific input into the development and
24 analysis of techniques for the recovery of fingerprints?

25 A. Yes, the research we do feeds into the manual of

1 fingerprint development techniques, which is the manual
2 used throughout the UK and then a few other countries
3 worldwide as the best practice guide for use in the
4 laboratory and at crime scenes.

5 Q. One other feature that this may add to your CV, have you
6 ever given evidence before?

7 A. No.

8 Q. You don't yourself profess to be a Fingerprint Examiner?

9 A. No, no. I've done a one-week basic introduction to
10 fingerprint identification but I couldn't profess to any
11 expertise in fingerprint identification.

12 Q. The work that you now do is geared to, in effect,
13 supporting the fingerprint work?

14 A. Yes, yes.

15 Q. I think the best way to enable you to let the public
16 know of the assistance that you have given to the
17 Inquiry is to let you work through the presentation that
18 you have actually provided for us, which for us is
19 EA0171 but we do not need to bring it up other than that
20 will be its code the due course. If I allow you to
21 proceed through your own presentation and then I will
22 ask questions later.

23 A. Thank you.

24 So, as I say, I prepared a presentation on several
25 aspects of what I have done for the Inquiry. What I

1 wanted to touch on before moving on was the HOSDB manual
2 itself. I've touched on that but I want to give a bit
3 of background as to the research we do and how it feeds
4 into the recommendations given in that manual. Then I
5 want to talk about the analysis that I've carried out on
6 the marks Y7, Q12 and XF and we will leave the final
7 section, the further testing of exhibits, which details
8 some other tests I have done.

9 So if we start with manual itself, what it is is a
10 best practice guide for fingerprint development. It's
11 endorsed by the Association of Chief Police Officers and
12 what it contains is a range of processes and processing
13 sequences that are designed to maximise the number of
14 fingerprints you will recover from any particular
15 surface.

16 So the front of the manual you will find advice
17 about lab design and background to fingerprints. The
18 second part will contain a number of sequential
19 processing charts. The one here you see for paper and
20 the cardboard, you will see there's a thick black line
21 going down to a single development process. That is if
22 you had a volume crime and you wanted to use the single
23 most effective process that's the one you would use. If
24 you had a serious crime and you wanted to explore every
25 eventuality, you would take into account the processes

1 in the side arms.

2 The final part of the manual deals with processing
3 techniques themselves. It talks about the way to apply
4 it safely in a laboratory and also if it's a technique
5 suitable for a crime scene it will talk how to apply it
6 at a crime scene as well.

7 As I said earlier, it's used in certainly all the
8 fingerprint laboratories in the UK and that's both
9 Scotland and Northern Ireland, many others worldwide, I
10 think Canada adopt it wholesale as does, I believe,
11 South Africa and certainly there's approaching 100
12 countries actually have a copy of the manual.

13 The processes we select, we select them in accord
14 with their effectiveness in developing fingerprints (in
15 other words, the processes that are likely to recover
16 the most fingerprints from a particular type of surface)
17 but we also take into account the health and safety of
18 the process. We don't recommend processes which we
19 think are fundamentally unsafe in terms of having toxic
20 elements or flammability.

21 Our recommendation of any process will follow quite
22 an extensive trial both in the laboratory followed by
23 operational environments and that's pseudo operational
24 and fully operational trials. The point I would like to
25 make, because I know some reference has been made to the

1 guidelines, it's not mandatory to follow this guidance.
2 It's endorsed by ACPO but it is not mandated that it is
3 compulsory to follow the guidance given in the
4 fingerprint development manual.

5 There's always going to be situations that don't
6 fall within the clear-cut surfaces we recommend.
7 There's all those operational constraints, for example,
8 if it is a valuable antique you have to use non-contact
9 techniques and you can't necessarily use some of the
10 more effective processes to recover fingerprints. So
11 some of these may dictate the use of alternative
12 sequences or processes that are outside the manual. So
13 that is the point I am trying to make there. It's not
14 mandatory and we must take into account that people may
15 need to step outside that manual on occasions.

16 What we do when we're trying to look at the
17 effectiveness of a technique is to use depletion series.
18 A depletion series is you are making multiple contacts
19 of a single finger on a surface, almost in a row, and
20 each time you are making contact with the surface we are
21 leaving less and less fingerprint residue. So what we
22 try to see is how far down that depletion series we're
23 still developing fingerprints. It's giving us an idea
24 how sensitive the technique is.

25 When we're comparing processes, for example, trying

1 to compare a process with an existing one we will try to
2 use a split depletion series, so we'll cut the row of
3 fingerprints down the middle, process one half with one
4 process, one half with another and then recombine them.
5 It enables us to make a direct comparison of the
6 effectiveness on the same fingerprint side-by-side.

7 We can't always do that so another process we use
8 quite commonly is panels where we are using lots of
9 donors, all placing depletion series next to each other,
10 and we prepare an identical panel except you are having
11 to use a different finger from the same donor. So they
12 are as similar as you can make it. We process one whole
13 panel with one process, one whole panel with another
14 process, and then we'll do an assessment of the quality
15 and number of fingerprints developed.

16 We're not just looking at single situation. When
17 we're developing a process, we're trying to make sure
18 that the work we're doing is on a range of surfaces
19 which are as representative as possible of the surfaces
20 that it's likely to be used in an operational
21 environment. For example, if we want to look at a
22 fingerprint powder, we look at it on something such
23 as -- well, in this case we have looked at gloss-painted
24 wood; we would look at things like kitchen unit
25 material; we would look at things like glass; we would

1 look at things like metals; with a car, a car with paint
2 scheme applied to it. So we are trying to make sure the
3 surfaces we are evaluating are as representative of what
4 the process is going to be used on.

5 We don't just look at fresh fingerprints.
6 Fingerprint composition will change significantly with
7 time. So we're trying to look at fingerprints over a
8 range of ages. Typically, we do experiments where we
9 look at fingerprints one day, one week, one month old
10 and we look at the effectiveness over all of those ages.

11 We're also trying to take into account a fairly
12 representative cross-section of the population.
13 On-site, we don't have the full range but we do try and
14 make sure that the donors we're using -- and we try and
15 use at least six in a single experiment -- they are
16 representative of the population. So we try to get male
17 donors, female donors, older, younger, workshop staff,
18 office staff. So we're trying to get as good a range as
19 possible when we're doing these comparisons.

20 A typical experiment will involve us depositing
21 fingerprints, putting them into a room to age them for a
22 while, then applying the development process, developing
23 the marks and then examining them in whichever way
24 necessary. That may involve fluorescence examination.
25 Some of the marks that have been involved in this

1 Inquiry would be assessed under fluorescence.

2 Then we apply a very basic grading scheme to them.

3 I'm certainly not a Fingerprint Expert and none of my

4 colleagues are. What we're trying to do is to try and

5 find a way of looking at the fingerprints that are

6 developed and applying a basic quality score to them to

7 enable us to do a very rudimentary assessment of the

8 comparative effectiveness. What we tend to do is give

9 it a grade 0 to 4: grade zero is absolutely nothing

10 visible on the surface; grade 1, you can see it has been

11 touched but there's no ridge detail present; grade 2,

12 typically you are seeing up to about one-third of the

13 available area being developed as ridge detail; grade 3,

14 you're getting towards something which a Fingerprint

15 Expert would probably say is identifiable, you're above

16 one-third of the area of ridge detail but it's not quite

17 a perfect mark; and, grade 4, you're seeing fingerprint

18 development across the entire surface of the finger.

19 It is subjective. We know that. It relies on all

20 fingerprints in a particular experiment being scored by

21 the same person, which can be quite time-consuming for

22 that person, but it does enable us to do comparisons.

23 We can look at the results in several ways. We can look

24 at average scores, we can look at all of the number of

25 marks that are actually passing what we think is a vague

1 identification criteria, the 3 and 4 grade marks, or we
2 can use more complex programmes such as Mini Tab to do
3 statistical analyses of these.

4 If it's not just the development we're looking at,
5 if it's other more subtle parts of the development
6 process we want to evaluate, we will look at things, a
7 secondary score for things like contrast, damage, does
8 the background develop as well as the fingerprint, how
9 easy is it to see the fingerprint against the
10 background?

11 To give you an idea of the scale of some of these
12 experiments, so we're not just basing this on tens of
13 marks, this is an example of an experiment that was done
14 in about 2003/2004 to produce guidance on the best brush
15 to use for application of aluminium powder. In this
16 case we were looking at 10 donors, 15 donors, 28 donors
17 on different materials, putting down different numbers
18 of prints in a series, using eight different bushes and
19 two different ages of mark and that experiment actually
20 involved assessing about 12,500 marks. So that's a
21 typical number of marks. Before we'll make guidance we
22 do like to make sure the experiments are thorough.

23 There is a stage beyond that. What we try to do
24 with some of the other processes, not necessarily
25 powdering, is we will try and run them in a pseudo

1 operational situation, for example, we do have still
2 some bundles of fraudulently passed cheques from about
3 1990. We occasionally take bundles of those and run
4 those through the new process, comparing it to existing
5 processes and score the number of marks we are actually
6 developing. We do similar things, we go and raid bins,
7 we pick up plastic bags, for example, we will try and
8 get a range of as representative operational style
9 material as possible and do that type of assessment.
10 Before that will go to a police force to be trialled in
11 their fingerprint laboratory we like to make sure the
12 new process we are recommending outperforms in the
13 laboratory or gives at least equivalent performance in a
14 pseudo operational trial.

15 So finishing off on the manual it's believed to be
16 the most comprehensively researched manual of its type
17 used worldwide. We do know the publishers of other
18 manuals. We don't think anybody tries to apply the
19 degree of rigour that we make efforts to go to.

20 There are new techniques and new equipment
21 constantly being developed and requiring evaluation so
22 this is an ongoing process for us. We're constantly
23 looking at new research, that's developing new
24 techniques or legislation may change and you may have to
25 reformulate a technique and also there are changes in

1 surfaces with time. The fact that we now have a lot
2 more recycled content in things like plastic bags has
3 meant that what was previously the most effective
4 process back in the mid-1980s when we last did a big
5 trial is no longer. We've just completed a trial and
6 we've had to redraw the processing chart which will be
7 issued in a couple of months' time.

8 So I've said health and safety and environmental
9 concerns may require changes in formulations. A lot of
10 work was done in the late 1990s when it was clear that
11 CFCs were going to be banned and we had to reformulate a
12 couple of the fingerprint development techniques.

13 So we're constantly doing work to ensure the advice
14 in the manual is current and that's the advice that
15 police forces will be working to in laboratories.

16 So if I move on to the analysis of the marks. I
17 will start with Y7. I've been in the immensely
18 fortunate position of being able to examine all of the
19 original exhibits here so when I received the doorframe
20 Y7 is still visible on the surface. This is a picture
21 taken a couple of days after I received it. It's
22 apparently developed using a black powder. I think
23 that's been discussed in previous evidence and as,
24 again, has been discussed during previous evidence there
25 is a brush mark clearly visible through mark Y7.

1 Q. Dr Bleay, I said to you I wouldn't interrupt you but
2 perhaps if I just go back to that preceding slide, when
3 you say there is a brush mark visible through the mark,
4 on the slide we have here "brush mark" is in inverted
5 commas.

6 A. Yes.

7 Q. At one stage you actually did consider this. In your
8 first report you had considered there might be an
9 alternative explanation for that striation?

10 A. Absolutely. Sorry, I haven't included that picture in
11 the presentation, but when we unpacked it at the end of
12 February in the presence of my police adviser, when we
13 drew the doorframe out of the container, there was a
14 string tied around it which had a fragment of what was
15 obviously had been -- well not, obviously, but may have
16 been an exhibit label attached to it and that was
17 directly over mark Y7 at the time.

18 Q. Why, in this particular slide, then do you put "brush
19 mark" in inverted commas?

20 A. Because there's obviously several possible explanations.
21 It may have been the string. It may been the brush. It
22 may have been a coincidence the string was above the
23 mark when I withdrew it.

24 Q. So that there's obviously some form of damage to the
25 mark?

1 A. Yes.

2 Q. That could have a variety of causes?

3 A. Yes.

4 Q. One of might be a brush mark, another could be simply
5 the string across the mark?

6 A. Yes, it may have caught or moved around it. I can't
7 really ...

8 Q. I am sorry to have interrupted you.

9 A. When I first received the doorframe exhibit, looking at
10 the entirety of it -- and the image on my screen is a
11 bit washed out compared to what I was hoping to
12 achieve -- it was obvious that certainly the top area of
13 the doorframe had been powdered with aluminium. There
14 were clearly traces of the powder that was consistent
15 with aluminium at the top, although there was only a
16 small portion that still hadn't been overpowdered. The
17 majority of the frame had been overpowdered with the
18 black granular powder and the bottom of the frame was
19 this pale blue colour, which is characteristic of being
20 treated with an acid black one, which is a dye used for
21 developing marks in blood.

22 The deposition of the aluminium at the top of the
23 doorframe is certainly more difficult to see than the
24 black granular powder and possibly less uniform. It's
25 very difficult to see the very pale silvery-grey of the

1 aluminium against the white of the doorframe. It's not
2 so easy to see where the powder actually is adhering to
3 the surface.

4 One thing that I thought I would look at or think
5 about was: was powdering actually an appropriate process
6 to use for this type of exhibit? Certainly looking at
7 the charts available at the time -- and this would have
8 been the booklet that was used at the time, this is the
9 Scene of Crime Handbook from 1993 -- these are the two
10 charts contained in it, one for the treatment of smooth
11 non-porous surfaces and one for treatment of rough
12 non-porous surfaces. It is a bit debatable, actually,
13 which the doorframe would fall into. But in both cases
14 powders are regarded as an appropriate development
15 process for these types of surface and certainly with a
16 fixed surface that you can't take back to the laboratory
17 is probably be the only option available.

18 So "powders" is the pale green box on the chart.
19 It's definitely the primary process recommended for a
20 smooth non-porous surface. It's one of several similar
21 performing options at the bottom of the rough non-porous
22 chart.

23 If you look inside the manual, it talks about the
24 options for powders and, having read the transcripts at
25 the early part of this Inquiry, some debate was made

1 about what was the appropriate powder to use. If I read
2 verbatim what is inside the handbook, it says that:

3 "Many types of powder and several methods of
4 application are available for the development of latent
5 fingerprints. With fresh fingerprints the aqueous
6 component of the fingerprint contributes significantly
7 to the adhesion of powders where as with older
8 fingerprints, powders adhere principally to the fatty
9 deposits of sebaceous sweat. The effectiveness of
10 powdering is variable depending on the chemical and
11 physical nature of the powder, the type of applicator,
12 and the care and expertise of the operator. Most
13 available data indicate that under many circumstances
14 the flake powders such as aluminium are more sensitive
15 than other types of powder."

16 So that's the state of advice at the time from our
17 knowledge as what was then the Police Scientific
18 Development Branch. There are some additional comments
19 within that section. One of them is:

20 "The sensitivity necessary in a powder to carry out
21 an effective fingerprint examination depends to some
22 extent on the nature and condition of the surface being
23 examined."

24 It says:

25 "Use the powder most sensitive to the latent

1 fingerprint deposit. Aluminium milled flake
2 powder ... is more sensitive when applied in the manner
3 described below, than other black or white powders."

4 Finally:

5 "With deposits such as furniture polish or general
6 grime, a less sensitive powder may sometimes be more
7 effective. This will reduce the chances of clogging or
8 filling in ridge detail."

9 So if we now look at what was done with Y7 -- oh
10 yes, another point is that's our guidance. That was our
11 guidance from the scientific research laboratories.
12 What also needs to be taken into account is the
13 operational experience of the SOCO. The fact that they
14 are doing this job day in, day out they may have
15 additional evidence that makes them believe that a
16 certain type of powder is going to be more effective on
17 a certain type of surface. So using the guidance in
18 their handbook in conjunction with SOCO's expertise is a
19 way to approach this.

20 If we move on to what was actually done with mark
21 Y7, our view is that the primary objective of when
22 treating a crime scene for fingerprint evidence it must
23 be to develop as many fingerprints as possible. So you
24 have got to try to use as best practice as possible.

25 Certainly the choice of aluminium flake as an

1 initial powder treatment is not inconsistent with the
2 advice available in 1997. Certainly a couple of the
3 phrases from the handbook would indicate that that's a
4 perfectly acceptable thing to do.

5 Again, the fact that the mark was subsequently
6 re-powdered with black granular powder after
7 observations by SOCOs that it was giving better results
8 on a painted wood surface at the **locus** is also not
9 inconsistent with the advice that was available in 1997.

10 It comes down to: is sequential powdering bad
11 practice? It's not bad practice. It's not something
12 that we really know a lot about and that's still the
13 case now. It may develop more marks overall. I think
14 there's the opportunity to do more research in this
15 area. We don't know all the answers. The issue seems
16 to be here that the uncertainty is arising because the
17 sequential powdering wasn't carried out on the same day
18 at the same time. We've developed a mark, we've got a
19 couple of days' ambiguity between the aluminium powder
20 being applied and the black powder being applied, but
21 the fact that the two powders were applied is not
22 inconsistent with the advice available and it's not
23 necessarily bad practice.

24 That leads us on to the question of why wasn't Y7
25 detected when powdering the doorframe with the aluminium

1 flake powder? There's several possible explanations.
2 I'm obviously not able to say conclusively which one it
3 is, but I will try and run through the possibilities
4 available. One is simply that the area containing Y7
5 was missed during the initial powdering; the brush
6 didn't pass over the area so no powder deposited. Along
7 similar to that it may be that the aluminium powder just
8 didn't adhere well to the surface of the doorframe at
9 that position, either because there was something like
10 furniture polish present or grime that inhibited the
11 aluminium actually sticking to the surface.

12 Another possibility is actually it was developed but
13 the subsequent examination of the doorframe didn't
14 actually -- well, the SOCO examining it may not have
15 actually seen it because, as I mentioned earlier, it's
16 very difficult to see a pale grey powder against a
17 white shiny doorframe material.

18 Another one which I will talk a bit about in the
19 next couple of sides is the that constituents, the
20 makeup, of the chemical composition of the mark may have
21 meant that it wasn't appropriate for development by
22 aluminium flake. It may not have been particularly
23 well-developed by aluminium flake but black granular may
24 have been a more appropriate powder to use for this
25 particular type of mark.

1 The final, final issue is, well, it's what has been
2 proposed and that's what Y7 was deposited between the
3 time that the doorframe was powdered with aluminium but
4 before the mark was actually re-powdered with black
5 granular.

6 Certainly the fact that marks can be developed on a
7 surface after powdering with aluminium and then come up
8 with subsequent black granular powder is something that
9 I'd observed in a pseudo-operational situation and I
10 have been able to replicate it in the laboratory during
11 the course of this Inquiry. So it's certainly a
12 possibility.

13 I did a brief experiment walking round site getting
14 marks from 50 different donors and it's between an
15 initial 5 and 10 per cent of marks may come up in this
16 way. If you look at the two photographs at the bottom,
17 it's again a bit of white gloss painted plaster board
18 which I powdered with aluminium. You can't easily see
19 any marks in the first image, but you can certainly see
20 at least two clearly developed marks after I applied the
21 black granular powder as a second process. So it's a
22 possibility. It does happen and a rough statistical
23 experiment indicates it may be 5 to 10 per cent of marks
24 will be developed.

25 A possible explanation for that is that the powders

1 are quite different in the morphologies they have. They
2 are quite different in their appearance, they are
3 possibly quite different in the way they stick to
4 fingerprints. The top pair of images are aluminium
5 flake powder. You can see that we have quite thin
6 platelets of material. You can see that when they stick
7 to a fingerprint they give quite a patchy set of
8 particles adhering to the fingerprint residue.

9 The bottom two images are from black granular
10 powder. It's a much finer powder, they are small sort
11 of spherical-type particles and they stick across the
12 entire surface of the fingerprint with some larger
13 clumps visible on the surface.

14 We don't know exactly the mechanisms by which these
15 powders stick to a surface. I was trying to think of an
16 analogy that might explain it, one of which is if you
17 have, for example, a table with some spilled liquid on
18 it (say it's beer) and I want to flick a beer mat across
19 that surface, it's a flat platelet-like material. If it
20 comes across the surface of the liquid, it wets it, it's
21 stuck down on to the liquid. Whereas if I pushed a
22 marble across that surface, it wouldn't. It would
23 travel through the water without stopping.

24 If I have something sticky and I try to roll a
25 marble through it, the marble would now stick to it and

1 if I flick the beer mat hard enough, it may skim across
2 the surface of the sticky material. So different
3 powders, different morphologies, different adhesion
4 mechanisms and that may explain why we're not developing
5 the mark with aluminium but we do with black granular
6 powder as a second treatment. So that's one explanation
7 but, as I said, there are other scenarios.

8 One thing I wanted to explore was whether we could
9 see if there was aluminium powder present on the surface
10 and, if we could, whether we could determine whether
11 it's actually above or below the deposit of the
12 fingerprint and that might give us some time-line for
13 when the fingerprint was present. I think it's been
14 said by other people, looking at the mark itself, it's
15 not possible to see whether there's aluminium powder
16 present on the surface in the region where Y7 has been
17 placed. Although I could see that the top part of the
18 frame had been powdered with aluminium, I couldn't see
19 any obvious elements of reflective aluminium particles
20 when I closely examined Y7 itself.

21 So what I proposed to the Inquiry team, and I was
22 permitted to do, was a non-destructive form of
23 evaluation called optical coherence tomography
24 (sometimes described as optical ultrasound) and I wanted
25 to use this to see if I could actually see the layers of

1 powder and the fingerprint deposit. It's basically
2 using reflections of infrared radiation from different
3 materials and different layers in the surface to form an
4 image. The image you see on the screen is actually an
5 image through a fingertip; so you can see the spiral
6 sweat glands leading up to the surface and you can see
7 the two layers of the skin. So I can produce a number
8 of depth images and also slices at levels through the
9 surface of the wood.

10 So I wanted to see whether we could, first of all,
11 determine between aluminium and black granular powder,
12 whether they had a different appearance, and they did.
13 The top sets of images is where I've taken a
14 fingerprint, half a fingerprint, blanked the other part
15 off, powdered one side with aluminium and left the other
16 one untreated. Now, if you can see on the left of the
17 dotted line, you will see some white specks on the
18 surface and that is where the aluminium powder is
19 adhering to the fingerprint ridge.

20 The black granular powder is more difficult to see.
21 The particles are a lot finer so you are not seeing
22 powders. What you are actually seeing is a very faint
23 shadowing effect. It's almost casting a shadow from
24 beneath the carbon, but I can distinguish between the
25 two types of powder.

1 You do see the large clumps. They are the black
2 specks on the right-hand side of the line in lower image
3 where there's large clumps of carbon. It's probably
4 better seen in this image. Again, this is
5 another planted mark. In this case I've powdered with
6 aluminium, I've placed my fingerprint and then I've
7 overpowdered with black granular powder. On the
8 surface, I'm able to see little white flecks so I can
9 see that the aluminium does exist across the surface.
10 If I look slightly below the surface, I can see that
11 shadowing effect from the black granular powder.

12 Unfortunately, what I was unable to tell from this
13 is what order things had been applied in. We did tests
14 using exhibits that we prepared with aluminium,
15 fingerprint, black granular and we also prepared
16 exhibits where we had fingerprint, aluminium, black
17 granular powder and there was no obvious difference
18 between those, the traces we were getting from optical
19 coherence tomography. So we couldn't do what I
20 originally set out to do and that was to determine the
21 order in which things had been deposited.

22 The main reason for that is I was actually unable
23 to find any aluminium on the surface in the region of
24 Y7. The two images on the left-hand side are looking at
25 the mark Y7 itself. We can see black particulates.

1 These are the carbon clumps for the black granular
2 powder. They seem to be bigger than the black granular
3 powder than we currently use, but you're not seeing any
4 white specks that could be associated with the
5 aluminium. When I examine an area of background close
6 to the mark Y7, I'm not seeing any white flecks
7 characteristic of aluminium there either.

8 What that sort of tends towards is that the region
9 containing Y7 was either missed during initial powdering
10 or that the aluminium flake powder did not actually
11 adhere particularly well to that region of the surface.
12 It's not possible obviously 12 years on 12/13 years on
13 to say which is the case. I will qualify that slightly
14 in saying that by the time I came to do this analysis, I
15 had applied another treatment to the part of the frame
16 which originally just contained aluminium; so I am not
17 able to take a control trace and say, no, there's
18 definitely no aluminium there. It may be that the
19 appearance of aluminium changed over that period of
20 time, but it is more indicative of the top two. It's
21 either missed during powdering or the powder didn't
22 adhere well to that particular part of the frame.

23 So we can't draw any conclusion about when Y7 was
24 deposited from this test.

25 The other bit of work I was asked to do was to do

1 with the step feature in the side of mark Y7. Reading
2 the transcripts, I was able to see that there were a
3 couple of possible explanations that were being
4 proposed: the first that it was to do with multiple
5 touches; the second that it was actually associated with
6 a feature, a depression in the grain of the wood.

7 Originally I was expecting to have to send the
8 doorframe back but I was able to do some quick test to
9 try and give some supporting evidence to one of these
10 theories. What I did was to do an examination of the
11 doorframe under a couple of different lighting
12 conditions, oblique lighting and specular lighting and
13 I'll describe what each of those are as I move on.

14 I took a series of photographs to obtain information
15 about the wood texture and also trying to relate that
16 texture to the structure of mark Y7. With oblique
17 lighting, I'm using a very low level light, shining the
18 light across almost level to the surface of the piece of
19 wood and hoping that the texture of the wood is casting
20 shadows on the surface. My imaging system is directly
21 above the surface so I'm capturing an image of the
22 shadows being cast.

23 I took a series of images moving the light source up
24 from perfectly oblique where I'm shining it across the
25 surface, moving it up so I'm now looking with the light

1 source shining down on the surface so we can see exactly
2 where Y7 is in relation to this groove. So, moving from
3 the top left-hand side on my screen, this is totally
4 oblique lighting. We can see that there is possibly a
5 depression running along the side of the mark and as I
6 raise the light source and we're now looking at the
7 light shining down, we can see that that does correspond
8 quite closely to the feature in the side of the mark
9 itself.

10 I also looked at it with specular lighting, which is
11 where we have the imaging system the opposite side of
12 the exhibit from the light source, and we are trying to
13 capture disturbances in the light being reflected off
14 the surface that are to do with, again, surface texture.
15 Again, we can see, not as well on this particular image,
16 but we can see that there is a groove in the wood
17 running down alongside the mark. If you see the -- I
18 don't know if I can indicate it particularly well on
19 here. There's a spot in about the middle of the red
20 circle in the right-hand image and that corresponds to a
21 white-ish bit of raised feature in the wood in the
22 left-hand image. But, again, it's strongly indicating
23 that there is a groove in the wood and it is running
24 alongside the mark Y7. That really confirms what I was
25 saying. The groove is present. It does correspond

1 closely with the edge of the mark and it does narrow and
2 could account for the step feature we see in Y7.

3 That really concludes the examinations I have done
4 of Y7. I would like to move on to mark Q12.

5 I think you saw this slide earlier. It's not a mark
6 that's visible under normal lighting conditions. It's a
7 mark which has been produced by superglue and then dying
8 with basic yellow 40 which, when we illuminate it with a
9 blue-violet light, it give us a green fluorescence when
10 we look at it through a yellow filter. I have produced
11 a colour image of what you actually see when you do that
12 analysis. Most of what I will be showing you are colour
13 images. Obviously, Ident1 (the National Fingerprint
14 Database) doesn't deal with colour images so these are
15 all converted to grey scale images before they are given
16 to a bureau or actually transmitted on to Ident1.

17 So, again, thinking through the same thought
18 process, was superglue the appropriate process to use?
19 Looking at the tin itself, it does have a very slight
20 texture associated with the screen printing so I'd
21 probably marginally go towards the fact that it's not a
22 perfectly smooth non-porous surface. We're moving
23 through the chart for rough non-porous materials.
24 Superglue is the sort of pale mauve box at the bottom.
25 It's one of a series of options. It's as good as any

1 other. It's certainly a recommended option for this
2 type of surface so I don't see a problem with going for
3 superglue as a development process.

4 As we know, from looking through the previous
5 discussions around Q12, when we carry out the
6 fluorescence examination of the mark, the background
7 fluoresces quite strongly itself and the pattern of the
8 background, the colours of the background and the fact
9 it's fluorescing actually make Q12 very difficult to
10 visualise. So what I hoped to do was to use ultraviolet
11 imaging to look at Q12 which would totally remove the
12 background. If we image outside the visible spectrum,
13 we don't get the interference of the colours, we just
14 get what parts of the mark are reflecting ultraviolet.

15 Unfortunately, I was made aware when I received the
16 exhibit that Q12 had previously been swabbed for DNA and
17 in this case what that's done is flatten the ridges in
18 that area. What I'm relying on is the superglue
19 development to raise the ridges of the mark above the
20 surface and scatter more ultraviolet than the smoother
21 background. Unfortunately, because the mark has been
22 swabbed, it's flattened all of the superglue deposits.

23 I can still see it by fluorescence, but I can't see it
24 through ultraviolet imaging. So I now have a big blank
25 ridge where Q12 can be seen visually but was for

1 ultraviolet imaging.

2 Another thing that I did want to comment on was the
3 comments made about Q12 being printed as a blurred image
4 when the negative is in focus. Certainly I realised
5 that one explanation or one proposition has been that it
6 was done to mislead a jury. I have looked at some of
7 the images. They are not particularly good quality. I
8 don't really want to comment on that.

9 What I want to talk about is the fact that there may
10 be an alternative explanation for that. I am not saying
11 it's the right explanation, but I just want to make
12 people aware that there is another possible explanation
13 for it and that is to increase the interpretation of
14 ridge flow by an expert.

15 The reason for raising that is that when I was
16 printing these images in conjunction with somebody who
17 was a forensic imaging specialist back in April, his
18 comment to me was, "Well, we should print this out as a
19 sharp image and we should also print it as a blurred
20 image because I think that an expert would prefer
21 looking at that type of image" and he said to me that
22 that's something he had done in the past in his
23 background at the request of an expert.

24 Now, I'm trying to use these two images here, these
25 are the ones we actually sent to the Inquiry, these are

1 rescanned by myself. Now, I realise identification is a
2 very subjective -- interpretation of image quality is a
3 very subjective thing but, to my eye, within the red
4 circle I think I can see the ridge flow in the
5 fingerprint more clearly than I can in the sharp image
6 on the left. What I think happens is that the regular
7 printed background pattern actually distracts the eye
8 and by blurring it you are doing something, which I
9 think I say on the next slide, it's analogous to when
10 you see a pixillated image on the screen and you
11 instinctively sort of squint to try and see that image a
12 bit better. You're breaking up the strong straight
13 lines of the pixillation, you are removing those and you
14 actually think, "Well, maybe I see that a bit more
15 clearly". So that's one possible explanation for why
16 the blurring was done. It does actually possibly
17 provide an aid to interpretation of the mark.

18 It wasn't unusual, talking to people that did do
19 photographic processing in the days of when wet
20 photography was the major source of images going to
21 bureaux, lots of things were done. Colour reversal,
22 contrasting colours, dodging and burning to reduce areas
23 that had been overexposed. These things did go on.
24 Ideally notes should have made at the time of printing
25 to describe if and why this was done. Certainly it is

1 something which is encapsulated in the digital imaging
2 procedure. There is a conscious decision in the fact
3 that there is more potential to adjust a digital image.
4 There are guidelines in place to make sure that this is
5 done in a controlled way.

6 As I say here, it is more easy to perform on digital
7 images. Loading a digital image up and using a program
8 such as PhotoShop gives you much more potential for
9 modifying or enhancing the mark in a lot of different
10 ways.

11 As early ago as 2001, the Home Office produced the
12 digital imaging procedure which outlines the way in
13 which images should be dealt with. For additional image
14 a master copy is taken and that's the original image as
15 taken. That's sealed and that's put to one side. A
16 copy is taken of that. That becomes a working copy.
17 That can be modified but an audit trail needs to be
18 taken of what modifications are being made to that
19 image. So if the modified image is the one presented in
20 court needs to be presented with the audit trail that
21 enables the jury to see what has been done to the master
22 image to arrive at what has been presented.

23 I have give an example at the bottom. I should have
24 found a better image but you can see the image at the
25 top is of a mark developed using DFO, so we get

1 fluorescent ridges, light ridges against a dark
2 background. What we've done is a colour reversal. I've
3 also changed the contrast and brightness. I've also
4 sharpened the mark. If you look in the box to the right
5 of it under notes section it says:

6 "Image processing sharpening field to one, contrast
7 increased 1.8, brightness reduced -98, inverted."

8 So it tells me all the steps that have been taken to
9 produce that image from the original master image at the
10 top.

11 Another thing to say is that enhancement tools,
12 including blurring and sharpening functions, are
13 available on all automated fingerprint identification
14 systems and these are as an aid to expert interpretation
15 of features. The expert has the image on screen. They
16 can apply a number of filters, switch them off and on,
17 have a look at a feature and see whether that feature is
18 made clearer or not by applying these adjustment
19 focuses. In this case they are not saved on the image.
20 They are just used in the bureau as an aid to whether
21 the expert thinks an feature is there or not.

22 The point I want to make is if the image of Q12 was
23 blurred to aid interpretation it wasn't unusual. It's
24 not unusual. It's something that is done but certainly
25 in the case of digital images nowadays audit trails

1 should be kept of any such adjustments. I don't know if
2 there are any notes in the Strathclyde Photographic
3 Department relating to it, but these days an audit trail
4 is kept. That is certainly a requirement in England and
5 Wales. I don't know about the adoption of a digital
6 imaging procedure and there's a more recent document,
7 the National Policing Improvement Agency's police use of
8 digital evidence, which goes into a bit more detail.
9 But that is the current guidance that we work to on the
10 presentation of digital images.

11 Lastly, if I come to mark XF, mark XF was still
12 visible on the surface of the gift tag. It's there and
13 visible as a very faint white deposit as. To my eye,
14 when I first looked at it, it was indicative of being
15 developed using superglue but, again, it was something I
16 was asked. It wasn't clear what the development
17 technique actually was. So I had to consider what other
18 techniques would give me a mark with that white-ish
19 appearance and the one process that was available then
20 and still is available now is white granular powder.

21 So to try and satisfy myself that the mark was
22 developed using superglue I did a couple of comparative
23 trials on similar semiporous glossy-type magazine,
24 glossy paper surfaces, side-by-side trials using
25 superglue and white granular powder.

1 The thing to say is that the marks developed using
2 superglue were much are crisper. There's no significant
3 development of the background whereas the marks
4 developed using white granular powder gives you quite a
5 lot of powder deposition on the background and I was
6 satisfied after doing this that mark XF most closely
7 related to marks developed using superglue. I was happy
8 it had been developed using superglue and also the fact
9 the gift tab was subsequently stained with this
10 yellow-ish material indicates that an attempt had been
11 made to dye it with basic yellow 40 and you wouldn't do
12 that if the mark had been developed using a white
13 granular powder. So everything satisfied me that the
14 mark was a superglue mark.

15 Again, what I have done from the other marks,
16 thinking about whether it's an appropriate process to
17 use, well we're most interested in the exterior surfaces
18 of the exhibit. They are the ones that are going to
19 have been handled. A decision needed to be taken about
20 whether you were going to split that exhibit into its
21 constituent parts or whether to treat them all at once.
22 We think about surfaces you have present, you have the
23 wrapping paper, which is a semiporous material; you have
24 the gift tag outer surface, the printed part of it with
25 the holly wreath design, that is also semiporous; you

1 have adhesive tape, which is a nonporous surface; and a
2 bit of the exposed soap bars, which is also a nonporous
3 surface.

4 So it's a case of do we treat the paper parts, the
5 card and the wrapping paper as a porous or a nonporous
6 exhibit and do we split the thing up? Again, I think
7 the decision taken was probably perfectly valid. We
8 know that it's probably more likely to behave as a
9 nonporous surface so to use the nonporous chart is
10 probably most appropriate for this case. The fact
11 that powders haven't been used, again is acceptable. We
12 know powders are not performing particularly well on
13 this type of exhibit from the tests I have done. So I
14 think the decision to use superglue was valid. It means
15 you could treat all of the surfaces of that exhibit,
16 which are quite different in nature, all at once in a
17 single process.

18 I was also asked about whether the mark could have
19 been planted and, reading the literature on the subject,
20 there's certainly, there are a couple of papers in the
21 literature, one by Mr Wertheim and one by Boris Geller
22 from the Israeli National Police, that deal with a
23 review of the techniques that have been used for
24 planting of fingerprints.

25 The techniques that are most widely publicised are

1 depositing a mark using a stamp, a moulding, a fake
2 finger or a photo-etched plate, all taken from some form
3 of the original or of a fingerprint found on a surface.
4 There's also transfer, transfer of the mark from one
5 surface to another using a lifting medium. You can try
6 and take something from the arrest form using a tape
7 lift or powdering then lifting the fingerprints on the
8 tape form or photomontage. People have reported taking
9 a picture by putting an image of a mark on to another
10 surface and then taking a composite image of the two.

11 So if we look at these in turn, it certainly can't
12 be a photomontage. What we are dealing with is the
13 original exhibit. That's available for inspection and
14 the mark can be seen in situ on the gift tag. So it's
15 not something where we're trying to put two images
16 together and take another picture to demonstrate the
17 mark in that way.

18 It does not appear to have been taken from the
19 arrest forms. Certainly, there are several differences
20 between what we see on the gift tag and what we see on
21 the arrest forms. XF on the gift tag is wider in the
22 extent, in terms of the ridges to either side of the
23 core of the mark, than the arrest form plain
24 impressions. The ridges of mark XF are thicker than
25 what we see on the arrest forms and also we see some

1 pores in some of the marks in mark XF. None are
2 apparent on the arrest forms, albeit we are dealing with
3 photocopies here. Certainly there's no evidence of any
4 paper fibres having been lifted from arrest forms or of
5 powder on the surface which may suggest that we are
6 lifting a powdered mark and replacing it on a surface.

7 So it brings us down to a couple of the other
8 possibilities. Could the mark have been transferred? I
9 can practically demonstrate what we're talking about by
10 being transferred. I have brought some props. What
11 I'll do is if I get some get some fingerprint deposit,
12 some greasy deposit from the side of my nose and put it
13 down on to a nonporous surface, there are a number of
14 things I can do, a number of lifting media I can use to
15 actually re-lift that mark. So what I've taken here is
16 a gelatine lift which is used to lift footwear marks
17 normally. If I apply that, rub it down and lift it up
18 you will see -- I don't know if anyone wants to actually
19 look at it -- you will see that I have actually lifted
20 my fingerprint on to that gelatine lift. So it can be
21 done. Certainly, I can lift a mark from a surface but
22 bear in mind what I have just done is placed a very,
23 very greasy, very fresh mark and lifted it.

24 The other thing you need to take into account is
25 what I have done is left half of that mark on the

1 surface. I may have lifted the top part of the deposit
2 but I've left one half of the deposit on the surface.
3 For me to put that mark down on something else I've now
4 got to put that tape on another surface and smooth it
5 down in place and each time I do that transfer operation
6 there's less and less material from the original mark
7 being placed. So what we start with may be a very thick
8 fingerprint with a lot of deposit present. What we're
9 actually left with is a very, very minimal amount of
10 deposit which is finally deposited.

11 Again, there's something if you want to ... but --

12 Q. Just take your time. You have obviously brought
13 something with you that you show the --

14 A. Yes, I have. I have put the picture of it but I think
15 this is probably a better thing to show.

16 Q. I think it would be better to hand that round rather
17 than the hand you have got there.

18 A. What I've got here is I've actually tried to show
19 whether you can transfer sufficient amount of
20 fingerprint deposit to develop a strong mark and XF is a
21 very strongly developed mark, there's a lot of deposit
22 there. The mark itself is very strongly developed. So
23 I have a series of where I have labelled "control", I've
24 put down a fingerprint and not carried out any lifting.

25 The column entitled "lift" is where I've put a

1 fingerprint down, taken the lift. The column labelled
2 "transfer" is where I've put the mark back down,
3 smoothed it place and peeled it off. I've then
4 developed the entire plate using superglue. What I hope
5 it shows is that in very few of those marks, in the
6 transfer column there's hardly any of those that you can
7 actually see by eye. So it's very, very difficult and
8 I've used different lifting media. I've used
9 fingerprint lifting tape. I've used the gel. I've used
10 a standard roll of sellotape but it's very, very
11 difficult to transfer sufficient material, even from
12 somebody who is quite greasy and sweaty like myself for
13 you to develop a good mark. So hopefully that will show
14 you the transfer process. **(Handed)**

15 So based on what you are seeing on that tile there,
16 I concluded that XF was a primary natural deposit rather
17 than a transferred mark and that was not an option.

18 The final option is it is possible to produce
19 realistic looking fingerprints from fake hands or
20 mouldings by, again, I have what is here is a very good
21 quality fake hand which has been developed for trials on
22 spoofing biometric readers. I can rub that with my own
23 sweat or rub it on the bridge of my nose, pick up a lot
24 of deposit and I can lay fingerprints using this which
25 will look pretty realistic. The mark develops in a

1 normal way. If I am rubbing natural sweat deposits on
2 that hand or picking up sebaceous deposits from the side
3 of my nose the marks that I put down and develop will
4 look very much like they come from a natural
5 fingerprint. So that's a possibility.

6 What tends to happen is that it's quite difficult to
7 actually get these to deform in the same way as a normal
8 hand would and there is the small chance that you will
9 get consistent moulding defects like little pin prick
10 bubbles or it doesn't quite capture the pore structure
11 you may find in a real hand.

12 So, yes, it's a possibility. It could have come
13 from a fake hand but XF does contain other features that
14 are more representative of it coming from a natural
15 contact from a real finger.

16 We've got at the top, within the yellow oval, there
17 is some smearing of ridges due to movement of the finger
18 across the surface. There's also some reproduction of
19 ridges at the tip of the finger which may be indicative
20 of it rocking a bit forward. If we look within the
21 green circle we are seeing some quite well-defined pores
22 within the ridges there. It's not impossible to
23 reproduce this in a fake hand but it is very, very
24 difficult to get something with that crisp, round pore
25 feature from something which is just a moulding.

1 Also within the red circle we almost see little
2 rings around the fingerprint, around the pores
3 themselves. This is something which can be quite
4 characteristic of a natural finger and the way that
5 fingers sweat naturally. With eccrine sweat it's coming
6 from the pores and you tend to get small rings with
7 quite high salt content around the pores in the
8 fingerprint. So the fact that we're seeing those there,
9 again, is suggestive that it's a natural finger rather
10 than a moulding.

11 I don't say it's impossible. We can reproduce
12 features within mark XF -- we can produce features
13 within a mark made by a moulding which are similar to
14 some of the things seen in XF but you really need the
15 person's finger to be able to make a moulding like this.
16 It's not something you can do from a placed fingerprint
17 very easily.

18 For that to have come from a moulded hand would have
19 meant that the subject was compliant and the moulding
20 was taken from the compliant subject and it was done
21 before the mark was first developed and that mark was
22 first developed, in my understanding, from the image I
23 was looking at on 13th January 1997.

24 My conclusion looking at all those analyses was that
25 XF was a naturally deposited mark from a real finger so

1 Q. The individual there who you were working with, he has a
2 forensic background?

3 A. Yes, he's worked for both the Forensic Science Service
4 and LGC Forensics and he's currently an imaging science
5 lecturer at the university.

6 Q. He is ...?

7 A. A lecturer in imaging science.

8 Q. So he has himself a forensic background?

9 A. Yes.

10 Q. Both as research and in practice?

11 A. Yes.

12 Q. Was it that individual, the lecturer, who suggested to
13 you that there might, in fact, be positive benefits in
14 blurring of images?

15 A. Yes, he did.

16 Q. Again, the positive benefit is that by blurring that in
17 fact diminishes the background and, therefore, brings to
18 greater prominence the ridge detail?

19 A. Yes. It's really what I was trying to do with
20 ultraviolet imaging, which would have removed the
21 background totally but it's doing it in a slightly
22 different way. But, yes, but it removes the distraction
23 of the background and enables you to see the way the
24 ridges are flowing.

25 Q. The second point I wanted to ask you about was in

1 relation to Y7 and at our request, an issue having been
2 raised in the Inquiry about the groove, you carried out
3 the experiments you did with the light to find that the
4 groove ran along the line of Y7.

5 In addition to that, I did raise with you the
6 possibility of experimentation in relation to movement
7 and multiple touches?

8 A. Yes.

9 Q. But do I understand that that is outwith your area of
10 expertise?

11 A. Yes, I'm certainly not qualified to talk about that.

12 Q. So all that you can say in relation to the contention
13 about Y7 is that an issue having been raised about
14 whether a groove may align with the edge of one edge of
15 Y7 and explain the pattern at the bottom where the
16 ridges come out beyond the right edge you have carried
17 out the light studies that you have indicated to show
18 the presence of a groove?

19 A. Yes.

20 Q. But beyond that you cannot comment?

21 A. That's right, yes. That's correct.

22 MR MOYNIHAN: I have no further questions. Thank you very
23 much.

24 THE CHAIRMAN: Shall I ask Mr Holmes first then if you have
25 any questions for this witness.

1 MR HOLMES: No thank you, sir.

2 MISS GALBRAITH: No, thank you, sir.

3 MISS GRAHAME: No, thank you, sir.

4 THE CHAIRMAN: I have only one question to ask you and

5 assuming you haven't thought of anything in the interim

6 that you want to ask, the one question I have is when

7 you mentioned the surface of Q12 had been affected

8 because of DNA. Is that something that had happened in

9 the past?

10 A. I was led to believe so. I'm not sure exactly what date

11 it was. I believe there had been a previous analysis

12 where some swabbing had been performed.

13 THE CHAIRMAN: Swabbing at some earlier stage?

14 A. Yes.

15 THE CHAIRMAN: I take it you don't have any expertise in

16 DNA?

17 A. I don't. I think when that has come up in the Inquiry I

18 have tried to find the Inquiry Team an expert who was

19 capable of talking through those issues with them.

20 THE CHAIRMAN: Should it be possible after such a long

21 period of time.

22 A. That's right, yes.

23 THE CHAIRMAN: Thank you. I have nothing else.

24 Thank you very much for the work you have done for

25 the Inquiry and the experiments you have conducted for

1 us. It has been very helpful. Thank you.

2 MR MOYNIHAN: Sir, two things: first of all, there are no
3 further witnesses for today. I do apologise. I didn't
4 anticipate going through matters quite as quickly.

5 The next witness is Mr Pattison and, in fact, it was
6 convenient for him, though he could have rearranged his
7 diary, he comes tomorrow morning.

8 THE CHAIRMAN: Yes.

9 MR MOYNIHAN: So the arrangement is Mr Pattison tomorrow.

10 After that the next witness is Mr Chamberlain but he is
11 arranged for Wednesday and then we go to Mr Pugh and
12 then, finally, Professor Champod next week.

13 I am not questioning Mr Pattison. I don't
14 understand that Miss Carmichael's questions are going to
15 be much longer. I don't know what the estimates are but
16 I was certainly suggesting to others in the break that
17 there's no need, tomorrow, for a 9.30 start. It could
18 be a more leisurely start.

19 THE CHAIRMAN: I am sure that will not disappoint anyone, so
20 we will sit at 10.00 then tomorrow.

21 MR MOYNIHAN: Yes. It may be an opportunity, sir, because
22 we are obviously towards the end of the hearing in
23 evidence that one of the points that we can discuss
24 tomorrow would be the concluding on loose ends in
25 relation to some witnesses. There's also the start of a

1 conversation about how long and in what circumstances
2 closing submissions may be made at the end of next week.
3 So we might use some of the time available tomorrow for
4 housekeeping discussions. Otherwise, I am afraid it's
5 going to be a relatively short day tomorrow and then
6 Mr Chamberlain on Wednesday.

7 THE CHAIRMAN: As long as we are keeping up to schedule.

8 MR MOYNIHAN: We are now, sir, yes.

9 THE CHAIRMAN: Thank you. We will sit tomorrow at 10.00.

10 **(3.05 pm)**

11 **(Adjourned until 10.00 am the following morning)**

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