

<p>1 Wednesday, 15 June 2016</p> <p>2 (9.30 am)</p> <p>3 (The hearing was delayed)</p> <p>4 (9.35 am)</p> <p>5 Housekeeping</p> <p>6 MR JUSTICE BLAKE: Yes. Good morning.</p> <p>7 MR HEPPINSTALL: Good morning, my Lord. May I raise two</p> <p>8 matters of housekeeping before we start.</p> <p>9 MR JUSTICE BLAKE: Yes.</p> <p>10 MR HEPPINSTALL: The first is that we were promised</p> <p>11 additional materials which were going to be relied upon</p> <p>12 by Professor Schmitz Feuerhake. Eight academic papers</p> <p>13 were received by the Government Legal Department at 7.22</p> <p>14 this morning. I am having hard copies brought over to</p> <p>15 court as soon as possible but obviously I won't have</p> <p>16 an opportunity to read them.</p> <p>17 MR JUSTICE BLAKE: No.</p> <p>18 MR HEPPINSTALL: I do have Professor Thomas in court, who</p> <p>19 hopefully will be able to look at them as soon as they</p> <p>20 arrive but then I will need to have some sort of</p> <p>21 discussion with her before they are relied upon by</p> <p>22 Professor Schmitz Feuerhake.</p> <p>23 There are two additional papers that I would like to</p> <p>24 rely on which have been supplied to my learned friend</p> <p>25 Mr Charlton that I would like Professor Schmitz</p> <p style="text-align: center;">Page 1</p>	<p>1 so we're very grateful to you for being able to come</p> <p>2 along. Don't worry if some of the technical issues may</p> <p>3 be a bit daunting. They are daunting certainly to me.</p> <p>4 MR HEPPINSTALL: Myself, Mr ter Haar and I think Dr Busby</p> <p>5 and my junior had discussions with the translator merely</p> <p>6 to set the scene in the briefest and most basic of</p> <p>7 terms.</p> <p>8 MR JUSTICE BLAKE: I see. Okay, we will try and use very</p> <p>9 simple terms if we possibly can. Yes, shall we swear in</p> <p>10 the interpreter?</p> <p>11 THE INTERPRETER: My name is Kiyoko Saito, I am a Japanese</p> <p>12 interpreter.</p> <p>13 (Interpreter sworn)</p> <p>14 PROFESSOR SHOJI SAWADA (continued)</p> <p>15 Examination by MR TER HAAR</p> <p>16 MR JUSTICE BLAKE: Thank you very much.</p> <p>17 Now, Professor Sawada.</p> <p>18 MR TER HAAR: My Lord, while Professor Sawada is coming</p> <p>19 forward, can I suggest that we proceed in this way and</p> <p>20 see how it works. My impression, having spoken to</p> <p>21 Professor Sawada is that he certainly understands spoken</p> <p>22 English well, particularly if taken at an appropriate</p> <p>23 pace. Therefore it probably will not generally be</p> <p>24 necessary for the questions to be translated for him to</p> <p>25 understand them. If we can avoid that, it saves quite</p> <p style="text-align: center;">Page 3</p>
<p>1 Feuerhake to consider -- I think she's in court this</p> <p>2 morning -- whilst Professor Sawada is giving his</p> <p>3 evidence.</p> <p>4 MR JUSTICE BLAKE: Right.</p> <p>5 MR HEPPINSTALL: Of course we have copies to be supplied to</p> <p>6 everybody's bundles.</p> <p>7 MR JUSTICE BLAKE: Can they be supplied now?</p> <p>8 MR HEPPINSTALL: Yes. (Pause)</p> <p>9 MR CHARLTON: We were arranging to print out our own copies</p> <p>10 so we will be overwhelmed with copies.</p> <p>11 MR JUSTICE BLAKE: As long as the Professor can look at</p> <p>12 copies whilst we deal with the first part of our hearing</p> <p>13 this morning. (Pause).</p> <p>14 Any other housekeeping matters?</p> <p>15 MR HEPPINSTALL: No, my Lord. The Japanese translator is</p> <p>16 here.</p> <p>17 MR JUSTICE BLAKE: Yes. Good morning.</p> <p>18 THE INTERPRETER: Good morning.</p> <p>19 MR JUSTICE BLAKE: Thank you so much for helping us out.</p> <p>20 THE INTERPRETER: I will do my best.</p> <p>21 MR JUSTICE BLAKE: I appreciate you are a little bit alarmed</p> <p>22 about the nature of the scientific issues and we fully</p> <p>23 understand that and we understand that you are not</p> <p>24 a technical interpreter. But I am sure that your</p> <p>25 presence here may just help in ordinary communication,</p> <p style="text-align: center;">Page 2</p>	<p>1 a lot of time. If, of course, Professor Sawada does not</p> <p>2 understand a question, then it can be repeated and the</p> <p>3 translator can translate it as appropriate.</p> <p>4 It may be that it's particularly in relation to</p> <p>5 making sure his answers are clear that the services of</p> <p>6 the interpreter will be most necessary. Some questions</p> <p>7 may require a "yes" or "no" answer, some may not. So</p> <p>8 I'm rather suggesting that we proceed on a slightly "try</p> <p>9 it and see" basis rather than formally have every</p> <p>10 question and every answer translated.</p> <p>11 MR JUSTICE BLAKE: Well, we will -- trial and error. The</p> <p>12 suggestion is that the questions we put to</p> <p>13 Professor Sawada in English, and it may be that if he</p> <p>14 understands the question you don't need to interpret</p> <p>15 every question into English.</p> <p>16 THE INTERPRETER: Okay.</p> <p>17 MR JUSTICE BLAKE: It's only if he asks you for assistance</p> <p>18 in understanding the question. But we'll see whether</p> <p>19 that works. Right, okay.</p> <p>20 A. (Not interpreted): Yes.</p> <p>21 MR TER HAAR: Professor Sawada, my first question is: do you</p> <p>22 understand the way in which we are intending to go</p> <p>23 forward?</p> <p>24 A. Yes. (Interpreted): Yes.</p> <p>25 Q. So, Professor Sawada, if you don't understand a question</p> <p style="text-align: center;">Page 4</p>

<p>1 from me or from Mr Heppinstall, or from Professor Busby, 2 please ask for assistance from your interpreter. 3 A. (Nodded assent) 4 Q. I want first of all to ask you a few questions about 5 your personal experience as a professional. 6 Now, we know that you had the misfortune to be 7 a young teenager when the explosion took place at 8 Hiroshima and we know about that. I am not going to ask 9 you about those experiences. 10 A. (Not interpreted) I understand. 11 Q. What I want to ask you about at this stage is what your 12 professional expertise is in order that the Tribunal can 13 understand from what position you give your evidence. 14 You are now, I think, a retired Professor, an 15 emeritus Professor, but at university when you were 16 still teaching, your special subject was particle 17 physics; is that correct? 18 A. (Not interpreted) Now I am not studying particle physics 19 and mainly study the effect of radiation. 20 Q. Was that your area of study when you were a Professor at 21 Nagoya University? 22 A. (Not interpreted) Yes. 23 Q. So could you explain to the Tribunal, as simply as 24 possible, what is the application of particle physics to 25 the understanding of the effect of radiation on human</p> <p style="text-align: center;">Page 5</p>	<p>1 A. (Not interpreted) Yes. 2 Q. But then in addition to your studies as a physicist you 3 took an interest in statistics in order to see what your 4 experience of particle physics could bring to the 5 statistical study of radiation. Is that right? 6 A. (Interpreted): In order to understand the effect -- the 7 effect of radiation on to the human body, we need both 8 the knowledge of particle physics as well as statistics. 9 Q. Thank you. With the benefit of those studies which 10 you've been carrying out for how many years now -- 11 50 years? 12 A. (Not interpreted) Study of radiation effect is maybe 13 I start 19 -- 1997. 14 Q. 1970, did you say? 15 A. (Not interpreted): So almost -- 16 MR JUSTICE BLAKE: 1997. 17 MR TER HAAR: 97. Sorry? 18 A. (Interpreted): Yes, 1997. 19 MR JUSTICE BLAKE: You started radiation -- 20 MR TER HAAR: Yes. 21 MR JUSTICE BLAKE: -- studies. 22 MR TER HAAR: Again, there are some agreed matters in this 23 case. One is that there has been a long-term study of 24 the effect upon the survivors of the two Japanese atom 25 bombs, called the ICRP study.</p> <p style="text-align: center;">Page 7</p>
<p>1 beings? Could you just explain how your professional 2 experience assists the Tribunal, please. Do take the 3 help of your interpreter as necessary. 4 A. (Not interpreted) Yes, I think the basis of radiation 5 effect is important to understand the particle physics 6 and also it is needed to statistical study method. 7 After I retire from university I teach statistical 8 theory to younger student, so I learn both particle 9 physics which are based on radiation effects and also 10 I study the effect of (inaudible) statistics so I could 11 study the effect of radiation on human body. 12 MR JUSTICE BLAKE: Pause there. Have I understood 13 understand that his expertise is in particle physics but 14 also in statistical theory and by combining those two he 15 developed his interest in radiation? 16 MR TER HAAR: The interest came for human purposes, or 17 reasons first. But what my Lord says is exactly how I 18 understand it. Let me see if I can just make sure that 19 we understand it. 20 Professor Sawada, you started by studying particle 21 physics. 22 A. (Not interpreted) Yes. 23 Q. Which enables you to have an understanding of the 24 physical effects of radioactivity on human tissue. Is 25 that right?</p> <p style="text-align: center;">Page 6</p>	<p>1 That's correct, isn't it, that there has been that 2 study? 3 A. (Not interpreted) No. 4 (Interpreted): The study on victims started as ABCC 5 study, and that stopped in 1975, and then ICRP study 6 which was corroboration work of Japan and United States. 7 (Not interpreted): No, ICRP is not study the effect. 8 (Interpreted) Of ICRP -- 9 (Not interpreted): Is the study continues ABCC 10 study. 11 MR JUSTICE BLAKE: Is it the lifetime -- 12 MR HEPPINSTALL: The agreement -- the agreed fact would be 13 that the Americans started the study under the format of 14 the ABC. There was then established the RERF, which is 15 joint Japanese and American funded, and they have 16 carried on the LSS study. It is nothing to do with the 17 ICRP. 18 MR JUSTICE BLAKE: I was going to interrupt you but 19 I thought I'd better not. 20 MR TER HAAR: My fault. We're talking about the LSS study. 21 A. (Not interpreted) Yes. The study, yes. 22 Q. I want to ask you questions about that study first of 23 all in relation to external contamination and then 24 internal contamination. 25 First of all, dealing with external contamination,</p> <p style="text-align: center;">Page 8</p>

1 from your studies and research, are there scientific
 2 problems with the statistical methods used by the LSS to
 3 assess external contamination?
 4 **A. (Not interpreted) No.**
 5 **LSS life study group set up by United States. ABCC**
 6 **set up this study group in 1950 and (inaudible) ought to**
 7 **study the radiation effect is for the (inaudible) by use**
 8 **of nuclear weapon and then the effect of radiation for**
 9 **human beings roughly classified two category. One is**
 10 **actual disease and the long-term effects, such as**
 11 **cancer, and both study made by ABCC on the LSS.**
 12 Q. I think I'm not sure you completely answered my
 13 question. I'll ask it again.
 14 From your studies and your knowledge, are there
 15 statistical problems with the work of the LSS in
 16 relation to radioactivity coming into contact with the
 17 external parts of the human body?
 18 **A. (Not interpreted): Yes.**
 19 **(Interpreted): The effects of radiation on human**
 20 **body is both external and internal. External impact was**
 21 **effect of first initial radiation.**
 22 THE INTERPRETER: I'm afraid this is very technical.
 23 MR JUSTICE BLAKE: Can we pause there because I'm not sure
 24 we're getting an answer. I am going to put the question
 25 for a third time.

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1 Dealing only with external radiation, do you see
 2 there was a problem with the LSS statistical method to
 3 measuring?
 4 **A. (Not interpreted) Yes. Yes.**
 5 MR JUSTICE BLAKE: Yes.
 6 **A. (Not interpreted) And to understand the effect of**
 7 **internal exposure it is necessary to study the fallout**
 8 **effect and the radiation effect.**
 9 MR JUSTICE BLAKE: Right. I think the question at the
 10 moment is being limited to measurement of external
 11 radiation, so can we just keep with that and I'm sure
 12 we'll go on to something else.
 13 MR TER HAAR: We're going to go on to internal effects.
 14 MR JUSTICE BLAKE: So do I have -- yes. So is your answer
 15 to the question, "Was there something wrong with the
 16 statistical method used to measure external rate
 17 contamination?", "Yes"?
 18 **A. (Not interpreted) Yes.**
 19 MR TER HAAR: Now I want to ask you about internal effects.
 20 From your studies, does the LSS literature give
 21 an accurate picture of the effects on the internal
 22 organs of the radiation from an atomic bomb?
 23 **A. (Interpreted): The LSS study only take into account of**
 24 **initial radiation effect.**
 25 MR JUSTICE BLAKE: Initial radiation.

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1 **A. (Interpreted): Initial radiation effect.**
 2 **(Not interpreted) Horizontal axis of graph, only**
 3 **external radiation effect is scaled and no effect of**
 4 **fallout effect, radiation effect, so the effect, the**
 5 **result cannot understand the effect of fallout. That is**
 6 **very bad system.**
 7 MR JUSTICE BLAKE: I'm afraid I haven't got -- I just have
 8 recorded: "LSS only takes into account the initial
 9 effect of radiation". I've got "It's a bad system" but
 10 I missed something in between.
 11 MR TER HAAR: Professor Sawada, perhaps if you could answer
 12 in Japanese this question, and very slowly so that the
 13 interpreter can get it.
 14 THE INTERPRETER: The Professor also said the LSS study
 15 didn't consider fallout and -- and residual.
 16 (Not interpreted): Induced radiation.
 17 (Interpreted): Induced radiation.
 18 MR TER HAAR: Good.
 19 MR JUSTICE BLAKE: So induced radiation?
 20 MR TER HAAR: Induced radiation.
 21 MR JUSTICE BLAKE: Yes.
 22 **A. (Not interpreted) If neutron absorbed -- absorbed by**
 23 **matter on the ground, then matter on the ground,**
 24 **radiation, changed into radioactive particles. This is**
 25 **called induced radiation.**

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1 MR TER HAAR: So can I try to put it in a different
 2 language.
 3 When the radioactive fallout comes to the ground,
 4 the ground itself becomes to an extent radioactive; is
 5 that right?
 6 **A. (Not interpreted) Yes, yes.**
 7 Q. Now, what is the particular radioactivity in the ground
 8 which is important for understanding the effect upon
 9 human beings?
 10 **A. (Interpreted): The radioactive fine particles on the**
 11 **ground are also important, but also the particles**
 12 **floating in the air also need to be considered.**
 13 Q. Good, thank you.
 14 Now, when you gave evidence on Monday in answer to
 15 questions you talked about the importance of people
 16 inhaling breathing in, particles in the air.
 17 Now I have two questions. The first is this: in
 18 what circumstances would there be particles, radioactive
 19 particles, in the air? What would cause them to be
 20 there?
 21 THE INTERPRETER: Sorry, can you repeat that?
 22 MR TER HAAR: In what circumstances would there be
 23 radioactive particles in the air?
 24 **A. (Interpreted): We had the black rain in the centre of**
 25 **the mushroom cloud, but we preferred part of black**

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1 mushroom cloud because the raindrops were too small --
 2 were very small, so that the water evaporated, so the
 3 radiation -- radioactive particles flows in the air.
 4 Q. My second question is: if a human being breathes in
 5 those particles what is the effect or what may be the
 6 effect on the human being who has breathed in that air?
 7 A. (Interpreted): The -- initially there's acute disease,
 8 such as --
 9 (Not interpreted): Hair loss.
 10 (Interpreted): Hair loss, epilation, and purple --
 11 purple spots. Internal bleeding.
 12 MR JUSTICE BLAKE: So I have recorded: initially there's
 13 acute disease, such as hair loss, epilation, and purple
 14 spots?
 15 A. (Not interpreted) And also diarrhoea.
 16 MR JUSTICE BLAKE: Diarrhoea. Yes.
 17 MR TER HAAR: So those are the initial consequences.
 18 What are the possible long-term consequences?
 19 A. (Interpreted): I forgot to mention that also it's
 20 important to consider the accumulated radioactive
 21 particles on the ground.
 22 Q. So we need to take those into account as well. But now
 23 if you have a human being who has taken these particles
 24 into their body through breathing, what are the
 25 long-term effects of that?

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1 A. (Interpreted): When the radioactive particles were
 2 inhaled it goes into blood and circulated throughout the
 3 body and goes to the small blood cells and finally reach
 4 to the different organs and goes -- reach to genetic
 5 cells.
 6 (Not interpreted): And DNA.
 7 (Interpreted): DNA.
 8 Q. And that's the first effect. What is the effect -- what
 9 is the consequence of the particles being in the
 10 bloodstream or in the DNA of the cells? What may be the
 11 consequences of that?
 12 A. (Interpreted): Leukaemia in quite early stage. It's
 13 about after -- after about 5 years. And different kind
 14 of cancer diseases after 20, 30 and sometimes 40 years.
 15 Thyroid, thyroid and kidney ... liver diseases.
 16 (Not interpreted): Liver, yes.
 17 MR JUSTICE BLAKE: So thyroid and liver cancers.
 18 THE INTERPRETER: Yes.
 19 MR JUSTICE BLAKE: Thank you.
 20 MR TER HAAR: And my final question, Professor Sawada, going
 21 back to the LSS study, how accurate statistically is the
 22 LSS in recording the effects of the internal
 23 contamination of which you have just spoken?
 24 A. (Interpreted): We could be able to find out by studying
 25 internal --

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1 (Not interpreted): Radiation.
 2 (Interpreted): Internal radiation. So far the
 3 effect of internal effects -- internal and external
 4 effects haven't been studied. And recently Hiroshima
 5 University, a group at Hiroshima University studied --
 6 studying victim of inside Hiroshima prefecture and also
 7 outside Hiroshima --
 8 (Not interpreted): No.
 9 (Interpreted): Hiroshima -- the victim in Hiroshima
 10 prefecture, and not victim.
 11 (Not interpreted): And compare.
 12 (Interpreted): So they compare two groups.
 13 MR JUSTICE BLAKE: Yes. Can I just take sure I've
 14 understood that answer.
 15 Recently, Hiroshima University studied those victims
 16 within Hiroshima prefecture and compared them with
 17 people who were not victims?
 18 A. (Not interpreted) Yes.
 19 MR JUSTICE BLAKE: Yes?
 20 A. (Interpreted): And the study found -- had found -- that
 21 the mortality of certain cancer is the same within 1,200
 22 metres to 2,000 metres from Ground Zero.
 23 (Not interpreted): The radiation effect of 1,200
 24 metre and 2,000 metre degrees -- 20 times degrees. So
 25 that not explain the mortality of the cancer, constant.

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1 It cannot explain. So that the fallout effect is very
 2 important in this region.
 3 MR JUSTICE BLAKE: Sorry, can I just check I have the
 4 answer? The study showed that those who were victims
 5 within 1,200 to 2,000 metres of Ground Zero showed
 6 a rate of 20 times higher the diseases than those
 7 outside that area?
 8 A. (Not interpreted) Yes.
 9 MR JUSTICE BLAKE: Right.
 10 A. (Not interpreted) I understand. (To the interpreter.
 11 (Not interpreted): Degree.
 12 THE INTERPRETER: No, no, it's --
 13 A. (Not interpreted) 20 times more effect, misunderstand.
 14 He -- he is right.
 15 MR JUSTICE BLAKE: I have it right? I'll just read out
 16 again what I understood the answer to be. If you think
 17 I have it wrong, either of you, let me know.
 18 The study showed that victims within 1,200 to
 19 2,000 metres of Ground Zero showed a rate 20 times
 20 higher by comparison with victims from outside that
 21 area. Do I have it right?
 22 A. (Not interpreted) My calculation.
 23 MR JUSTICE BLAKE: That's correct, is it?
 24 A. (Not interpreted) Initial radiation produced is 20 times
 25 more, so the effect is 20 times more.

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<p>1 MR TER HAAR: How did the result of the recent Hiroshima 2 University study compare to the results of the LSS 3 study? 4 A. (Interpreted): The LSS at present only conduct the 5 research on the victims near the Ground Zero epicentre 6 and victims of far away from the Ground Zero. They only 7 consider initial radiation. Initial radiation. 8 (Not interpreted): That is exploding from the fire 9 ball, directly come within 1 minute(?). 10 THE INTERPRETER: I'm afraid I didn't really understand. 11 1980 ... 12 MR JUSTICE BLAKE: Can I read back what I have and if you 13 think he has added anything else to it, check? 14 THE INTERPRETER: Okay. 15 MR JUSTICE BLAKE: I appreciate it's difficult. 16 The LSS study only considered victims near Ground 17 Zero and victims who are far away. They only considered 18 the effect -- the initial effects of radiation. 19 A. (Not interpreted) Now. 20 MR JUSTICE BLAKE: Is there anything else I do not have? 21 A. (Not interpreted) Okay, but distant survivor also 22 affected by initial(?) radiation, almost zero. So the 23 effect of fallout completely ignored. 24 MR JUSTICE BLAKE: The distant survivors are also affected 25 by radiation. All right I have that.</p> <p style="text-align: center;">Page 17</p>	<p>1 Cross-examination by MR HEPPINSTALL 2 MR HEPPINSTALL: It may help before we begin if you could 3 have out, in addition to the Professor's report, SB4, 4 SB5 and SB17. We are going to start in SB4 (Pause) 5 If we start with SB4, tab 40. You have 1, you need 6 4. 7 MR JUSTICE BLAKE: This is "Basic facts about Thyroid 8 Cancer"? 9 MR HEPPINSTALL: That's how it starts, yes. 10 Can you find tab 40? 11 If you turn five pages you'll come to a coloured 12 depiction of the city of Hiroshima, and it's the slide 13 entitled "A bomb health effects". 14 The source, Professor Sawada, of this slide, you can 15 see at the bottom, it's a paper by Douple et al, 16 Disaster Medical Public Health. 17 Do you see that? Do you see that at the bottom of 18 the slide? 19 A. (Interpreted): Yes. 20 Q. On the right-hand side, you can see that the colours 21 describe various doses of radiation. Can you see that? 22 A. (Not interpreted) That is the initial tradition. 23 Q. Sorry? 24 A. Initial radiation only. 25 MR JUSTICE BLAKE: Initial radiation.</p> <p style="text-align: center;">Page 19</p>
<p>1 MR TER HAAR: I think also the end of that was "and the 2 effects of internal radiation were", I think the 3 expression was "almost completely ignored". 4 MR JUSTICE BLAKE: I have "only considered the initial 5 effect of radiation". 6 MR TER HAAR: It will be on the transcript, but that was 7 there also. 8 A. (Interpreted): Yes, only internal exposure on (Not 9 interpreted) Distant survivor. 10 THE INTERPRETER: Yes, distant survivor. 11 MR TER HAAR: Thank you very much. 12 MR HEPPINSTALL: My Lord, I know that time is under pressure 13 this morning, but could I ask for an indulgence of five 14 minutes? I just need to take very quick instructions. 15 MR JUSTICE BLAKE: Yes. Certainly. We'll take a break and 16 the stenographers can have a break. Thank you for your 17 work so far, I am sure it has been helpful. (To the 18 interpreter). 19 We'll have a break for five minutes, Professor, so 20 sit at the back. Can you tell the Professor not to 21 speak to anyone about his evidence because he in the 22 middle of giving evidence. Thank you. 23 (10.21 am) 24 (A short break) 25 (10.30 am)</p> <p style="text-align: center;">Page 18</p>	<p>1 MR HEPPINSTALL: Yes. And then we have rings that represent 2 distances from the epicentre, the first ring 3 2 kilometres and the second ring 3 kilometres? 4 A. (Not interpreted): Yes. 5 Q. So can I just check, using the benefit of this 6 diagram -- I should say this is Hiroshima. 7 A. (Not interpreted): Only considered initial radiation. 8 Q. Yes, and if I could check your answer. What you were 9 saying earlier was that the Hiroshima University study 10 has found that the incidence of cancer is 20 times 11 greater within that inner ring than it is outside of 12 that inner ring. Is that right? 13 A. (Not interpreted) No. Distant part. 14 (Interpreted): The conclusion -- what we can see 15 from the study is that the cancer rate -- 16 (Not interpreted): The cancer rate. 17 (Interpreted): Solid cancer rate is 20 times higher 18 outside the Ground Zero. Outside, 1,200 metres from the 19 Ground Zero. 20 Q. So you are saying that the solid cancer rate is outside 21 of that middle ring? 22 A. (Not interpreted) No, not higher, the same. 23 (Interpreted): The same. 24 Q. The same? 25 A. (Not interpreted) 1,200 metre and 2,000 metre,</p> <p style="text-align: center;">Page 20</p>

5 (Pages 17 to 20)

<p>1 mortality of the solid cancer is the same. You just 2 cannot understand this initial radiation. Then it is 3 needed to consider the fallout effect of internal 4 exposure. They prove this one by solid cancer 5 mortality. 6 Q. Can we just go back to the 20 times point. Let's get 7 that straight first. 8 What I thought you said in answer to Mr ter Haar was 9 that the cancer rates were 20 times greater within -- 10 closer to the epicentre, between 1,200 and 2,000 metres, 11 than they were outside of that area. Is that right or 12 wrong? 13 A. (Interpreted): The mortality 20 times higher cannot be 14 explained, scientifically explained. 15 Q. Can we just go back to where the 20 times is. 16 Is your evidence that if you were within that inner 17 ring, this study shows that there's a 20 times greater 18 chance of solid cancer than if you were outside of the 19 ring? 20 A. (Not interpreted): No. 21 (Interpreted): When we compare the initial radiation 22 at the point of 1,200 metre and the point of 23 2,000 metre, at the 2,000 metre point the initial 24 radiation decreased to one-twentieth. One-twentieth. 25 So because the cancer mortality is the same at the</p> <p style="text-align: center;">Page 21</p>	<p>1 A. (Not interpreted): So I consider the effect of fallout 2 increased 20 times. 3 MR JUSTICE BLAKE: Yes. Which is greater? Inside the 4 2-kilometre circle or outside the 2-kilometre circle? 5 A. (Not interpreted) At the point -- they study the 6 200-metre depth, divided into 200-metre depth and the 7 depth between 1,200 metre, plus or minus 100 metre, and 8 the 2,000 metre plus/minus 100 metre. This is part of 9 the reason they study the effect of the solid cancer 10 effect, mortality effect. 11 DR BUSBY: Would it help, my Lord? Because I know exactly 12 what he is saying. 13 MR JUSTICE BLAKE: No. 14 MR HEPPINSTALL: I am going to move on, my Lord. There can 15 obviously be re-examination in due course. 16 MR JUSTICE BLAKE: Yes. 17 MR HEPPINSTALL: Can we go back to your report at tab 2.6 of 18 SB1, please, and start with the graph at figure 4. So 19 back to SB1. It's at page 11, figure 4. 20 MR JUSTICE BLAKE: Yes. 21 MR HEPPINSTALL: Do you have figure 4? 22 A. (Not interpreted) Yes, 4. 23 Q. Yes, 4. 24 Is it right that what this graph is showing us is 25 that as the dose rises, the incidence of epilation also</p> <p style="text-align: center;">Page 23</p>
<p>1 point of 1,200 metre, at the point of 2,000 metre, so we 2 have to -- we can say that ... so we have to say 3 that ... the cancer is not just effect of initial 4 radiation, yes. 5 Q. I'm still struggling with the 20 times. 6 MR JUSTICE BLAKE: Can I have a go? 7 MR HEPPINSTALL: Please. By all means. 8 MR JUSTICE BLAKE: Professor, just one moment, please. 9 Are you telling us that the difference between the 10 2,000 metre mark is the radiation or the cancers 11 resulting from the radiation? 12 I recorded you saying that there is a 20 times 13 greater increase in health effects of radiation, but 14 I think you just been saying that the radiation was 20 15 times greater inside the circle. I don't know whether 16 it's the radiation or the cancers that you are telling 17 us about. Can you clarify, please? 18 A. (Not interpreted) Inside radiation, degree is 19 one-twentieth, so effectiveness of mortality of solid 20 cancer should consider 20 times more significant in the 21 2,000 metre. This is completely contradict to 22 scientific viewpoint. 23 MR JUSTICE BLAKE: Right. So what is it again? It's the 24 mortality from solid cancers is 20 times greater -- now, 25 the question: is it inside the ring or outside the ring?</p> <p style="text-align: center;">Page 22</p>	<p>1 goes up? 2 A. (Not interpreted) Yes. 3 (Interpreted): Yes. 4 Q. And this based on LSS data? 5 A. (Not interpreted): Yes. 6 Q. And then if we look at figure 5 on page 11, is it right 7 that as the person's distance from the hypocentre 8 increases, the incidence rate of epilation falls? 9 A. (Interpreted): Yes. 10 (Not interpreted): The red one. 11 Q. The red one is? 12 A. (Interpreted): Are you referring to red line or black 13 lines? 14 Q. The red line is marked "LSS normal distribution". 15 Perhaps the Professor could explain -- 16 A. (Not interpreted): Total. Total. 17 Q. Thank you. The black line is marked "Normal 18 distribution of SM relation". I would be interested to 19 know what "SM relation" refers to? 20 A. (Not interpreted) Severe epilation. 21 Q. Severe epilation. 22 A. Severe. 23 Q. Then can we turn over the page, please, to page 12. 24 Now, at figure 6 there's a solid black line, and that's 25 labelled "Initial radiation by DSO2". Does "DSO2" refer</p> <p style="text-align: center;">Page 24</p>

6 (Pages 21 to 24)

<p>1 to the latest dosimetry produced by the RERF?</p> <p>2 A. (Not interpreted): Yes.</p> <p>3 Q. I think as you explain in your paper there's been</p> <p>4 several different, over time, dosimetry systems produced</p> <p>5 by the RERF, hasn't there?</p> <p>6 A. (Not interpreted): I consider the effect of.</p> <p>7 THE INTERPRETER: (Word in Japanese).</p> <p>8 MR JUSTICE BLAKE: It's quite a simple question. There have</p> <p>9 been several dosimetry -- is it studies?</p> <p>10 MR HEPPINSTALL: Systems.</p> <p>11 MR JUSTICE BLAKE: -- systems produced by the RERF. Do you</p> <p>12 agree with that proposition, yes or no?</p> <p>13 THE INTERPRETER: May I repeat? May I ask you to repeat?</p> <p>14 MR JUSTICE BLAKE: There have been several systems of</p> <p>15 measuring doses produced by RERF. Do you agree?</p> <p>16 A. (Not interpreted) I join to explain DSO2 with many</p> <p>17 scientists, including the United States --</p> <p>18 MR JUSTICE BLAKE: I just think you should try to listen to</p> <p>19 the question and answer the question, please, otherwise</p> <p>20 we are going to be at cross-purposes.</p> <p>21 MR HEPPINSTALL: Shall I try this a different way? If you</p> <p>22 look on page 3, at the bottom of page 3 you refer to</p> <p>23 a 1957 dosimetry system and then a 1965 dosimetry</p> <p>24 system. T57D, T65D. Do you see that?</p> <p>25 A. (Not interpreted) Yes. That is development.</p> <p style="text-align: center;">Page 25</p>	<p>1 Professor Sawada?</p> <p>2 A. (Not interpreted): In 1980, the latter part of 1980, and</p> <p>3 1997 to 2002 I joined to this study.</p> <p>4 MR JUSTICE BLAKE: You joined the studies between 1980 and</p> <p>5 2002; is that right?</p> <p>6 THE INTERPRETER: Late 1980s.</p> <p>7 MR JUSTICE BLAKE: Yes.</p> <p>8 THE INTERPRETER: And 1997 and 2002.</p> <p>9 MR JUSTICE BLAKE: So two periods: late 1980 and then 1997</p> <p>10 to 2002?</p> <p>11 A. (Nodded assent).</p> <p>12 MR JUSTICE BLAKE: Yes.</p> <p>13 A. (Not interpreted): Yes.</p> <p>14 THE INTERPRETER: Three occasions.</p> <p>15 MR JUSTICE BLAKE: Right, three occasions. I see.</p> <p>16 MR HEPPINSTALL: Sorry, can we just clarify,</p> <p>17 Professor Sawada. Were you part of the research team or</p> <p>18 were you in fact a subject who had been exposed to</p> <p>19 ionising radiation who was being studied?</p> <p>20 A. (Not interpreted): As a scientist.</p> <p>21 Q. As a scientist?</p> <p>22 A. (Nodded assent).</p> <p>23 Q. Right. If we look at figure 6, the solid black line is</p> <p>24 marked "Initial radiation by DSO2". There's then</p> <p>25 a dotted red line that you have entitled "Exposure to</p> <p style="text-align: center;">Page 27</p>
<p>1 Q. That was development. Yes, so if we look at page 4, if</p> <p>2 you look at the top of page 4, you see you've written in</p> <p>3 the second paragraph that the tentative 65 one was</p> <p>4 prepared on the basis of nuclear tests only. I think it</p> <p>5 was prepared only on the basis of the plutonium bomb at</p> <p>6 Nagasaki. Then you see in 1986 there was a new</p> <p>7 dosimetry system that took into account transfer</p> <p>8 radiation from the ground. That's right; yes?</p> <p>9 A. (Not interpreted): Yes.</p> <p>10 Q. And then we were just looking at, on your figure 6 at</p> <p>11 page 12, the latest one which is from 2004, DSO2. Is</p> <p>12 that right?</p> <p>13 A. (Not interpreted): Figure 6?</p> <p>14 THE INTERPRETER: Page 6?</p> <p>15 MR HEPPINSTALL: On figure 6, your black line is "Initial</p> <p>16 radiation by DSO2"; yes?</p> <p>17 A. (Not interpreted): Yes. Yes.</p> <p>18 Q. And do you agree with this proposition,</p> <p>19 Professor Sawada: that each time the foundation has</p> <p>20 tried to improve the accuracy of the dosimetry?</p> <p>21 A. (Not interpreted): Yes. I joined to the RERF study to</p> <p>22 the internal radiation estimation. I joined there.</p> <p>23 Q. You participated in it? You joined?</p> <p>24 A. (Not interpreted): Yes.</p> <p>25 Q. I see. Right. Which one did you work on,</p> <p style="text-align: center;">Page 26</p>	<p>1 initial", but could you explain us to where you got --</p> <p>2 the source of the data of that dotted line.</p> <p>3 A. (Not interpreted) Yes, that -- most of the areas the</p> <p>4 survivor arrives maybe in the near region, bomb, inside</p> <p>5 of the house. So radiation interfered(?) by their</p> <p>6 house --</p> <p>7 Q. Sorry, Professor --</p> <p>8 A. (Not interpreted) -- so this is the (inaudible words) is</p> <p>9 the effects --</p> <p>10 Q. In the black line --</p> <p>11 A. (Not interpreted): Black line is --</p> <p>12 Q. Just a moment, Professor. In the black solid line you</p> <p>13 have told us that you have sourced the data from DSO2.</p> <p>14 For the dotted line where have you got the data from?</p> <p>15 A. (Not interpreted): By analysis -- analyse by the actual</p> <p>16 disease of survivor, then it should consider the effect</p> <p>17 of building effect --</p> <p>18 Q. Can you say -- did you get the data from the --</p> <p>19 A. (Not interpreted): My study.</p> <p>20 Q. From your study?</p> <p>21 A. (Not interpreted): Yes. Here on this page -- yes, in</p> <p>22 this page the "PR" means initial radiation dose of DSO2.</p> <p>23 That is PR.</p> <p>24 Q. But where did you get the --</p> <p>25 A. (Not interpreted): And --</p> <p style="text-align: center;">Page 28</p>

7 (Pages 25 to 28)

<p>1 Q. Where did you get the dose data from for this dotted 2 line? Because it's different from the black line which 3 we know comes from DSO2. Where does the data come from 4 for the dotted line? 5 A. (Not interpreted): By analysing -- 6 MR JUSTICE BLAKE: By analysing what? 7 A. (Not interpreted) -- taking actual disease rate, 8 I study -- 9 MR HEPPINSTALL: Perhaps if you could explain in Japanese. 10 A. (Interpreted): So this is the data I analysed -- that 11 I took from analysis of acute -- 12 (Not interpreted): Disease. 13 (Interpreted): -- diseases. 14 (Not interpreted): Parameter C here obtained by 15 analysing acute diseases. 16 Q. So this line is the product of your own work; yes? 17 A. (Not interpreted): Yes, yes. 18 Q. To carry out that work, you must have obtained 19 information from a source. Can you just tell us what 20 source or sources you used? 21 A. (Not interpreted): LSS data. 22 Q. LSS data. Right. DSO2 as well? 23 A. (Not interpreted): DSO2, no. 24 (Interpreted): There's a book. 25 (Not interpreted): Data book.</p> <p style="text-align: center;">Page 29</p>	<p>1 A. (Not interpreted): So this is total effects. 2 Q. So let's just break it down. So to plot that line you'd 3 have to have some dose information. 4 So where did that dose -- information about dose 5 from fallout come from? 6 A. (Interpreted): This is my study, from my study. 7 Q. This is your study? 8 A. (Nodded assent). 9 Q. But to do that work you must have had a source of data 10 for dose from fallout. Can you describe that source to 11 us, please? 12 A. (Not interpreted): From total exposure effect to 13 subtract the initial radiation effect, including 14 shielding effect in subtract, then retain -- 15 Q. Can I just try it from a different angle? We know, 16 don't we, and it's part of your thesis, that DSO2, the 17 RERF dosimetry system, only takes into account, 18 primarily, the external initial dose, doesn't it? 19 A. (Nodded assent). 20 Q. Yes. So the RERF does not provide data as to dose from 21 fallout radiation, does it? 22 A. (Not interpreted): RERF describe in DS86 book. 23 Q. Yes. 24 A. (Not interpreted) And their effect of fallout is here in 25 figure 6, blue line.</p> <p style="text-align: center;">Page 31</p>
<p>1 (Interpreted): Data book, that I have. 2 Q. That you have? 3 A. (Nodded assent). 4 Q. Written by the LSS? 5 A. (Not interpreted): RERF publish. 6 Q. RERF. Can you explain then, if the source of the data 7 is the same, why the line is different, why the curve is 8 different? 9 A. (Interpreted): The black line shows the initial 10 radiation outside the building. 11 Q. I understand. So the dotted line, is that taken from 12 the dosimetry which takes into account shielding? 13 A. (Not interpreted): Yes. 14 Q. Yes, right, good. 15 Now, there's another line which is marked "Exposure 16 to fallout radiation". Again, can you perhaps just 17 explain to us how you came to plot that line on the 18 graph? 19 A. (Interpreted): We can say that acute diseases rate -- 20 acute disease rate is total exposure effect. 21 (Not interpreted): From study, analysis from 22 total -- from analysis of acute disease incidence, 23 I could found the total exposure effects, including 24 initial and fallout radiation, both -- 25 Q. All right --</p> <p style="text-align: center;">Page 30</p>	<p>1 Q. Yes. So you are getting ahead, because you are right, 2 there's a black line, which is DSO2 simple dosimetry, 3 there's a dotted line which is shielding, and then 4 I think you do have a blue line which is some RERF work 5 about black rain. But what I want to talk about 6 is: where did you get your data when you did your work 7 on your thick red line? 8 A. (Not interpreted): Figure 5 square, the red square. 9 (Interpreted): The data is from red squares on 10 figure 5. 11 (Not interpreted): For example, I can explain up to 12 2 kilometres from Ground Zero the incidence rate of hair 13 loss is about 5 per cent. I study this one and 14 I explain, you can understand at 2 kilometre the 15 incidence rate is about 5 per cent. Then above figure 16 4, incident rate of 5 per cent is about 1.4. 17 Q. How -- 18 A. (Not interpreted): Can you understand? 19 Q. But if we look at figure 6 you are correlating dose 20 against distance, aren't you? 21 A. (Nodded assent). 22 Q. Yes. So how did you get from incidence against distance 23 to dose against distance? How did you go from one to 24 the other? 25 A. (Not interpreted): This is initial my study.</p> <p style="text-align: center;">Page 32</p>

<p>1 Q. Yes, but how did you do the work -- you are saying that 2 you used those red squares at figure 5 which, as 3 I understand it, is the LSS epilation incidence rate 4 according to distance from hypocentre, but what I don't 5 understand is how you came to then know what dose those 6 people suffered.</p> <p>7 A. (Not interpreted): I -- you understand the figure 4, the 8 dose and incidence rate of total epilation, red curve, 9 so in figure 4 were radiation between exposure dose and 10 the incidence rate of hair loss.</p> <p>11 Q. Yes.</p> <p>12 A. (Not interpreted): Then if 2 kilometre, data of 13 incidence rate of hair loss about 5 per cent. 14 Then 5 per cent is just between zero and 10. 15 Then the red squares show about 1.4 gray, 1.4 gray. 16 Do you understand?</p> <p>17 Q. What I am trying to understand what was the source --</p> <p>18 A. (Not interpreted): 1.4 is just 2 incidence -- 5 per cent 19 of incidence rate. Then in figure 6, at 2 kilometre, 20 the total dose about 1.4 gray. Then you can study all 21 the position and incidence rate of hair loss. Then you 22 can understand the total exposure.</p> <p>23 Q. Yes. If we look at figure 4, as you agreed with me 24 earlier, as the dose goes up the incidence rate goes up, 25 doesn't it?</p> <p style="text-align: center;">Page 33</p>	<p>1 THE INTERPRETER: Two dotted red lines.</p> <p>2 MR HEPPINSTALL: Yes, there's another one marked "Estimation 3 of total exposure from incidence rates of epilation".</p> <p>4 THE INTERPRETER: Yes.</p> <p>5 MR HEPPINSTALL: Yes?</p> <p>6 A. (Interpreted): Yes.</p> <p>7 Q. Right. Now where does that one come from?</p> <p>8 A. (Not interpreted): Analyse the incidence rate of acute 9 disease, by use of deviation between exposed dose and 10 incidence rate of epilation. Then I could found the 11 total exposure effect. 12 Then I subtract the effect of the initial radiation, 13 shown by total dotted line, then I get the whole effect 14 shown by --</p> <p>15 Q. To put it in the simplest terms, Professor, where is the 16 additional dose data coming from?</p> <p>17 A. (Not interpreted): Total exposure effects is not add any 18 other part. I analyse by deviation between exposure 19 dose and incident rate of epilation. Then I could 20 obtain the total exposure effects. 21 Then I subtract the initial radiation effects, then 22 I get fallout effect.</p> <p>23 Q. So you formed a calculation based on the data at figure 24 4 --</p> <p>25 A. (Not interpreted): Yes.</p> <p style="text-align: center;">Page 35</p>
<p>1 A. (Not interpreted): Yes.</p> <p>2 Q. Then at figure 5, as the distance goes up, the incidence 3 rate falls; yes?</p> <p>4 A. (Not interpreted): Yes.</p> <p>5 Q. So it's also case, isn't it -- and we know this with LSS 6 data -- that the dose falls as the distance rises; yes?</p> <p>7 A. (Not interpreted): Not the distance. That is seen in 8 figure 5.</p> <p>9 Q. Yes, and we looked at the rings that show the LSS data, 10 that show the dose falling away with distance. 11 What I don't understand at figure 6 is how come the 12 exposed dose is -- it is falling away to a degree, it 13 starts at 1.3 and falls to about 800 milligray, but why 14 is that curve different, Professor Sawada? What source 15 of data have you brought into the equation that means 16 that that curve is not doing what you would expect it to 17 do if you looked at figures 4 and 5?</p> <p>18 A. (Not interpreted): The total dose as shown by along that 19 curve of about 1 -- total curve is degrees, as shown on 20 this --</p> <p>21 Q. But I am going to ...</p> <p>22 A. (Interpreted): If you could look at the --</p> <p>23 THE INTERPRETER: I think the Professor Is talking about 24 another dotted red line.</p> <p>25 Q. Another dotted red line, yes.</p> <p style="text-align: center;">Page 34</p>	<p>1 Q. I understand that, but what have you done to increase 2 the dose?</p> <p>3 Put another way, why can we not correlate figures 4 4 and 5 into figure 6? Because you are doing dose 5 incident rate, incident rate a distance from hypocentre. 6 Then you do exposed dose to distance. One would 7 imagine, if you were using the only dosimetry evidence 8 that we have available, the RERF, that you would end up 9 with a curve that showed the -- well, the curve that you 10 have -- the dotted line or the black line -- that shows 11 the dose falling away with distance.</p> <p>12 There must be an additional element or ingredient 13 that you have added in to make the curve do something 14 else. I am just trying to identify what that is, 15 please.</p> <p>16 A. (Not interpreted): No. By use of figure 5, LSS 17 epilation data presented by square -- there's 18 a square -- and I use the figure 4 curve and represented 19 the relation between exposed dose and incidence rate. 20 Then from figure 5 red square I could estimate the 21 total exposure effects. That is represented by the 22 longer data curve, total effects, total exposure 23 effects. 24 Then I subtract -- subtract the initial radiation 25 effects, then retain the fallout effects.</p> <p style="text-align: center;">Page 36</p>

<p>1 Q. What --</p> <p>2 A. (Not interpreted): This is explained. Turn over the</p> <p>3 page, I explain more really by use --</p> <p>4 Q. Professor, the reason I am asking the questions is that</p> <p>5 those paragraphs above did not explain to me, nor others</p> <p>6 who have more expertise than me, the origin of the</p> <p>7 slide.</p> <p>8 So putting it another way, what is the evidence that</p> <p>9 supports the proposition that someone 6 kilometres</p> <p>10 distant from the hypocentre suffered a dose of</p> <p>11 800 milligrays which is how I interpret your graph.</p> <p>12 What is the evidence for that, given that we know</p> <p>13 that the only dosimetry we have is from the RERF.</p> <p>14 A. (Not interpreted): RERF only consider initial radiation,</p> <p>15 then the difference of the short dot -- broken line, and</p> <p>16 they only consider. Then at 6 kilometre they completely</p> <p>17 neglect(?) the effect of fallout rate and from my study</p> <p>18 the fallout effect is very important in long distance.</p> <p>19 As you understand my study, the study is 1.2</p> <p>20 kilometre and 2 kilometre, the incidence radiation</p> <p>21 rapidly decrease in this region. And I study the effect</p> <p>22 of fallout effect almost constant in this region. Then</p> <p>23 I could understand the effect of the solid cancers</p> <p>24 mortality.</p> <p>25 Q. Let's put it another way. Could you look at SB5,</p> <p style="text-align: center;">Page 37</p>	<p>1 Q. The next sentence is:</p> <p>2 "There was, however, residual radioactivity produced</p> <p>3 by neutron activation of materials near the</p> <p>4 hypocentre..."</p> <p>5 Now you referred to that as "induced radiation"</p> <p>6 earlier, didn't you?</p> <p>7 A. (Not interpreted): Yes.</p> <p>8 Q. That's where there's, say, a metal piece of machinery on</p> <p>9 the ground, and that is made radioactive by coming into</p> <p>10 contact with other radioactive material?</p> <p>11 THE INTERPRETER: Can you repeat that, please?</p> <p>12 MR HEPPINSTALL: So that's the situation where something</p> <p>13 that's not radioactive, say a piece of metal on the</p> <p>14 ground, is made, becomes radioactive, because it comes</p> <p>15 into contact with other radioactive material?</p> <p>16 A. (Not interpreted): Yes, neutron absorption.</p> <p>17 Q. Yes. Then the next clause of that sentence is:</p> <p>18 "... and radioactive fallout of activation and</p> <p>19 fission products from the cloud formed by the</p> <p>20 explosion."</p> <p>21 Now that, if you like, has been your life's work,</p> <p>22 that there's also a source which is fallout of</p> <p>23 activation of fission products from the cloud?</p> <p>24 A. (Not interpreted): Yes.</p> <p>25 Q. Yes?</p> <p style="text-align: center;">Page 39</p>
<p>1 please, tab 58. It's a paper entitled "Radiation doses</p> <p>2 from residual radioactivity".</p> <p>3 THE INTERPRETER: Tab 55?</p> <p>4 MR HEPPINSTALL: It's 58.</p> <p>5 MR JUSTICE BLAKE: 58, the last tab in the bundle.</p> <p>6 MR HEPPINSTALL: Now, I think this comes from the RERF that</p> <p>7 we keep talking about and I think you've mentioned one</p> <p>8 of their many books or booklets from which this is</p> <p>9 taken. Do you recognise it, Professor Sawada, from your</p> <p>10 work?</p> <p>11 A. (Not interpreted): Frequently I did this.</p> <p>12 Q. You have looked at this frequently, have you? Good.</p> <p>13 But I think just to assist people who haven't read</p> <p>14 it as much as you, can we just look at paragraph 1:</p> <p>15 "Most of the dose to survivors of Hiroshima and</p> <p>16 Nagasaki explosions came from direct radiations produced</p> <p>17 by the weapons, the radiations discussed in the</p> <p>18 preceding chapters."</p> <p>19 Now I think -- well, apart from the preceding</p> <p>20 chapters, we agree the proposition, don't we, that most</p> <p>21 of the dose came from direct radiation?</p> <p>22 A. (Not interpreted): This is a position of the RERF.</p> <p>23 Q. Fine.</p> <p>24 A. (Not interpreted): And I not agree. I do not agree</p> <p>25 this.</p> <p style="text-align: center;">Page 38</p>	<p>1 A. (Not interpreted): Yes.</p> <p>2 Q. And the authors acknowledge that radiation from those</p> <p>3 two sources has not been considered in assessments of</p> <p>4 dose and that that led to some criticism?</p> <p>5 A. (Not interpreted): Yes.</p> <p>6 Q. And for the record, there's two articles cited there,</p> <p>7 and one is authored by Professor Schmitz Feuerhake who</p> <p>8 we are going to hear from this afternoon.</p> <p>9 A. (Nodded assent).</p> <p>10 Q. Now, we do not have time to go through this article in</p> <p>11 detail, but they deal with induced radiation, and then</p> <p>12 they deal with internal radiation from pages 214</p> <p>13 onwards. Can you turn to that, please.</p> <p>14 MR JUSTICE BLAKE: 214?</p> <p>15 MR HEPPINSTALL: 214, the bottom of the page.</p> <p>16 Now, if we look at that, hopefully we can agree that</p> <p>17 there were several possibilities for exposure to</p> <p>18 internal radiation following a nuclear explosion,</p> <p>19 including inhalation and ingestion.</p> <p>20 We can agree with that, can't we?</p> <p>21 A. (Not interpreted): Yes.</p> <p>22 Q. And then the next few sentences put the hopefully</p> <p>23 uncontroversial proposition that in the particular</p> <p>24 circumstances of this detonation there wasn't any</p> <p>25 monitoring equipment and therefore doses have to be</p> <p style="text-align: center;">Page 40</p>

1 reconstructed?
 2 **A. (Not interpreted): Mm. Yes.**
 3 Q. Yes. But it's right, isn't it, that for long-lived
 4 isotopes -- and here you will see if we turn over the
 5 page we are talking about caesium-137 -- you can go back
 6 and look and -- sorry, do you want to turn over the --
 7 it is page 215. Yes.
 8 It's right, isn't it, that you can go and look at
 9 the soil in certain areas to see if you can find
 10 radionuclides like caesium-137, or I should say
 11 isotopes?
 12 **A. (Not interpreted): Yes, but the rain and typhoon**
 13 **attacked Hiroshima and Nagasaki so all radioactive**
 14 **particles are washed out then after the weather, after**
 15 **the typhoon. So do not consider this is total of**
 16 **detained radioactive particles.**
 17 MR JUSTICE BLAKE: Was that rain washing out?
 18 MR HEPPINSTALL: Yes. We take -- as I said earlier, because
 19 of the circumstances, Professor Sawada, of this
 20 detonation and what happened next, both in terms of
 21 weather and other most unfortunate circumstances, we are
 22 never going to know, are we, what the total fallout or
 23 dose was, it all has to be reconstructed after the
 24 event? Sorry, that's very long.
 25 **A. (Interpreted): The only -- the way we know the dose is**

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1 **from human body.**
 2 Q. Well, here we have a study of the internal dose from
 3 caesium-137 to the residents of a district of
 4 Nagasaki -- you'll have to forgive me -- Nishiyama?
 5 **A. (Nodded assent).**
 6 Q. And in 1969, scientists, I think Okajima and others,
 7 measured with a whole body count the internal burden of
 8 caesium-137 in 20 males and 30 females living in that
 9 district, along with the same number of controls.
 10 Do you see that?
 11 **A. (Not interpreted): I met also Okajima.**
 12 Q. You've met him.
 13 **A. (Not interpreted): Later, and the caesium-141 they take**
 14 **into the body, caesium is about 80 days half is outside.**
 15 **So these measurements by whole body counter are 24 years**
 16 **later, so all inhaled caesium, they already go out. So**
 17 **these effects do not explain the effect of just after**
 18 **the bombing. So entirely different.**
 19 Q. Yes. If you are looking at this data you have to take
 20 into the facts you are making this measurement in 1969,
 21 but you see, I don't want to get into too much science
 22 with you Professor, but caesium-137 has a biological
 23 half life and therefore you can estimate how much
 24 caesium-137 has been taken into the body prior to 1969,
 25 can't you?

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1 **A. (Not interpreted): It is very different, completely**
 2 **different, because the caesium included -- inhaled in**
 3 **body go out half -- about 80 days become half. Then one**
 4 **year later, about one-tenth or more or less.**
 5 **So 20 whole years later, completely decrease. So we**
 6 **cannot measure the effect of fallout radiation just**
 7 **after the bombing.**
 8 **So this description is not correct. Entirely**
 9 **different.**
 10 Q. Well, let's look at the description. So under the table
 11 on page 215 you'll see that 10 of the 15 persons who had
 12 had a high or relatively high burden were measured for
 13 a second time in 1981 and there had been a decrease in
 14 the amount of caesium-137 in their body, hadn't there?
 15 **A. (Not interpreted): This clarified the degree of caesium.**
 16 Q. Of excretion, of the body expelling the caesium, yes.
 17 **A. (Not interpreted): Yes, so this shows that it's very**
 18 **difficult to estimate just after the bombing fallout**
 19 **effects.**
 20 Q. But if we look at the final paragraph, the conclusion,
 21 if you like:
 22 "Using the above data ... the internal dose in the
 23 40 years from 1945 to 1985 is estimated at 10 millirem
 24 for males and 8 millirem for females ..."
 25 Do you see that?

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1 **A. (Not interpreted): Yes. This decrease of 7 point the**
 2 **whole years shows they inhale from the circumstances to**
 3 **eat vegetable, et cetera, then from ground to absorb**
 4 **caesium, then the circumstances decrease, 7.0 years**
 5 **become half. They measured only the circumstances**
 6 **caesium. So inside body is not -- is entirely**
 7 **different.**
 8 Q. Now, I have a history, Professor, in these proceedings
 9 of getting this wrong but 10 millirem is about 0.1
 10 millisieverts, is that right?
 11 **A. Yes.**
 12 Q. So the dose rate for the 40 years from 1945 to 1985 for
 13 the males was 0.1 and 0.08 for the females?
 14 **A. (Not interpreted): This information is completely**
 15 **misleading.**
 16 MR JUSTICE BLAKE: Yes, I have you disagree with this method
 17 of calculation.
 18 MR HEPPINSTALL: But the reason why the RERF has not taken
 19 into account internal dose within the LSS is because of
 20 results such as these that show that the contribution to
 21 dose for internal contamination is very low?
 22 **A. (Not interpreted): Initiation of study of RERF is**
 23 **subjective to the beginning ABCC's study policies,**
 24 **continued in 1975 ABCC's growth, but the total study**
 25 **principle -- success -- continue. So their policy to**

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<p>1 study ABCC is the same. The same policy with ABCC. And</p> <p>2 ABCC is constructed by Professor Truman's direction, and</p> <p>3 Professor Truman want to -- when use the nuclear bomb</p> <p>4 the effect of initial radiation is very important. So</p> <p>5 it is better to study the A bomb survivor to study such</p> <p>6 effect. That is the initial view.</p> <p>7 Q. Professor Sawada, the problem is this. The RERF has</p> <p>8 carried out studies such as we've just looked at to try</p> <p>9 and estimate the contribution to dose from internal</p> <p>10 exposure, yes?</p> <p>11 A. (Not interpreted): In this chapter 6 of DS86 describe</p> <p>12 the residual radiation effect, but as you explain how</p> <p>13 the reality is completely misleading.</p> <p>14 MR JUSTICE BLAKE: I think another question is coming.</p> <p>15 I have down that you disagree with the calculations and</p> <p>16 we may have to go back and explore why, but I think --</p> <p>17 MR HEPPINSTALL: I beg your pardon, my Lord.</p> <p>18 MR JUSTICE BLAKE: Don't worry, take instructions. You had</p> <p>19 better listen in case I get your question wrong.</p> <p>20 MR HEPPINSTALL: Yes.</p> <p>21 MR JUSTICE BLAKE: I think the question was, first of all,</p> <p>22 they were seeking your agreement with the proposition</p> <p>23 that the RERF has tried to assess internal dose. Do you</p> <p>24 agree that they've tried to do it? Whether they</p> <p>25 succeeded or not may be another matter.</p> <p style="text-align: center;">Page 45</p>	<p>1 hypocentre. What evidence of dose do you --</p> <p>2 A. (Not interpreted): That shows the internal effect is</p> <p>3 very important.</p> <p>4 Q. But, but ...</p> <p>5 A. (Interpreted): The mushroom cloud --</p> <p>6 (Not interpreted): Produced by.</p> <p>7 (Interpreted) -- forms when --</p> <p>8 (Not interpreted): Rising fire ball, rising. Then</p> <p>9 in the centre of the fire ball is filled by radioactive</p> <p>10 particles and these radioactive go up, then the</p> <p>11 raindrop, the rain, catch and make raindrop of mushroom</p> <p>12 cloud. Then mushroom cloud raindrop continue the</p> <p>13 radioactive particle.</p> <p>14 MR JUSTICE BLAKE: I think, can I just pause and interrupt</p> <p>15 your answer, because I think you've told us about the</p> <p>16 mechanisms and you've just described it again. For</p> <p>17 myself, I understand what you are telling us about your</p> <p>18 views about the mechanism. But the questions that has</p> <p>19 been asked for some time now is how you were able to</p> <p>20 give an assessment of measurement of dose in figure 6</p> <p>21 and I'm afraid we don't know the answer to that</p> <p>22 question.</p> <p>23 MR HEPPINSTALL: For example, Professor, the caesium-137</p> <p>24 which was found in Nishiami, we don't know the mechanism</p> <p>25 but let's assume it was fallout from the cloud, yes, and</p> <p style="text-align: center;">Page 47</p>
<p>1 A. (Not interpreted): I do not agree with the RERF policy.</p> <p>2 I've been there and discuss their scientists, but I --</p> <p>3 some scientists are very intimate friend, but the total</p> <p>4 policy of RERF did not -- different. Different.</p> <p>5 MR JUSTICE BLAKE: I just got you recording -- I'll read</p> <p>6 back what I've written down and see whether you agree.</p> <p>7 "I do not agree that RERF has tried to carry out</p> <p>8 assessments of internal dose."</p> <p>9 Is that your answer?</p> <p>10 A. (Interpreted): No, I don't -- I disagree.</p> <p>11 (Not interpreted): Only partially they consider.</p> <p>12 Only partially.</p> <p>13 MR JUSTICE BLAKE: "I do not agree that they tried to carry</p> <p>14 out an assessment of internal dose because they have</p> <p>15 only partially considered it."</p> <p>16 Yes?</p> <p>17 A. (Nodded assent)</p> <p>18 (Not interpreted): Very partial. Very partial, yes.</p> <p>19 MR JUSTICE BLAKE: All right.</p> <p>20 MR HEPPINSTALL: Returning back to the 800 millisieverts or</p> <p>21 milligrays, sorry, in your figure 6.</p> <p>22 RERF have gone looking in soil and people's body for</p> <p>23 evidence of dose.</p> <p>24 I still do not understand what you have done to get</p> <p>25 such a high dose at such a great distance from the</p> <p style="text-align: center;">Page 46</p>	<p>1 some scientists went to work out the dose. What data</p> <p>2 have you relied on for your -- let's just take this</p> <p>3 example of 800 milligray.</p> <p>4 A. (Not interpreted): I analyse the LSS's incidence rate,</p> <p>5 then I could find the long distance part, fallout</p> <p>6 effect.</p> <p>7 Q. Right. Can I hazard a guess and you can tell me whether</p> <p>8 I'm right or wrong. Is it the product of some sort of</p> <p>9 mathematical equation or construct that gives you that?</p> <p>10 A. (Nodded assent).</p> <p>11 Q. Can you list out for us as simply as possible what the</p> <p>12 ingredients of that mathematical equation or</p> <p>13 construct were?</p> <p>14 A. (Not Interpreted): Chi is the Greek letter Chi. That is</p> <p>15 the Chi square method then I have from incidence rate of</p> <p>16 survivor (inaudible), then by use of Chi square method</p> <p>17 I could find effect of fallout radiation.</p> <p>18 Q. There's a word there: "high scale"?</p> <p>19 DR RAYNOR: "Chi squared".</p> <p>20 MR HEPPINSTALL: Which I picked up in your text on</p> <p>21 paragraph 12.</p> <p>22 So have you tried to somehow correlate the incidence</p> <p>23 of epilation to doses which you are assuming or you</p> <p>24 worked out were experienced at, say, 6 kilometres from</p> <p>25 the hypocentre? Have you tried to work out where the</p> <p style="text-align: center;">Page 48</p>

1 people were who had heavy hair loss and tried to
 2 correlate that?
 3 **A. (Nodded assent).**
 4 Q. Right. How did you do that? Because I'm not clear on
 5 how one could do that.
 6 **A. (Not interpreted): Even at 6 kilometre from Ground Zero**
 7 **hair loss is found about near 1 per cent or 0.8 per cent**
 8 **in Hiroshima.**
 9 Q. Yes, so look at figure 5 --
 10 **A. (Not interpreted): In Nagasaki, a third of a kilometre**
 11 **the hair loss is about 2 per cent or more.**
 12 Q. So if you look at figure 5 you have your incidence
 13 against distance?
 14 **A. (Not interpreted): Mm, yes.**
 15 Q. So you are going up in squares of 5 per cent?
 16 **A. (Not interpreted): Yes.**
 17 Q. So at 6-kilometres what are you saying the incidence
 18 rate is?
 19 **A. (Not interpreted): About 0.8 kilometre.**
 20 Q. Per cent?
 21 **A. 0.8 per cent.**
 22 Q. Right, 0.08 per cent. Okay, so we've got that, and we
 23 know the incident rate against the dose in figure 4.
 24 What do we do next?
 25 **A. (Not interpreted): That is Chi square method. It is**

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1 **an important method to do from data for the effect of**
 2 **radiation. That is a very important method.**
 3 Q. But how on earth does that data tell you that people at
 4 6 kilometres, in particular people at 6 kilometres with
 5 these high levels of hair loss -- well, how do you get
 6 there first? How do you quantify that so that you can
 7 then correlate it against dose?
 8 MR TER HAAR: My Lord, I wonder if I can assist. It's
 9 taking a while but in fact there is a language problem.
 10 In fact whether the method is right or not, what has
 11 been done is quite simple.
 12 MR JUSTICE BLAKE: I had better give him another attempt.
 13 Hang on.
 14 **A. (Not interpreted): You see figure 9.**
 15 MR HEPINSTALL: Figure 9, right.
 16 **A. (Not interpreted): This is an analysis. And figure ...**
 17 **Nagasaki, Nagasaki city and Nagasaki prefecture study**
 18 **the effect of acute radiation incidence rate in 1999,**
 19 **and from their data I could found that even a third of a**
 20 **kilometre from Ground Zero the effect of fallout**
 21 **radiation is about more than 1 gray. Because mushroom**
 22 **cloud extend very rapidly compared Hiroshima mushroom**
 23 **cloud, I found about four times more rapidly extend the**
 24 **mushroom cloud over Nagasaki.**
 25 **Then effect of fallout is very important, because**

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1 **radiation decrease -- before radiation decrease the**
 2 **fallout beat (inaudible) over people around even**
 3 **two-thirds of a kilometre.**
 4 Q. Professor, just leaving the method to one side for
 5 a moment and whether we look at figure 9 or we look at
 6 figure 6, these are very high levels of dose at very
 7 great distances from the hypocentre, aren't they? If
 8 you are looking at figure 9 you are going as far as 11
 9 or 12 kilometres and we are looking at 1.5 grays of
 10 dose. Now they are totally at odds with the rest of the
 11 evidence, aren't they?
 12 **A. (Not interpreted): Not different from -- because some**
 13 **exploded the power of the Nagasaki bomb is 1 point to 4**
 14 **times more stronger than Hiroshima bomb, and the**
 15 **mushroom cloud extended more rapidly than Hiroshima,**
 16 **four times rapidly, then effect of (inaudible) from the**
 17 **Hiroshima (inaudible) of 0.8 gray and Nagasaki is 1**
 18 **point to 2 or 1 point to 3 gray. This is consistent to**
 19 **the explosion path and spreading the speed of the**
 20 **mushroom cloud.**
 21 Q. So you are explaining the difference between Hiroshima
 22 and Nagasaki, I understand that, but the RERF scientists
 23 have conducted experiments using real data, so they
 24 looked at real people with real isotopes in their bodies
 25 and measured them.

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1 First of all, isn't that a far better way of working
 2 out internal dose than some sort of manipulation of
 3 data? And I don't imply by the word "manipulation"
 4 anything -- let's call it analysis of data or
 5 mathematical analysis of data.
 6 Isn't that a far better way of working out internal
 7 exposure than what you have done?
 8 **A. (Not interpreted): Most of the scientists in the world**
 9 **I think only consider the physics method and do not**
 10 **consider the human body effect. I think to understand**
 11 **the internal exposure effects it is necessary to study**
 12 **the human body effects. Then I want younger people in**
 13 **future human being to study the human effect because**
 14 **RERF there are many examine the data concerning to the**
 15 **acute disease, but these data mainly only store and not**
 16 **study.**
 17 **So I think for human being it is better to**
 18 **understand all human being to study the internal**
 19 **exposure effects from this data.**
 20 MR JUSTICE BLAKE: Is it accurate to summarise that answer
 21 that you think it's important to study the human body
 22 for the effect of internal radiation?
 23 **A. (Nodded assent).**
 24 MR JUSTICE BLAKE: Right. Okay. Now, I just want to go
 25 back to the question, because I think it was being put

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<p>1 to you that it is better to get this information about 2 dose exposure at distance from studying the human body 3 and what you find there and working back to how much 4 there was originally, to making a mathematical 5 calculation of some other sort without studying the 6 body. Do you want to translate that? 7 A. (Not interpreted): Yes. Yes, I -- 8 MR JUSTICE BLAKE: You agree with that? 9 A. (Nodded assent). 10 MR JUSTICE BLAKE: Yes, well -- 11 MR HEPPINSTALL: I think at that stage I've discharged my 12 duties and put my case on that topic and I propose to 13 move on to the second of two, you will be happy to know, 14 topics I am conscious of the time. 15 A. (Not interpreted): As a survivor I want England 16 Government to study the atomic soldier effects. The 17 statistical effect can be found from these effects or 18 atomic soldiers' internal exposure effects. 19 MR JUSTICE BLAKE: I think we have probably come to the end 20 of that topic. Are you all right to carry on now? We 21 are going to change to another topic. 22 MR TER HAAR: Before Mr Heppinstall does, I am concerned 23 that what the witness was saying -- I did, I think, get 24 to use the expression "lost in translation" -- because 25 actually, whether it be right or not, the exercise</p> <p style="text-align: center;">Page 53</p>	<p>1 MR HEPPINSTALL: 12, please. 2 Do you have that paper, professor, it's "Studies of 3 the Mortality of Atomic Bomb Survivors, Report 14" 4 A. (Nodded assent) 5 Q. I know there will be a whole series of reports, and this 6 is just an example, I am just using it as an example. 7 So this is the end product, isn't it, if you like, 8 of the LSS, where they assess the excess relative risk 9 of, I think in this case, cancer and non-cancer diseases 10 against the dose. 11 A. (Not interpreted) Table 9? 12 Q. Sorry, we are on page 229, the first page of this paper. 13 A. (Not interpreted) Yes. 14 Q. And -- well -- 15 MR JUSTICE BLAKE: Are you familiar with this paper? 16 A. (Not interpreted) Already I did. 17 MR JUSTICE BLAKE: Yes. 18 MR HEPPINSTALL: Let's look at 233, let's get into it, shall 19 we? 20 MR JUSTICE BLAKE: Move on. 21 MR HEPPINSTALL: Yes. 233. 22 MR JUSTICE BLAKE: 233, the left-hand side. Yes. 23 MR HEPPINSTALL: We have the causes of death of the 24 survivors, and we have the excess relative risk per gray 25 of exposure at the 95 per cent confidence interval in</p> <p style="text-align: center;">Page 55</p>
<p>1 carried out at figures 4, 5 and 6 is, in concept, 2 extremely simple. I'm not convinced it came over. 3 MR JUSTICE BLAKE: Well, re-examination, I'm afraid. 4 MR TER HAAR: I don't have a right to re-examine. 5 Perhaps -- 6 MR JUSTICE BLAKE: Unless you want to exercise delegated 7 powers. We have been trying for some time and it's 8 really what his explanation is. 9 MR TER HAAR: Perhaps if I would be permitted to have 10 an unusual right of re-examination in that regard. 11 MR JUSTICE BLAKE: Well, you have to agree that with 12 Mr Busby. 13 DR BUSBY: We would support that, my Lord. 14 MR JUSTICE BLAKE: Right. Okay. 15 A. (Not interpreted) Figure 4 -- 16 MR JUSTICE BLAKE: I think we've got to move on because I'm 17 conscious of the time and we have lot to fit in today. 18 If Mr Busby is content for you to re-examine and 19 anything else he wants you to do. Right. 20 MR HEPPINSTALL: Do you have SB17? 21 MR JUSTICE BLAKE: Could we put any of these bundles away, 22 or are we going to be needing 4, 5 and --? 23 MR HEPPINSTALL: You'll need 5 again. 24 MR JUSTICE BLAKE: Righty ho, just checking. (Pause). Which 25 tab would you like us to go to?</p> <p style="text-align: center;">Page 54</p>	<p>1 the next column. And then we have some depictions of 2 that ERR in the diagram on the right. Do you see that? 3 Yes? 4 A. (Not interpreted) Yes. 5 Q. And it's that data that gets us to the graph which may 6 be the centre piece of these entire proceedings at 7 page 237, figure 4: 8 "Excess relative risk for all solid cancer in 9 relation to radiation exposure." 10 There we have the L&T(?) model, the dose against ERR 11 rising from 0 ERR up to somewhere around 1.2/1.4 at 3 12 greys. Do you see that? 13 A. (Interpreted): This figure 4 only take into 14 consideration initial (Not interpreted) Initial 15 radiation only. The weighted colon dose only consider 16 initial radiation and do not consider the fallout 17 radiation. So 0.0 means distant survivor exposure 18 because only initial radiation is considered. Then 0.0 19 means the 0.0 ERR is distant survivor's ERR. 20 So you should consider to the long(?) radiation 21 effects of people is more distant from this graph, 22 more -- about 1.2 or 1.4 is the fallout effect, then 23 this line should extend to 1.4. 24 So effect of human being may be (inaudible) 25 represented.</p> <p style="text-align: center;">Page 56</p>

<p>1 Q. I didn't follow that answer, Professor Sawada, but can 2 I try this? 3 MR JUSTICE BLAKE: Listen to the question first. 4 MR HEPPINSTALL: As I understand it your criticism is that 5 the doses upon which this is based have been 6 underestimated? 7 A. (Interpreted): It's not my view, it's the fact that the 8 doses ... 9 Q. Well, the Tribunal are interested in your opinion, and 10 your opinion is, as I understand it, the doses have been 11 underestimated. 12 A. (Not interpreted) Not my opinion. 13 Q. Right. 14 A. (Not interpreted) But the truth. 15 MR JUSTICE BLAKE: Well, it's also your opinion, and if it's 16 the truth as well, well, that's a good opinion. But 17 let's just deal with your opinion for the moment. 18 MR HEPPINSTALL: Do you agree, though, that if the -- do you 19 agree that the biological effect, so looking at figure 20 4, the cancer that has been monitored and identified by 21 the LSS study, do you agree that the rates of incidence 22 are correct? So do you agree that the biological effect 23 described is correct? 24 A. (Not interpreted) Solid Cancer is a biological effect, 25 but those and the ERR evaluation(?) do not correctly</p> <p style="text-align: center;">Page 57</p>	<p>1 they'd still -- you would still see the same biological 2 effect. Is that right? 3 A. (Not interpreted) Yes. 4 Q. Is that a --? 5 A. (Not interpreted) So to understand true effect of 6 radiation. 7 Q. Yes. 8 A. (Not interpreted) The radiation effect of initial 9 radiation and the fallout radiation effect is the same. 10 Q. Mm. 11 A. (Not interpreted) But the effect, when they inhaled the 12 fallout particle, entirely different to effects because 13 fallout radiation continuing and accumulated. 14 Q. Do you agree with me that if you increase the level of 15 dose and have the same biological effect the risk would 16 go down? 17 A. (Nodded assent) 18 Q. Yes. 19 20 A. (Not interpreted) The biological effect is the same, but 21 the process to exposure is entirely different. That is 22 very important. 23 Q. Let's look at another study, SB5/53. 24 Now, are you familiar with this study, Professor? 25 A. (Not interpreted) No.</p> <p style="text-align: center;">Page 59</p>
<p>1 consider the effect of fallout radiation. 2 Q. Yes. So on your graph you would have a lower risk per 1 3 gray of radiation because you would be increasing the 4 doses but keeping the biological effect the same. So in 5 fact the risk per 1 gray of dose would be lower, 6 wouldn't it? 7 A. (Not interpreted) It is better to understand from this 8 paper, figure 9. 9 Q. Figure 9, yes. 10 THE INTERPRETER: Table 9? 11 A. (Not interpreted) Table 9, this is very important. This 12 observed and excess deaths from solid cancer and 13 non-cancer disease, and the most higher class is less 14 than 0.005. This is -- this means distance survivors. 15 Q. Yes, but -- 16 A. (Not interpreted) And the number of excess cases is only 17 2, and attributed to the (inaudible) is 0. So this 18 figure, the table shows, that the distant survivors 19 affected completely neglected. So I should consider -- 20 I want to consider the effect of fallout, even solid 21 cancer effect. 22 Q. But you want to attribute to the survivors -- not all of 23 them, but a portion of them -- a level of dose that the 24 RERF, the LSS, has not attributed to them. So they 25 would -- in your study they'd have higher doses, but</p> <p style="text-align: center;">Page 58</p>	<p>1 Q. You are not familiar? 2 A. (Not interpreted) (inaudible). 3 Q. Sorry? 4 A. (Not interpreted) (inaudible). 5 Q. This is this study of a -- this is the report of a study 6 that I think is referred to as INWORKS. You can see 7 from "Methods" that 308,000 workers in the nuclear 8 industry in France, the United Kingdom and the 9 United States have been monitored for external exposure 10 and then linked to death registries. This gives you 11 an excess relative rate per gray of radiation dose for 12 mortality from cancer. Do you see that from "Methods"? 13 A. (Not interpreted) I understand. 14 Q. If at any stage you want to take a moment to read it, 15 read this or looking at this paper in your own time, 16 then please tell us. 17 A. (Not interpreted) Now? 18 Q. Well, let's proceed. I can give you the bare facts and 19 I can be corrected. 20 So we've looked at the size of the study, 308,000. 21 If you look under "Study Answer and Limitations" you see 22 that the average community of colon dose was 29.9 23 milligray. Do you see that? 24 A. (Not interpreted) Okay. 25 Q. If you look under what this study adds, you'll see:</p> <p style="text-align: center;">Page 60</p>

<p>1 "The study provides direct estimate of the 2 association between protracted low dose exposure to 3 ionising radiation and solid cancer mortality. Although 4 high does rate exposures are thought to be more 5 dangerous than low dose rate exposures, the risk per 6 unit of radiation dose for cancer among radiation 7 workers was similar to estimates derived from studies of 8 Japanese atomic bomb survivors." 9 If you turn over to page 5 you'll see under 10 "Comparison with other studies", it says at the bottom 11 of the first column: 12 "The primary basis for the radiation risk estimates 13 used to establish contemporary radiation protection 14 standards comes from analyses of cancer in the Life Span 15 Study of the Japanese atomic bomb survivors." 16 So that's the papers we were looking at, or papers 17 of that type. Or in that series, perhaps, I should say. 18 Yes? 19 MR JUSTICE BLAKE: Do you want to read on? 20 MR HEPPINSTALL: Then you will see: 21 "Historically it's been assumed that radiation-solid 22 cancer associations diminish with falling dose..." 23 We looked at figure 4. 24 "For example, the ICRP recommended that regulators 25 divide the radiation risk coefficients obtained from the</p> <p style="text-align: center;">Page 61</p>	<p>1 survivors of the Japanese atomic bomb exposed at ages 2 20-60 years." 3 A. (Not interpreted) This is different to my understanding 4 because I did effect of (inaudible words) result, then 5 the estimation are of RERF and of internal radiation 6 effects very different. So this is a paper showed that 7 different position compared to the RE -- RC -- the ICRP 8 status, because RC -- ICRF (sic) said that under 100 9 milligray there are no evidence, said; but this is 20 10 million -- 20 milligray effects already found. So 11 completely different from ICRP position. 12 But the effect of 1 gray exposure is similar to the 13 A bomb survivor I could not understand. 14 Q. Let's try it a different way, let's look at tab 48 now, 15 please. This is a paper from the British Journal of 16 Cancer 2009, and this a similar study to the one we've 17 just looked at but this only focuses on something called 18 the National Registry for Radiation Workers, which has 19 been set up by a British Government body. You can see 20 at table 1 this is where it acquires its data from, on 21 page -- well, the second page, 207. 22 You can see that it has accumulated data from 23 various organisations where exposures to ionising 24 radiation occur at work. 25 I'll let you read that. (Pause)</p> <p style="text-align: center;">Page 63</p>
<p>1 study of Japanese atomic bomb survivors in half when 2 estimating risks for cancers other than leukaemia in 3 settings with exposures of low dose and low dose rate 4 radiation." 5 Then if you go on you'll see that it states: 6 "Our estimated association between radiation and 7 solid cancer (excess relative rate 0.47 per Gy ...) is 8 larger than but statistically compatible with the 9 estimate from a mortality analysis of male survivors of 10 the Japanese atomic bomb exposed at ages 20-60." 11 So in short, professor, this very separate study of 12 radiation workers provides support, doesn't it, to the 13 LSS results? 14 A. (Not interpreted) I could not understand. 15 Q. You? 16 A. (Not interpreted) I could not understand. 17 MR JUSTICE BLAKE: The question or the study? 18 A. (Not interpreted) The question. 19 MR HEPPINSTALL: The question. So we've just been looking 20 there at the conclusion of this study. Perhaps the key 21 thing to read are these words on page 5 in the second 22 column, second paragraph, and I'll read them out again: 23 "Our estimated association between radiation and 24 solid cancer is larger than but statistically compatible 25 with the estimate from mortality analysis of male</p> <p style="text-align: center;">Page 62</p>	<p>1 Do you want to also read the opening paragraph of 2 the paper that starts, "Estimates of the long-term 3 health risks from ionising radiation". 4 MR JUSTICE BLAKE: Down to "leukaemia mortality"? 5 MR HEPPINSTALL: Yes, my Lord. (Pause) 6 MR JUSTICE BLAKE: Yes. 7 MR HEPPINSTALL: If you turn to page 210 you get the result, 8 for our purposes, at the bottom of the page, the bottom 9 of the first column on that page. It's a paragraph 10 starting "Figure 2 shows good agreement". Do you want 11 to read that down to the end of that paragraph on the 12 next column, which is "DDREF of 2". Could you read 13 that? (Pause) 14 A. (Not interpreted) I could not agree because -- to the 15 more detail with this paper, but the conclusions are 16 very (inaudible). 17 MR JUSTICE BLAKE: I can't agree with conclusions of the 18 paper -- sorry, could you just repeat what your 19 information you just gave us was? 20 A. (Not interpreted) I need to read it more carefully, this 21 approach and this book. 22 MR JUSTICE BLAKE: You need to read it more carefully? 23 A. (Not interpreted) And scientists consider is very 24 important to these. 25 MR JUSTICE BLAKE: Yes.</p> <p style="text-align: center;">Page 64</p>

<p>1 MR HEPPINSTALL: Well, my Lord, in fact, the turn that the 2 cross-examination has taken, I am now almost on my last 3 question. If the professor wants to take time to 4 consider the paper then I can ask my last questions 5 afterwards. Then we may have time, I think we are now 6 at quarter past twelve. I don't know how long the 7 professor would require.</p> <p>8 MR JUSTICE BLAKE: Right. So how long would you like to 9 take to read -- is it this paper or this paper and the 10 previous paper?</p> <p>11 A. (Not interpreted) Both.</p> <p>12 MR JUSTICE BLAKE: Both.</p> <p>13 MR HEPPINSTALL: I can also perhaps indicate, fairly, that 14 I'm sure the professor understands that we are 15 correlating here the results of the LSS with these two 16 studies and that's what my questions will be about.</p> <p>17 MR JUSTICE BLAKE: Okay. Can I suggest, see how we go, that 18 if we adjourn now and give the professor time to read 19 these two papers, can we resume at half past one?</p> <p>20 MR HEPPINSTALL: Yes, my Lord, very well.</p> <p>21 MR JUSTICE BLAKE: We could try to complete in 15 minutes, 22 if you get a decent run. Then some time for 23 re-examination. We might complete the evidence in half 24 an hour or thereabouts.</p> <p>25 MR HEPPINSTALL: Yes. I am in other's hands in</p> <p style="text-align: center;">Page 65</p>	<p>1 these reports over lunchtime. This is going to take 2 time."</p> <p>3 MR JUSTICE BLAKE: Well, we'll see how far we go.</p> <p>4 MR CHARLTON: One other very brief matter, my Lord, is in 5 fact -- I don't think it makes a difference -- but 6 Dr Schmitz Feuerhake will not be leaving until tomorrow 7 afternoon.</p> <p>8 MR JUSTICE BLAKE: We may need to spill over into tomorrow 9 morning --</p> <p>10 MR CHARLTON: That is possible. We are hoping to avoid it, 11 but it is possible.</p> <p>12 MR JUSTICE BLAKE: -- with her. Let's take a look at that 13 at some point. I am going to rise at some point in the 14 afternoon and we'll see how far we've got.</p> <p>15 Just another topic, just before you begin, I raise 16 this with a degree of circumspection but over the short 17 adjournment Dr Rayner was helping we understand Chi 18 square. What I am about to say is me, and if I get it 19 wrong it's down to me, not anyone else, but it might 20 just help comprehension if what I am about to say might 21 conceivably be the topic that Mr ter Haar might have 22 been re-examining on. But if you all look glum and 23 shake your head I fully understand.</p> <p>24 My understanding is that if, from tables 4 and 5, 25 you can get a dose estimate from hair loss, then if you</p> <p style="text-align: center;">Page 67</p>
<p>1 re-examination.</p> <p>2 MR JUSTICE BLAKE: Quite.</p> <p>3 MR HEPPINSTALL: 15 minutes, with a fair wind, is --</p> <p>4 MR JUSTICE BLAKE: Right. Then we'll move on.</p> <p>5 So thank you for being with us, professor, and Madam 6 Interpreter. We are going to rise now. Can I explain 7 what we are proposing to do. We will take a break now. 8 We will come back at half past one, and I hope you can 9 stay with us until then, please, and then in the next 30 10 or so minutes we will complete the questions and 11 re-examination. Yes?</p> <p>12 Then we'll move on to Professor Schmitz Feuerhake. 13 Thank you very much.</p> <p>14 (12.20 pm)</p> <p>15 (The short adjournment)</p> <p>16 (1.30 pm)</p> <p>17 MR HEPPINSTALL: My Lord, Mr Charlton has spoken to me just 18 before we started and I think he wants to relay 19 something that Professor Sawada said to him.</p> <p>20 MR CHARLTON: Well, actually he said to Dr Busby. I think 21 there was a misunderstanding at the end and I rather 22 regret that perhaps I wasn't more forceful in raising 23 the matter. As we suspected, we pointed out to him "You 24 are meant to be looking at the reports" and he said, 25 I think to Dr Busby, that "I can't possibly look at</p> <p style="text-align: center;">Page 66</p>	<p>1 get a dose estimate from hair loss at 6 kilometres you 2 can use mathematically the Chi square calculation to 3 assess dose more generally.</p> <p>4 MR TER HAAR: That may also be true. That is not, 5 I think --</p> <p>6 MR JUSTICE BLAKE: I don't want to take up time.</p> <p>7 MR TER HAAR: I think I can put it very simply. The simple 8 point, there's a more complicated point which comes to 9 me now, but the simple point is that if you take the LSS 10 data as adjusted in the way that Professor Sawada 11 describes in his report, you would expect effectively 12 there to be minimal hair loss from radiation, for 13 example, at 6 kilometres. In fact, the actual rate of 14 hair loss, 6 kilometres out from the epicentre -- I take 15 that as one example -- is much higher, therefore you 16 work back and say: that means either you had a higher 17 dose there or you have some other factor which would 18 explain it.</p> <p>19 But that's the statistical issue which arises.</p> <p>20 MR HEPPINSTALL: The only explanation can be 21 Professor Sawada's explanation. We may all have our 22 own -- I may have my own understanding but I can't put 23 it to Professor Sawada, he has to put it to us.</p> <p>24 MR JUSTICE BLAKE: Right. I am just trying to possibly 25 raise a topic which might shortcut but if it doesn't,</p> <p style="text-align: center;">Page 68</p>

<p>1 I'm sorry. There we are. 2 MR HEPPINSTALL: Yes. 3 Professor Sawada, have you had a chance to look at 4 the document at tab 48, the National Register of 5 Radiation Workers? 6 Well, did you re-read or look at the passages you 7 were asked to read? 8 A. (Not interpreted): Yes. I already did. 9 Q. Yes. So you understand what the authors are saying is 10 that there's a correlation between the results of this 11 study and the results of the LSS? 12 A. (Interpreted): In order to judge that, I need to read 13 the paper thoroughly, including the background 14 information. 15 As a scientist I need to read carefully and 16 understand the background of their argument. So not 17 like reading a novel. 18 Q. Professor Sawada, in your report you are critical of the 19 LSS model, aren't you? 20 A. (Interpreted): I think the data LSS has is precious and 21 important because that is of what ABCC studied in 1950s. 22 (Not interpreted): ABCC examined, you know, people 23 effect. But to analyse and to deduce these recent data 24 it's important to consider all exposure effects, 25 including internal exposure. But ABCC and RERF do not</p> <p style="text-align: center;">Page 69</p>	<p>1 (Not interpreted): A bomb survivors' study. 2 (Interpreted): -- a bomb survivors' study. 3 (Not interpreted): Who ingest the radiation effect. 4 The effects are very different effects. 5 Q. But, Professor, if you have a study where the dose is as 6 certain as it could ever possibly be, and the biological 7 effect of that dose is the same or following the same 8 model as the Japanese A bomb survivor cohort, doesn't 9 that give you an amount of confidence that the risk 10 levels in the LSS are correct? 11 A. (Interpreted): If you look at part 48, the study. 12 (Not interpreted): This is the title. 13 (Interpreted): Okay, "Mortality and cancer incidence 14 following occupational radiation exposure". 15 Q. Yes. 16 A. (Interpreted): The first paragraph I read in this study, 17 research paper, says -- ICRP. 18 THE INTERPRETER: Okay, this paper only refers to "ICRP"... 19 A. (Interpreted): I assume that they use data of RERF. But 20 we don't know how they have understood and use that 21 data. 22 Q. Sorry. As you looked at before lunch, this is a study 23 of UK dosimetry for those in occupations where there is 24 a risk of exposure to ionising radiation? 25 A. (Interpreted): Yes, I understand, but in order to</p> <p style="text-align: center;">Page 71</p>
<p>1 consider internal exposure. 2 So LSS data is very important, but down from LSS 3 data it is necessary to consider all effects of 4 exposure. 5 Q. Were you aware that there were other studies in other 6 parts of the world trying to replicate or test the LSS 7 data? 8 A. (Not interpreted): I know. 9 Q. So were you aware, for example, of the INWORKS study 10 that we looked at this morning? 11 A. (Interpreted): It is -- we cannot evaluate their study. 12 (Not interpreted): Take into account. 13 (Interpreted): We don't know if their study is 14 taking into account internal and both internal and 15 external effects. 16 Q. Well, the INWORKS study makes it perfectly clear that 17 it's only external radiation that is being looked at. 18 If we look at the National Registry data, you agree 19 that we are looking at people in occupations where their 20 doses are closely monitored and recorded, aren't we? 21 A. (Interpreted): So it is nonsense to compare these two 22 totally different studies, one which is a study on -- 23 like a national register. 24 Q. Registry. 25 A. (Interpreted): Registry, and others, others which is --</p> <p style="text-align: center;">Page 70</p>	<p>1 consider their study and compare with the Japanese 2 atomic bomb victims, so we need to be careful and we 3 need to know how we compare this study and the study on 4 atomic bomb victims. 5 Q. Well, surely the conclusion that one draws, Professor, 6 is notwithstanding the uncertainties about dose in the 7 LSS, the risk model that LSS produces is fairly secure 8 because we find it replicated in other exposed 9 populations? 10 A. (Interpreted): LSS is not a risk model, it's just 11 an accumulation of data taken from -- 12 (Not interpreted): You do not misunderstand that LSS 13 is only examining the data accumulation, and not a risk 14 model. So you must discriminate this assessment 15 meaning. 16 Q. You agree, do you not, that the ICRP risk model is 17 largely based on the LSS result? 18 A. (Not interpreted): I also LSS data model, data, so how 19 to analyse the LSS data considering both internal and 20 external exposure. But if completely ignores the health 21 of the internal exposure then analysis based on LSS is 22 different result. This is a very important point. 23 Q. Do you think it is important when providing evidence to 24 this Tribunal to mention evidence that does not support 25 the LSS results, the ICRP risk model, as well as</p> <p style="text-align: center;">Page 72</p>

<p>1 evidence that does support that risk model?</p> <p>2 A. (Interpreted): The UK and nuclear workers have had both</p> <p>3 external and internal exposures, and this study only</p> <p>4 considers external exposure. So I need more time to</p> <p>5 read this paper carefully to answer your questions.</p> <p>6 MR HEPPINSTALL: My Lord, I have no further questions.</p> <p>7 I don't know whether the members of the panel have any</p> <p>8 questions before we turn to re-examination.</p> <p>9 Questions from the Tribunal</p> <p>10 DR RAYNER: Thank you very much. I wonder if I can ask</p> <p>11 a question. It's about the screening process that</p> <p>12 happens for the LSS study. So what exactly does the</p> <p>13 screening process consist of? As I understand it, it's</p> <p>14 an annual event.</p> <p>15 A. (Not interpreted): What means you are "screening"?</p> <p>16 What?</p> <p>17 DR RAYNER: A sort of --</p> <p>18 A. (Not interpreted): Exposure screening or ...?</p> <p>19 DR RAYNER: A physical examination, blood tests, scans. Do</p> <p>20 you understand what I mean?</p> <p>21 A. (Not interpreted): A bomb survivor is screening every</p> <p>22 year, maybe twice every year.</p> <p>23 DR RAYNER: Twice every year.</p> <p>24 A. (Not interpreted): So incidence rate of cancer is very</p> <p>25 high of atomic bomb survivor but the mortality is rather</p> <p style="text-align: center;">Page 73</p>	<p>1 A. (Interpreted): Mammography.</p> <p>2 DR RAYNER: A mammogram. Okay. Anything else?</p> <p>3 A. (Not interpreted): I ask Japanese Government to more</p> <p>4 widely check, but very limited.</p> <p>5 DR RAYNER: Right. Okay, thank you.</p> <p>6 A. (Not interpreted): But that is even to find cancer</p> <p>7 effects, so mortality decrease.</p> <p>8 DR RAYNER: Thank you.</p> <p>9 MR JUSTICE BLAKE: Thank you. I think that completes any</p> <p>10 questions we have.</p> <p>11 Are you going to re-examine?</p> <p>12 MR TER HAAR: Yes, is the answer and I am hopefully doing it</p> <p>13 on behalf of all of those on this side of the room.</p> <p>14 DR BUSBY: Just the one point.</p> <p>15 MR TER HAAR: I think I will not ask any further questions,</p> <p>16 I will leave it to Professor Busby except for this, and</p> <p>17 it is not a question, but at the lunch adjournment the</p> <p>18 interpreter expressed some concern as to whether her</p> <p>19 translation had been properly understood by the</p> <p>20 Tribunal. So could I just ask that she explain to the</p> <p>21 Tribunal what her concern was?</p> <p>22 THE INTERPRETER: I understood that Professor Sawada said</p> <p>23 the mortality rate of the victims near the hypocentre</p> <p>24 and also distant victims are the same. That's what my</p> <p>25 understanding is. So it's not 20 times higher.</p> <p style="text-align: center;">Page 75</p>
<p>1 small. That is effect of screening effect.</p> <p>2 DR RAYNER: Yes. So how are those cancers or whatever</p> <p>3 picked up? What happens during the screening? What</p> <p>4 tests are performed?</p> <p>5 A. (Not interpreted): Whole body screening but very</p> <p>6 important is cancer risk.</p> <p>7 DR RAYNER: Yes, so whole body screening, and what does that</p> <p>8 involve? A CT scan, an MRI scan?</p> <p>9 A. (Not interpreted): No, measurement of whole body</p> <p>10 counter.</p> <p>11 (Interpreted): Blood test.</p> <p>12 DR RAYNER: Right. Blood test.</p> <p>13 A. (Interpreted): Scan.</p> <p>14 (Not interpreted): Echo analysis.</p> <p>15 DR RAYNER: Echo of what? Echo of what?</p> <p>16 A. (Not interpreted): Mainly --</p> <p>17 DR RAYNER: An ultrasound scan of the abdomen?</p> <p>18 A. (Nodded assent) (Interpreted): And a prostate cancer</p> <p>19 check. A prostate cancer check.</p> <p>20 DR RAYNER: Done by a blood test?</p> <p>21 A. (Not interpreted): A sample.</p> <p>22 DR RAYNER: A sample, a biopsy, of the prostate?</p> <p>23 A. (Not interpreted): Yes.</p> <p>24 (Interpreted): Breast cancer.</p> <p>25 DR RAYNER: So an examination or a mammography?</p> <p style="text-align: center;">Page 74</p>	<p>1 MR JUSTICE BLAKE: There were a number of questions designed</p> <p>2 to find out what he was saying was 20 times higher.</p> <p>3 Anyway, thank you for that.</p> <p>4 MR TER HAAR: If I understand what the interpreter is</p> <p>5 saying, explained to me earlier, the mortality rate is</p> <p>6 the same at 2 kilometres and at 1 kilometre, which if</p> <p>7 you look at the the radiation rates measured would be 20</p> <p>8 times the degree of mortality you would expect for the</p> <p>9 radiation measured. I see the translator --</p> <p>10 MR HEPPINSTALL: Well, the evidence can only come from</p> <p>11 Professor Sawada and the re-examination must not lead</p> <p>12 and must not suggest any answers to Professor Sawada at</p> <p>13 all.</p> <p>14 MR JUSTICE BLAKE: We'll add all that on to the table.</p> <p>15 MR TER HAAR: As to the other question on which I was going</p> <p>16 to ask questions in re-examination, I understand that</p> <p>17 Dr Rayner's understanding is correct and therefore in</p> <p>18 a sense I adopt what came from Dr Rayner through you.</p> <p>19 So I have no further questions on that subject.</p> <p>20 MR JUSTICE BLAKE: Yes. I'm anxious, however, in the light</p> <p>21 of that last answer that it's not Dr Rayner giving</p> <p>22 evidence on the matter or me. Let me try this then.</p> <p>23 MR TER HAAR: I think --</p> <p>24 MR JUSTICE BLAKE: I think since I have introduced the hare,</p> <p>25 either you --</p> <p style="text-align: center;">Page 76</p>

<p>1 MR TER HAAR: On that subject, can I just say this. As 2 I understand it, in this Tribunal the Tribunal is 3 entitled to take into account the expert knowledge of 4 a member --</p> <p>5 MR JUSTICE BLAKE: Yes, we certainly are. I just wanted to 6 make sure the expert knowledge of the member which 7 I introduced, I thought to help you all, is also the 8 understanding of the witness. But let me take that on. 9 I think that's only fair.</p> <p>10 Just another question from us about your report, 11 Professor Sawada. 12 I'll take it slowly.</p> <p>13 We understand that you told us that you got the 14 information from figure 6, the red line, exposure to 15 fallout radiation, by using a Chi square calculation 16 from data from figures 4 and 5. Have I understood that 17 correctly?</p> <p>18 A. (Not interpreted): Yes, yes.</p> <p>19 MR JUSTICE BLAKE: Right.</p> <p>20 A. (Not interpreted): The direct result is figure 6, the 21 estimation of total exposure from incidence date of 22 epilation.</p> <p>23 MR JUSTICE BLAKE: Yes.</p> <p>24 A. (Not interpreted): But it is a direct result.</p> <p>25 MR JUSTICE BLAKE: Right. Do I understand that from the</p> <p style="text-align: center;">Page 77</p>	<p>1 DR BUSBY: My Lord, I am conscious of the amount of time we 2 have available so I will keep this as brief as possible. 3 I have two points here which I would like to ask 4 Professor Sawada.</p> <p>5 MR JUSTICE BLAKE: You can't lead but you can ask him 6 a question, if it's new.</p> <p>7 DR BUSBY: Yes. Do you think that nuclear workers -- you 8 see two nuclear worker studies here -- do you think that 9 nuclear workers are exposed to particles from a nuclear 10 bomb of the type that you described earlier, the 11 particles that were coming down when the bomb -- the 12 same sort of particles?</p> <p>13 A. (Not interpreted): In the Nagasaki bomb it's a plutonium 14 bomb and the Hiroshima bomb is a uranium bomb so the 15 effect of plutonium is much larger than uranium nuclei, 16 so expect to increase on Nagasaki people. And my result 17 is constant with the difference.</p> <p>18 Q. But my question was about nuclear workers, people who 19 work in the nuclear industry. Are they exposed to 20 particles of uranium and particles of plutonium in the 21 same way as you said people in Hiroshima were exposed to 22 particles of plutonium and particles of uranium?</p> <p>23 A. (Not interpreted): Maybe slightly different because 24 uranium or plutonium is not emitted.</p> <p>25 Q. Thank you.</p> <p style="text-align: center;">Page 79</p>
<p>1 information given in figures 4 and 5, where you have 2 data about epilation rates suffered by victims at 3 a certain distance, that gives you some information 4 about dose?</p> <p>5 A. (Not interpreted): By use of figure 4 curve and by use 6 of figure 5 incidence rate of epilation, then compare by 7 use of Chi square, then I get to figure 6.</p> <p>8 MR JUSTICE BLAKE: Right. And are you comparing there what 9 has been observed with what you would expect? 10 Try again?</p> <p>11 THE INTERPRETER: Yes, please.</p> <p>12 MR JUSTICE BLAKE: Does the calculation make a comparison 13 between what has been observed in the earlier tables 14 with what you would have expected to have found?</p> <p>15 A. (Not interpreted): I astonished when I found this one, 16 but it's the truth so I understand.</p> <p>17 MR JUSTICE BLAKE: So you didn't expect to find it but 18 that's what came out as the calculation?</p> <p>19 A. (Not interpreted): Yes.</p> <p>20 MR JUSTICE BLAKE: Right. Thank you. Well, I'm learning at 21 least! 22 Does that complete the evidence?</p> <p>23 MR TER HAAR: I am not going to re-examine. I think 24 Professor Busby may have some questions. 25 Re-examination by DR BUSBY</p> <p style="text-align: center;">Page 78</p>	<p>1 A. (Not interpreted): If there is no accident.</p> <p>2 Q. Thank you. That's the one point. 3 The second one quickly now, I want to go to SB7/110, 4 if we can do that. Do you have that? Yes.</p> <p>5 THE INTERPRETER: Yes.</p> <p>6 DR BUSBY: Now, if I can just direct you to the title of 7 this. Am I allowed to say what the title is, my Lord?</p> <p>8 MR JUSTICE BLAKE: You can probably read it.</p> <p>9 DR BUSBY: "Uranium isotopes in Hiroshima black rain soil." 10 Now Mr Heppinstall made some reference to residual 11 radiation at Hiroshima and talked about caesium but what 12 I wanted to ask was more about uranium and I notice that 13 this says "Shozo Sawada". That's not you, though, 14 that's a different Sawada?</p> <p>15 A. (Not interpreted): Yes, a different Sawada.</p> <p>16 Q. Okay just a coincidence then. But this study shows that 17 there was uranium in the black rain and there was 18 uranium contamination from Hiroshima in the soil. 19 I just wanted you to say whether this study is accurate 20 and reliable.</p> <p>21 A. (Not interpreted): To measure uranium detained in the 22 ground is very difficult because uranium usually exists 23 before bombing, but the plutonium in Nagasaki is very 24 different from natural existence, so this is very 25 difficult to study.</p> <p style="text-align: center;">Page 80</p>

<p>1 Q. But if you look at this paper --</p> <p>2 MR JUSTICE BLAKE: I just want to catch, so I have the</p> <p>3 answer, this is a very different study from what you</p> <p>4 were talking about?</p> <p>5 THE INTERPRETER: Difficult.</p> <p>6 MR JUSTICE BLAKE: A difficult study, not different. Thank</p> <p>7 you.</p> <p>8 DR BUSBY: The point about this I wanted to ask,</p> <p>9 Professor Sawada, if you look at figure 3 on this,</p> <p>10 page 233, this shows the isotopic ratio of the samples</p> <p>11 that they took in the black rain areas. Okay?</p> <p>12 A. (Not interpreted): Yes.</p> <p>13 Q. If we go back to the first page now, where the abstract</p> <p>14 is on the first page, it says, on the third line:</p> <p>15 "The U-234/238 activity ratios from the soil were</p> <p>16 significantly higher than those of other areas."</p> <p>17 So would it not, that would suggest this uranium was</p> <p>18 from the Hiroshima bomb?</p> <p>19 Thank you. Well, you haven't said anything yet but</p> <p>20 do you agree?</p> <p>21 A. (Not interpreted): Yes, uranium-234 is produced by</p> <p>22 nuclear explosion, then the ratio changes.</p> <p>23 Q. Yes.</p> <p>24 A. (Not interpreted): Then figure 4 shows this change and</p> <p>25 figure 3 is slightly changed. Then they found effect of</p> <p style="text-align: center;">Page 81</p>	<p>1 it there? Are there any citations? I have to say that</p> <p>2 there are not. They haven't cited this document there,</p> <p>3 which is a critically important document --</p> <p>4 MR JUSTICE BLAKE: Probably we can do that for ourselves.</p> <p>5 We don't need him to assist us.</p> <p>6 DR BUSBY: Sorry, my Lord, I always overflow in these cases.</p> <p>7 Yes.</p> <p>8 Yes. So the question is: is this uranium paper</p> <p>9 cited in the official, or at least the RERF document</p> <p>10 which refers to fallout and residual contamination?</p> <p>11 THE INTERPRETER: Can you repeat that, please?</p> <p>12 DR BUSBY: I think we move on because I have no further</p> <p>13 questions. It's just a bit tedious for Professor Sawada</p> <p>14 to look through all of this.</p> <p>15 MR JUSTICE BLAKE: If you want his expertise this is the</p> <p>16 chance to get it. If it's simply a question of</p> <p>17 comparing lists of academic information, I'm not sure</p> <p>18 that that's the best use of his brain.</p> <p>19 DR BUSBY: No, I just wanted to make a point, my Lord.</p> <p>20 Should it? Well, should it have contained reference to</p> <p>21 this document that says that there was uranium</p> <p>22 contamination at Hiroshima in your opinion?</p> <p>23 A. (Not interpreted): Yes. I am very influenced</p> <p>24 Professor Hoshi, who has already died, but I'm very</p> <p>25 influenced to the Professor also, but it is not to</p> <p style="text-align: center;">Page 83</p>
<p>1 exposure from fallout.</p> <p>2 Q. Thank you, I take that as a "yes".</p> <p>3 So if we can now go to SB5/58, this is the document</p> <p>4 that Mr Heppinstall drew to your attention earlier on,</p> <p>5 "Radiation doses from residual radioactivity".</p> <p>6 THE INTERPRETER: 50.</p> <p>7 MR JUSTICE BLAKE: We have finished with this one, have we,</p> <p>8 ??</p> <p>9 DR BUSBY: I just want to ask one question to compare?</p> <p>10 A. (Not interpreted): Can you repeat? What number?</p> <p>11 Q. This is tab 58. SB5, tab 58.</p> <p>12 MR JUSTICE BLAKE: 58, yes. We've looked at this before.</p> <p>13 What's the question?</p> <p>14 DR BUSBY: The question is: could you look at the references</p> <p>15 in this document at the back, where all the citations</p> <p>16 are of the measurements that were made that were put to</p> <p>17 you by Mr Heppinstall. That's page 224 onwards.</p> <p>18 I mean, I don't really need you to look but if you want</p> <p>19 to you may. I just want you to recognise or to say or</p> <p>20 to answer the question whether or not this uranium</p> <p>21 isotope paper appears in the citations of this document.</p> <p>22 Do they --</p> <p>23 MR JUSTICE BLAKE: Do you need his evidence on this?</p> <p>24 DR BUSBY: -- recognise that there was uranium in the black</p> <p>25 rain in this document? Have they written anything about</p> <p style="text-align: center;">Page 82</p>	<p>1 understand why that the paper is not cited.</p> <p>2 MR JUSTICE BLAKE: I am going to ask that again because</p> <p>3 I don't know if it's important or not.</p> <p>4 Professor Sawada, I think the question is being put</p> <p>5 to you, and can we have your views, please, on the</p> <p>6 following. Should the paper which you have in front of</p> <p>7 you at tab 58 called "Radiation Doses from Residual</p> <p>8 Radioactivity" have taken into account the data that we</p> <p>9 had at the other bundle, tab 11, called "Uranium</p> <p>10 Isotopes in Hiroshima Black Rain Soil", tab 110. Do you</p> <p>11 follow the question?</p> <p>12 A. (Not interpreted): Maybe Okajima and Afjita(?) did not</p> <p>13 know at that time the measurement of Horsiata(?), maybe.</p> <p>14 MR JUSTICE BLAKE: Right. But would you have expected that</p> <p>15 the paper at tab 58 would have referenced the paper at</p> <p>16 110 here. Or was it 111? 110.</p> <p>17 A. (Not interpreted): Yes, yes, it is better to --</p> <p>18 MR JUSTICE BLAKE: That would be best?</p> <p>19 A. (Not interpreted): Better.</p> <p>20 DR BUSBY: No further questions, my Lord.</p> <p>21 MR JUSTICE BLAKE: All right, thank you.</p> <p>22 So I think that completes your evidence. Thank you</p> <p>23 very much. You can go. And, Madam Interpreter, thank</p> <p>24 you very much for the assistance you have given us.</p> <p>25 That must have been a difficult task for you but you</p> <p style="text-align: center;">Page 84</p>

<p>1 have done very well. So thank you very much for coming 2 to help us. 3 (The witness withdrew) 4 MR JUSTICE BLAKE: Are we about to hear from -- 5 DR BUSBY: We call Professor Inge Schmitz Feuerhake. 6 MS JEANIE ELDON (interpreter) (affirmed) 7 PROFESSOR INGE SCHMITZ FEUERHAKE (affirmed) 8 (All answers are given in English 9 unless otherwise indicated) 10 Examination-in-chief by DR BUSBY 11 MR JUSTICE BLAKE: Now, would you like to sit down? 12 THE WITNESS: I would like to stand. 13 MR JUSTICE BLAKE: Right. Whatever makes you more 14 comfortable. You have an interpreter there in case you 15 need some assistance. Let's see how far we get. 16 THE WITNESS: I'm very grateful to have a supporter, but may 17 I be allowed to speak in German English? I hope to 18 understand all the questions. It may be that I have 19 some difficulties to express myself -- 20 MR JUSTICE BLAKE: We'll try and keep the language in 21 English, but if you need any help with any words you 22 have the interpreter here to help you. 23 THE WITNESS: Yes. 24 DR BUSBY: Professor Schmitz Feuerhake, do you have your 25 report there?</p> <p style="text-align: center;">Page 85</p>	<p>1 MR JUSTICE BLAKE: Can you just tell me which paper you are 2 referring to at page 18 of your report? 3 DR BUSBY: It is her report, my Lord. 4 MR JUSTICE BLAKE: I have page 18. Which paper are you 5 drawing my attention to? 6 A. I beg your pardon. It is in my curriculum vitae. 7 MR JUSTICE BLAKE: Yes, I have page 18. 8 A. And that is 17. 17. You see in the middle Richardson, 9 Wing, Schroeder and so on. 10 MR JUSTICE BLAKE: There we are. 11 A. "Ionising radiation and chronic lymphocytic leukaemia." 12 This was a very important paper because it got the NIOSH 13 people, the occupational people in the United States to 14 look to have a better risk figure for -- 15 MR JUSTICE BLAKE: Okay, just pausing there, you have 16 identified the paper. I was looking at the wrong page. 17 I was looking at 18, not 17. Can I just ask, do we have 18 this paper in our supporting materials file? 19 DR BUSBY: We do. The paper should be in the bundle. 20 MR JUSTICE BLAKE: It's somewhere in the bundle. 21 MR TER HAAR: In believe it's somewhere in the bundle, 22 my Lord, yes, but if not we'll certainly provide it. 23 MR JUSTICE BLAKE: If we have a cross-reference that's 24 helpful. 25 DR BUSBY: We'll endeavour -- well, we will find the paper</p> <p style="text-align: center;">Page 87</p>
<p>1 A. I have my report and I have the questions of the 2 claimants. 3 Q. Do you stand by what you wrote in your report? 4 A. Oh yes. 5 Q. Yes. Do you have anything that you might want to add to 6 this report that has occurred since you wrote it? 7 A. Yes, indeed I would like to add something. 8 When I was asked to make an expertise the question 9 was the discrepancies in the ICRP risk figures and I did 10 unfortunately not really realise that -- I knew there 11 were cancer cases but I didn't realise that it was CLL 12 and pancreas cancer. And I -- and involved in Germany, 13 I was involved during my professional active time and 14 afterwards in many cases of cancers in occupational 15 exposed people and my speciality is CLL, the origin and 16 the risk figure for it in such cases. And I also 17 published about pancreatic cancer in German. 18 And I would like to refer on these experience. 19 I may admit that in my curriculum vitae and the 20 literature on page 18, there is a citation of a common 21 work by Richardson and others and Schmitz Feuerhake, 22 where we explain why formerly was it misleadingly 23 thought that CLL is not radiogenic. Today the official 24 version that it is radiogenic, but it's not very 25 sensitive, it's not a very high effect.</p> <p style="text-align: center;">Page 86</p>	<p>1 in the bundle or if it's not in the bundle we'll provide 2 the paper. 3 A. This paper was updated by me -- 4 MS BUSBY: We do have an update. 5 A. -- in 2011 and I think we come to the point because the 6 question of the claimant was about the Leurand and 7 INWORKS study about lymphoma and so on. I think we -- 8 DR BUSBY: I think that Mr Heppinstall will ask you 9 questions about that. So all we need to establish at 10 the moment is that you are an expert -- 11 MR JUSTICE BLAKE: Do you have -- 12 MR HEPPINSTALL: It would be clever of me to ask questions 13 without a copy of it. It's not in the bundle. 14 DR BUSBY: No, that one isn't. But the 2005 paper is, 15 I believe. 16 MR JUSTICE BLAKE: Well, you had better tell him where it 17 is, if it is. Anyway, we've just been handed an updated 18 paper of 2011. I will clip that -- 19 A. Yes, a short summary of new findings. 20 MR JUSTICE BLAKE: I'll put that behind this report unless 21 I'm told to put it somewhere else. 22 DR BUSBY: Well, yes, so I think at that stage I think 23 I have established what Professor Schmitz Feuerhake 24 added. 25 A. If you would allow I would talk on that. And the other</p> <p style="text-align: center;">Page 88</p>

<p>1 point is pancreatic cancer is a low dose effect which is 2 shown in several studies. I also have made 3 a compilation. 4 MR JUSTICE BLAKE: Right. Can we just get back to -- we've 5 been chasing down the paper rather than your evidence 6 about the paper. 7 DR BUSBY: SB 7/103, my Lord. 8 MR JUSTICE BLAKE: The 2005 paper? 9 DR BUSBY: Yes, 2005. 10 MR JUSTICE BLAKE: Right, I have that reference. 11 DR BUSBY: I think that's all I need to say. 12 MR JUSTICE BLAKE: I am going to ask a question. I think 13 Professor Schmitz Feuerhake wants to say something. 14 Summarising your paper of 2005 and updated in 2011, 15 your conclusions first on CLL were that it is radiogenic 16 but not a very sensitive organ to radiogenic -- 17 A. It is a very sensitive effect. Very sensitive. 18 MR JUSTICE BLAKE: Very sensitive. What does that mean, 19 that it's a small -- 20 A. That means that the doubling dose or the risk figure for 21 this kind of cancer is high and the doubling dose is 22 low, about 100 millisievert, and this is shown in a new 23 paper -- 24 MR JUSTICE BLAKE: We are talking about CLL? 25 A. CLL. Is shown in a paper of -- you know that the</p> <p style="text-align: center;">Page 89</p>	<p>1 which show the effect. 2 MR JUSTICE BLAKE: I'm not sure that Mr Heppinstall will be 3 very grateful to receive a paper in German at this 4 stage. 5 A. I heard that people in former times learn German as 6 a first or second ... 7 MR JUSTICE BLAKE: Right. Thank you. 8 DR BUSBY: Well, that's the end of my -- 9 MR JUSTICE BLAKE: Right, thank you very much. If you stay 10 there you'll be asked some questions, I think. 11 Cross-examination by MR HEPPINSTALL 12 MR HEPPINSTALL: Professor Schmitz Feuerhake, could we turn 13 to page 2 of your report. 14 A. Yes. 15 Q. You say at the top there, the second substantive 16 sentence: 17 "So for radioactive elements bound by chemical 18 affinity to DNA ..." 19 Then you give two examples, strontium-90 and 20 uranium. 21 Looking at considering only uranium for the moment, 22 do you mean by that sentence that uranium has 23 an affinity to DNA, it binds the DNA? 24 A. Yes, I mean that. 25 Q. You haven't given us a reference for that proposition,</p> <p style="text-align: center;">Page 91</p>
<p>1 Canadians have a national registry and they overlook 2 80,000 -- 80 hundred thousand workers -- and 3 occupationally-exposed persons in Canada and they have 4 dose effect curves, they have measured the dose. 5 External mainly. And they found this elevation for CLL. 6 It is the work of Zielinsky and others. 7 This is also in the papers. 8 MR JUSTICE BLAKE: Right. We have the extract that has just 9 been handed up, I think. Right. 10 Then is that all you want to say for the time being 11 about CLL? 12 A. CLL. 13 And I would like to draw your attention on new 14 findings about -- it's not very new -- pancreatic 15 cancer. 16 MR JUSTICE BLAKE: Yes. 17 A. It is also judged to be -- the pancreas is judged to be 18 insensitive because always the reference are the A bomb 19 survivors, but there are many studies showing pancreas 20 cancer rates elevated in people exposed chronically, not 21 after acute exposure, and it is most excessive in 22 studies with workers on uranium and as are in 23 cooperation(?) cases. 24 So unfortunately I have that only in the German 25 paper. But I can deliver the -- I have the publications</p> <p style="text-align: center;">Page 90</p>	<p>1 have you? 2 A. Oh, maybe I thought that is common sense. Yes, there 3 are many, many publications. So I had to ... 4 Q. Well, let's look at SB7/97, please. 5 A. 97. 6 Q. Do you have SB7? Can you get file SB7? 7 MR JUSTICE BLAKE: You have some files to your left. One 8 should be called SB7. 9 THE INTERPRETER: Page 97? 10 MR HEPPINSTALL: No, tab 97. 11 MR JUSTICE BLAKE: Divider 97. Yes. Is that the paper 12 called "Preferential staining of nucleic and containing 13 structures for electron microscopy"? 14 A. Yes, and so what? 15 MR JUSTICE BLAKE: I am just trying to work out -- 16 A. Is this Huxley and -- 17 MR HEPPINSTALL: Huxley and Zubay. 18 A. Yes. 19 Q. Right. Now, I understand -- well, have you seen this 20 paper before? 21 A. No. 22 Q. No. Let me put it this way: the only paper proffered by 23 the appellants that you are going to give evidence on 24 behalf of in respect of uranium and its affinity to DNA 25 is this one, that's the only paper we have.</p> <p style="text-align: center;">Page 92</p>

<p>1 A. You mean -- excuse me -- you mean it's the only paper 2 which exists or which was -- 3 Q. No, it's the only paper within the bundles. 4 A. Okay, okay. 5 Q. And to be clear, Professor Schmitz Feuerhake, the 6 Secretary of State's position is that uranium does not 7 bind to DNA. 8 A. No, the problem is that we have effects value of 9 uranium. You know all these discussions about depleted 10 uranium. You have again and again by different 11 researchers who have stated, confirmed the effects, and 12 the only radiation source there in the Gulf War and so 13 on is depleted uranium. And we in our university and in 14 my group had -- we could do biological dosimetry. You 15 know what that is? 16 Q. Yes. 17 A. And this is a very sensitive method to look if people 18 are radiated by ionising radiation, and you can also 19 differentiate if it was low LET radiation or high LET 20 radiation. And this group as I have found it, they 21 worked after my pension, they found in these people 22 aberrations and they found a high LET component. And 23 the effect is that the method of biological dosimetry by 24 dicentric chromosomes, it's very sensitive but it's not 25 so sensitive that it can measure very, very, very low</p> <p style="text-align: center;">Page 93</p>	<p>1 about that? 2 A. We see also the effect in uranium contaminated regions 3 but there you have another variety of contamination -- 4 Q. You see, the Secretary of State's position is that 5 uranium cannot and does not bind to DNA. A man-made 6 compound, uranyl acetate, does but not uranium. Can you 7 help the Tribunal with that or not? 8 A. I doubt that you have the complete overview. 9 MR JUSTICE BLAKE: Well, do you have information which you 10 can tell us about to support the proposition that 11 uranium binds with DNA as opposed to uranyl acetate? 12 MR HEPPINSTALL: Can we just see if you can help us a little 13 bit more about uranium. SB4/12, please. 14 MR JUSTICE BLAKE: Yes. 15 MR HEPPINSTALL: Professor, we're looking here at a document 16 produced by a US Government agency, the Agency for Toxic 17 Substance and Disease Registry. And this is their 18 guidance on uranium toxicity. If we can turn, please, 19 to page 25. 20 A. 25. 21 Q. Please tell us immediately if these matters are outside 22 your expertise, but we can see that under "inhalation 23 exposure" it states: 24 "Inhaled uranium deposits in the various portions of 25 the respiratory tract and the lungs based on particle</p> <p style="text-align: center;">Page 95</p>
<p>1 doses and very, very, very low doses are reported by the 2 officials. They say there's nothing. But this method 3 confirms that the official dose estimation is much too 4 low. Yes? 5 Q. We are going to look at chromosomal aberrations and 6 biological reverse dosimetry when we look at the Wahabe 7 and Rowland paper later on this afternoon, 8 But for the moment I am just interested in the 9 evidence for uranium binding to DNA because this paper, 10 as you can see from the abstract, is about uranyl 11 acetate binding to a particular form of nucleic acid, 12 which we call DNA. It is not about uranium binding to 13 DNA. 14 A. Ah. Yes. May I -- I mean, I confess that since some 15 years I'm not working in the field of uranium. I had 16 a last paper with Beotell, it is in my list of 17 publications, that seem is known to me and for me it's 18 a fact that these depleted uranium things cannot be 19 explained by conventional dose estimates. 20 Q. Just to be clear, your thesis for the relationship 21 between uranium and DNA is based on a presumed effect 22 from things like chromosomal aberrations rather than -- 23 A. I see the effect in the (inaudible), so -- 24 Q. Rather than -- you are saying that you know that 25 chemically uranium binds to DNA, you can't give evidence</p> <p style="text-align: center;">Page 94</p>	<p>1 size, most of the deposited uranium clears rapidly via 2 mucociliary transport to the throat." 3 Do you agree with that? 4 A. This is a qualitative description of the metabolism so 5 I don't know if most of the deposits cleared rapidly. 6 They are modelled by the ICRP. I think they are 7 referred to. 8 Q. Well, do you have any expertise in the biological 9 processing of uranium within the body? 10 A. What? 11 Q. Do you have any expertise in the way in which the body 12 processes or excretes uranium? 13 A. I have not personally investigated that. I wonder about 14 the complexity and the difficulties to describe the 15 metabolism in a model. This is one criticism against 16 ICRP, because all the parameters may be different and 17 they change and I look at the endpoint. Therefore, 18 because I don't trust the calculation, the simulation, 19 I look at the endpoint and I look at the effect and then 20 try to draw the conclusion about the origin. 21 And I don't see if I have resiled in studies in 22 humans what is critical if I don't know the specific 23 mucociliary transport. 24 Q. Well, Professor Schmitz Feuerhake your statement at 25 page 2:</p> <p style="text-align: center;">Page 96</p>

<p>1 "For radioactive elements bound by chemical affinity 2 to DNA, the dose at the DNA could be about 100 times the 3 average dose used by the ICRP approach." 4 A. This is taken from the statement of Rosalie Beotell. 5 You know her? She has worked a lot of uranium. So this 6 is a citing. I cite that. 7 Q. Well, it was the lack of citation which was concerning 8 me, Professor Schmitz Feuerhake, because what I am 9 putting to you is that uranium does not have a chemical 10 affinity to DNA. To look at the way in which uranium 11 interacts on the body you would need to have knowledge 12 about the way the body processes and excretes uranium 13 but yet you say with confidence in this sentence that 14 it's got chemical affinity and the dose of the DNA could 15 be about 100 times the average dose used by the ICRP. 16 Now, without the expertise I don't understand how 17 the statement can be made. 18 A. I compare the effect and the constructed dose by a model 19 and this is a discrepancy I find. 20 Q. Can we look at the LSS model, please. SB 5/58. 21 Sorry, I'm getting ahead of myself. Before we get 22 to the model we're just going to chapter 6 that we 23 looked at earlier. 24 Sorry, before we look at the LSS paper, this is 25 again -- I think you were in court when I showed this to</p> <p style="text-align: center;">Page 97</p>	<p>1 they recommended me to do it as a letter, a letter to 2 the editor, because they said that my or our findings 3 would differ -- would be different in such a large scale 4 to the official mainstream thinking of the RERF that 5 they could only accept it or publish it as this. 6 And it is a reality that the residual radiation and 7 the fallout cannot be neglected or thought to be 8 negligible. It is this former opinion that acute 9 radiation is harmful or will make high effect compared 10 to a dose which is chronic, which is given by a very 11 low, low, low, low dose rate. They really believed at 12 the time that this is the case. 13 And so I think that they have problems to explain 14 the effects which are observed in the meantime in the 15 nor in city group. You know they have a not in city 16 group of perhaps 20,000 or 25,000 persons who came to 17 the cities of Hiroshima and Nagasaki days and weeks 18 after the explosion. And they were contaminated. And 19 if you look at these people, they show cancer, elevated 20 cancer rates. This was my point to investigate this. 21 And this is a continuation by Professor Sawada. He made 22 some continuously -- he had some more data inside from 23 the population there which said this hair loss and so 24 on. 25 But we made only a raw estimation. We took the data</p> <p style="text-align: center;">Page 99</p>
<p>1 Professor Sawada earlier -- the RERF, the chapter from 2 DAOS86, chapter 6, "Radiation dose from residual 3 radioactivity". Do you have that in front of you? 4 A. Where is it? This? "Radiation dose from residual 5 radioactivity"? 6 Q. Yes, and I think you were in court earlier when I was 7 showing Professor Sawada that at pages 214 and 215 8 an attempt had been made to estimate an internal dose in 9 a particular district of Nagasaki. 10 A. Yes. What's your question? 11 Q. So do you accept that the RERF have investigated the 12 internal doses which may have been suffered by the A 13 bomb survivors? 14 A. No, this is a speciality of mine. The RERF does not use 15 an internal component in their dosimetry. They say it 16 is negligible -- 17 Q. We know what you mean, yes. 18 A. And I always wondered how it could be that an atomic 19 bomb with a lot of fallout, many megacuries of isotopes, 20 should make a negligible dose. And so I also came to 21 the mind that one should ask it, and I had 22 a dissertation on that. One of my students made 23 a dissertation on that theme. And I published a paper 24 in The Lancet in 1983. I published the results of our 25 research there in short form. And the editors of Lancet</p> <p style="text-align: center;">Page 98</p>	<p>1 which were given by the ABCC. There are many reports 2 about the dose and the residual radiation and so on. 3 I don't believe that it's a merit to look at it. It 4 is legal and is correct to calculate, but they can't 5 give you -- or you must retrospective do it. You have 6 no measurement at the location at the time. You have no 7 measurement in the location, you have no measurement in 8 the people, you have no measurement in the food and, 9 and, and. So there was a range of confidences -- what 10 is this? -- grades of -- 11 Q. Wide. 12 A. Yes. 13 Q. I think -- 14 A. And another point, there are two groups in Japan. 15 There's Hiroshima -- I forgot the name of the author, it 16 is cited by Sawada -- they investigated again the effect 17 not in city people, in people who were not in the cities 18 at the time of the bombing, and they find significantly 19 increased rates of leukaemia and the common known 20 radiation inducible effects. And it's not explained by 21 this. 22 Q. Professor Schmitz Feuerhake, the only point is that 23 everybody understands and agrees that it's very 24 difficult to carry out reverse dosimetry for these two 25 events in Japan. But do you agree that in the</p> <p style="text-align: center;">Page 100</p>

<p>1 circumstances, the best way of doing it is to 2 investigate the internal burden of things like 3 caesium-137 in those who you suspect lived in places 4 that received radioactive fallout after the bomb? 5 A. Of course, yes. We have such studies in -- yes. 6 Q. So in this -- 7 A. -- Chernobyl and so on. 8 MR JUSTICE BLAKE: Okay. But let's just get the answers. 9 So you agree that what the authors of this paper were 10 apparently doing at 214 to 215 was a reasonable attempt 11 to get information? 12 A. Okay, okay, yes. 13 MR JUSTICE BLAKE: Yes? 14 A. Yes. 15 MR JUSTICE BLAKE: And if you just turn over to 215, 16 page 215 -- is it 215? 17 MR HEPPINSTALL: 215, yes. 18 MR JUSTICE BLAKE: 215. Page 215 in the same tab. Can you 19 help the Professor? Yes. The sentence starts "Gamma 20 ray-emitting radionuclide ..." 21 A. Mm. 22 MR JUSTICE BLAKE: Do you see the paragraph begins: 23 "Estimates were made of the internal dose from 24 caesium and the residents of Nishiyama district, an area 25 where radioactive fallout from the bomb was most heavily</p> <p style="text-align: center;">Page 101</p>	<p>1 1981. As I understand it, they found some caesium and 2 on that data they are trying to do a retrospective 3 analysis back to 1945. 4 A. Yes, but caesium is only one. 5 MR JUSTICE BLAKE: Right. 6 A. Once you -- you can't measure -- 7 MR JUSTICE BLAKE: Let's stick with caesium for the time 8 being. I just want your help, please, as to what you 9 think the limitations of that exercise are, backward 10 calculation of caesium from something -- 11 A. I would think it helpful to try to estimate a worst-case 12 dose, which is usually not done, and to compare it with 13 the potentially real dose, because of all the 14 uncertainties. And then it may be that you can estimate 15 a maximum of possible dose by fallout and maximum dose 16 by neutron activation because people were also 17 irradiated from the ground, and so -- and then as far as 18 I remember they say that the residual component is 19 thought to be about 5 millisievert or so. And that is 20 negligible. I don't -- I have not in mind the result of 21 this paper. 22 MR HEPPINSTALL: You can see at the bottom of 215 that the 23 internal 40 year dose is estimated, if we use the 24 metric, at 0.1 millisieverts and 0.08 millisieverts. 25 I think that's why --</p> <p style="text-align: center;">Page 103</p>
<p>1 deposited. In 1969 they measured with a whole body 2 count of the internal burden ..." 3 Then they did it again, I think, later. 4 In your view, what information would that tell you? 5 A. Nothing. It's 20 years after the -- 6 MR JUSTICE BLAKE: 24 years, I think, 1969 and -- anyway. 7 And because it is 24 years late, what do you miss? Why 8 does it tell you nothing? 9 A. It doesn't tell me nothing. If we find something, if we 10 find caesium in the body, it is possible to a certain 11 degree -- 12 MR JUSTICE BLAKE: Yes, I think they found some caesium and 13 as I understand it they were working back using the -- 14 A. Yes, you find some becquerels of caesium and you have to 15 extrapolate back to 24 years. This is not a serious -- 16 it's -- you can't do that. You know there is a mean 17 half life of 100 days. 18 MR HEPPINSTALL: In fact, let's be clear. 19 A. It's not possible. 20 MR HEPPINSTALL: They don't use the mean half life, do they? 21 If we look at the paragraph below the table they 22 actually look at the half life in these people because 23 they look at them again in 1981. So they actually get 24 a half life for these actual individuals. 25 MR JUSTICE BLAKE: So they have two calculations, 1969 and</p> <p style="text-align: center;">Page 102</p>	<p>1 A. 10 you said was -- 2 Q. For males and 8 for females. 3 A. How much is it in sievert? 4 Q. 0.1 millisieverts for males and 0.08 for -- 5 A. 0.1? I don't think that's very sensible to insist on 6 these calculations because the main dose will have done 7 by the trans-urymic incorporated -- 8 MR JUSTICE BLAKE: Sorry? 9 A. You have plutonium -- 10 MR JUSTICE BLAKE: Okay, I was just trying, since this paper 11 is about caesium -- 12 A. The caesium is the isotope, it can be measured simply by 13 this gamma radiation, but it is in -- the dose factors 14 by the ICRP are 10 to the minus 10 or so, while the dose 15 factor of trans-uranium plutonium is 10 to the minus 4, 16 that are decades of differences. 17 MR JUSTICE BLAKE: Look -- 18 A. So what can you know from this caesium parameter? 19 MR JUSTICE BLAKE: So your answer is that an investigation 20 into caesium is not particularly -- 21 A. It is helpful to -- 22 MR JUSTICE BLAKE: It's some material but it's not 23 sufficient -- 24 A. Of course you can -- you have a certain knowledge about 25 composition of the fallout. You can do some work on</p> <p style="text-align: center;">Page 104</p>

<p>1 this. Yes.</p> <p>2 MR HEPPINSTALL: You see, one reason why one might choose</p> <p>3 caesium is because I showed you earlier that uranium is</p> <p>4 easily excreted from the body. So you are looking for</p> <p>5 a radionuclide that you are going to be able to find.</p> <p>6 That's why you are looking for caesium-137.</p> <p>7 A. Uranium is not easily excreted. If you ingest it, but</p> <p>8 if you had it in the lungs, so it's deposit --</p> <p>9 Q. Shall we go back and look at that? I understood that</p> <p>10 you disavowed -- that you say you didn't have --</p> <p>11 MR JUSTICE BLAKE: Just before we do, I am trying to get the</p> <p>12 information down in one go. Let's do that, but just</p> <p>13 before we do can I ask the Professor one question. Is</p> <p>14 caesium easily expelled from the body by other means</p> <p>15 than half life decay?</p> <p>16 A. I think so. Some -- some people think it is more</p> <p>17 dangerous.</p> <p>18 MR HEPPINSTALL: Maybe we'll --</p> <p>19 MR JUSTICE BLAKE: Okay. You want to go back to uranium</p> <p>20 now?</p> <p>21 MR HEPPINSTALL: No, I think --</p> <p>22 MR JUSTICE BLAKE: Stick to caesium?</p> <p>23 MR HEPPINSTALL: I just don't want to push at the</p> <p>24 Professor's expertise. I think there are other experts</p> <p>25 coming to help us with that.</p> <p style="text-align: center;">Page 105</p>	<p>1 exposure situations, and this is confirmation for as the</p> <p>2 critic we always said that the ICRP risk figures are too</p> <p>3 low and this is the case --</p> <p>4 Q. Sorry to interrupt you, but if we go to page 5, I don't</p> <p>5 want to over-claim on behalf of these authors. If we</p> <p>6 look at page 5, the second column, the second paragraph,</p> <p>7 the claim they are making, their conclusion, we need to</p> <p>8 be very careful about it, is:</p> <p>9 "Our estimated association between radiation and</p> <p>10 solid cancer ...(Reading to the words)... confidence</p> <p>11 interval the span is 0.18 to 0.79 is larger than but</p> <p>12 statistically compatible with the estimate from mortal</p> <p>13 till analysis of male survivors of the Japanese atomic</p> <p>14 bomb exposed to ages 20 to 60 ...(Reading to the</p> <p>15 words)... to 0.5."</p> <p>16 So they are claiming a statistic compatibility, not</p> <p>17 identical ERRs. Do you agree with those conclusions?</p> <p>18 A. Yes.</p> <p>19 Q. So --</p> <p>20 A. But the point is ICRP, not the RERF. You know, if the</p> <p>21 current standards in occupational -- in compensation</p> <p>22 cases for occupational diseases is based on ICRP and not</p> <p>23 on RERF, or the UNSCEAR 2006.</p> <p>24 Q. Are you familiar with the British National Registry for</p> <p>25 Radiation Workers study?</p> <p style="text-align: center;">Page 107</p>
<p>1 MR JUSTICE BLAKE: Rightly ho.</p> <p>2 MR HEPPINSTALL: So let us now move on and look at the</p> <p>3 INWORKS study. Are you familiar with the INWORKS study?</p> <p>4 A. Yes.</p> <p>5 Q. So SB5/53.</p> <p>6 A. Yes.</p> <p>7 Q. Now, do you accept, Professor, the premise of what these</p> <p>8 researchers are trying to achieve here, which is looking</p> <p>9 at other exposed populations to see whether the risks of</p> <p>10 cancer from that exposure are similar to those we derive</p> <p>11 from the Japanese atomic bomb survivors? Do you</p> <p>12 understand that's what they are trying to do?</p> <p>13 A. Yes. What does this mean? If we look at the data we</p> <p>14 see that the risk figure for solid cancer mortality is</p> <p>15 about twice than the result, the last results of the</p> <p>16 RERF. And this statement that there is a congruence</p> <p>17 between both cohorts, the results in both cohorts,</p> <p>18 refers to external radiation.</p> <p>19 Q. Yes.</p> <p>20 A. Yes? And so that only means that the ranges of</p> <p>21 confidence overlap and it does not mean that the CLL</p> <p>22 measured in the Japanese, the risk is identical with the</p> <p>23 risk in workers. That does not --</p> <p>24 Q. No.</p> <p>25 A. This is a whole solid cancer in low dose chronic</p> <p style="text-align: center;">Page 106</p>	<p>1 A. Yes.</p> <p>2 Q. That's at tab 48.</p> <p>3 A. Yes.</p> <p>4 Q. And we can see -- we looked at it with</p> <p>5 Professor Sawada -- we can see that this is based on the</p> <p>6 National Registry, which has both dose information and</p> <p>7 health information about the range of occupational</p> <p>8 workers, their employers are listed in that table and</p> <p>9 I think for the avoidance of all doubt if we look at the</p> <p>10 paragraphs underneath that table, the first column,</p> <p>11 first paragraph, we see at the end of that paragraph:</p> <p>12 "Estimates of doses for ...(Reading to the words)...</p> <p>13 inhaled or ingested were not generally available and</p> <p>14 ...(Reading to the words)... monitored for potential</p> <p>15 exposure were identified."</p> <p>16 So we can all agree that these studies are only</p> <p>17 based on external radiation, can't we?</p> <p>18 A. I don't -- I think the main component will be external</p> <p>19 radiation because this is the experience with workers in</p> <p>20 the nuclear industry, I think.</p> <p>21 Q. We can see from page 210 that again, if we look at the</p> <p>22 bottom of that first column, the second last paragraph</p> <p>23 from the end:</p> <p>24 "Figure 2 shows good agreement between the ERR</p> <p>25 mortality estimates for all ...(Reading to the words)..."</p> <p style="text-align: center;">Page 108</p>

<p>1 excluding leukaemia from the study and the Japanese A 2 bomb study based on a linear dose response model." 3 Do you agree with that? 4 A. I agree in that sense we talked about the confidence 5 limits overlapping. 6 Q. Mm-hm. 7 A. And this is not the most important result of this study. 8 This study was most important to show that effects below 9 100 millisievert are significantly elevated, which means 10 that those limits will allow real damages in 11 occupational people, and there is a limit in this study 12 that is the time of observation. 13 You know that the Hiroshima collective is studied 14 until the present, and as far as I remember the mean 15 observation time in this study is 20 years or less. And 16 the RERF estimates they grew, they increased over time 17 continuously, continuously. And this may not be the 18 last word on the British collective. So the longer you 19 look, the more you find. And so this is a very 20 preliminary statement. 21 And the INWORKS besides is now at 27 years of 22 observation. 23 Q. Yes, but the more corroboration there is for the 24 findings of the LSS study, does that not tell us that 25 the risk of incidence of cancer is well correlated to</p> <p style="text-align: center;">Page 109</p>	<p>1 Q. I understand that the study is important for that 2 purpose, but I want to concentrate on something else -- 3 A. We have the congruence now, the last ten years -- 4 Q. Exactly. There's a congruence between the INWORKS, the 5 National Registry, I also know there's the 15 country 6 study but I know the Canadian data causes problems so -- 7 A. Not any more. 8 Q. Well, but we can be certain about the National Registry 9 study and we can be certain about INWORKS, but isn't 10 that telling us that the result of the LSS study is 11 a sound basis for ICRP because it's a good predictor of 12 biological effect? 13 A. No. The problem is the certain tissues which are 14 irradiated and these shows the mortality studies, and 15 you have to look to the certain cancer, which 16 I emphasise in the case of CLL and pancreatic cancer 17 which were not found in Japanese collectives in the 18 early studies because of certain different situations 19 because perhaps the Japanese people, the CLL is a very, 20 very rare event in Japanese people. So we didn't find 21 anything. But it is often observed now more and more in 22 chronic exposed collectives and the incidence is 23 increased and you have data for the incidence and this 24 is important in the case of compensation. You cannot 25 look to the mortality and say "Oh, we know other things</p> <p style="text-align: center;">Page 111</p>
<p>1 the external dose because that model keeps being 2 reproduced -- 3 A. If you look only at the external dose. 4 Q. Well, if the biological effect is being properly or as 5 accurately as possible being recorded, Professor, both 6 by all these studies, and maybe the National Register 7 study is the best because radiation workers' medical 8 records are flagged and monitored and so forth, isn't it 9 right that the external dose is a good predictor of the 10 biological effect? 11 A. Yes, in cases of external doses. Perhaps in medical 12 applications or diagnostic X-ray, yes. 13 Q. Let's imagine there is a massive or any significant size 14 internal dose missing from the RERF's dosimetry, it 15 doesn't matter, does it, because the external risk is 16 still showing a good guide to cancer risk? The external 17 dose is still showing a good guide to cancer risk, isn't 18 it? 19 A. In Japanese people who are exposed in a catastrophic 20 situation, perhaps, for their catastrophic management, 21 but we are glad to have the Muirhead study and the 22 INWORK study showing the risks of low dose chronic 23 exposure. Former times the officials told us it would 24 be never possible to find statistical increases in that 25 region of doses.</p> <p style="text-align: center;">Page 110</p>	<p>1 now." You must look to the incidence of the cancer. 2 And this may be different if you compare the 3 Japanese and Japanese. They have genetic differences 4 and there are some epidemiological things you have to 5 look for. 6 Q. Yes. Can we now turn -- 7 MR JUSTICE BLAKE: I think we should give the stenographers 8 a break this afternoon. Is this a convenient point to 9 do so? 10 MR HEPPINSTALL: Yes. 11 MR JUSTICE BLAKE: Thank you. We'll take a 15-minute break. 12 You are in the middle of giving your evidence. You can 13 go and wonder around and relax but please don't speak to 14 anybody about your evidence until you have completed. 15 Thank you. 16 (3.15 pm) 17 (A short break) 18 (3.30 pm) 19 MR HEPPINSTALL: We are now going to turn to one of the new 20 documents that was handed up. It's a document entitled 21 "Risks from ionising radiation". Its code in the 22 top-right hand corner is HPARPD066, Mobbs, Muirhead and 23 Harrison. 24 We were debating whilst we were out whether we were 25 going to create an SB22 for the additional materials, or</p> <p style="text-align: center;">Page 112</p>

<p>1 we can squeeze it in behind Professor Schmitz 2 Feuerhake's report. It may be that we are approaching 3 a time when we need a new bundle. 4 I think you have it in front of you, don't you, now? 5 A. Yes. 6 MR HEPPINSTALL: Does the Tribunal have that? 7 MR JUSTICE BLAKE: Yes. We'll share one for the time being. 8 I put mine somewhere else. Don't worry. 9 MR HEPPINSTALL: Shall we look at the abstract first to 10 orientate ourselves. This was a document produced by 11 the Health Protection Agency, their Centre for 12 Radiation, Chemical and Environmental Hazards, which was 13 the main UK Government advisory agency on ionising 14 radiation. The abstract says: 15 "The purpose of this report is to provide 16 ...(Reading to the words)... including the risks from 17 inhaled and ingested radionuclides." 18 If you turn over the page, you will see that it's 19 dated or approved in March -- 20 A. Excuse me, it was too fast. First you talk about the 21 abstract. 22 Q. The abstract, yes. 23 I was giving you, if you haven't had time to look at 24 it in detail, I was giving you the purpose of the 25 report, its authors and I was attempting to do the date</p> <p style="text-align: center;">Page 113</p>	<p>1 It goes on to say: 2 "The cancer incidence and mortality data for A bomb 3 survivors shows a statistically significant increase in 4 solid cancers for doses from around 100 millisieverts up 5 to around 3 sieverts." 6 Do you agree with that statement? 7 A. Yes. 8 Q. "The data on solid cancer incidence indicate that any 9 dose threshold would not exceed 85 millisieverts." 10 Do you agree with that? 11 A. Yes, but this is incomplete information from this work. 12 Q. It goes on: 13 "Separate studies of cancers in children ...(Reading 14 to the words)... to X-rays during diagnostic 15 radiography, principally the Oxford Survey of Childhood 16 Cancers have shown statistically significant increase in 17 childhood leukaemia and solid cancers at doses of the 18 order of 10 millisieverts." 19 Do you agree with that? 20 A. I think it was 5 millisievert. I know this work very 21 well. But I agree, yes. The original papers talked of 22 5 millisievert. 23 Q. Over the page we see that it says: 24 "The risk per unit dose estimated for the Oxford 25 study was compatible with that obtained from the A bomb</p> <p style="text-align: center;">Page 115</p>
<p>1 and I think it's March 2010. 2 A. Yes. 3 Q. I think it was amended in June 2010. 4 So if we turn to section 4, page 5. 5 A. Section 4? 6 Q. Section 4. It's on page 5, entitled "Scientific basis 7 for ICRP recommendation". 8 MR JUSTICE BLAKE: Page 5 at the bottom. 9 MR HEPPINSTALL: Bottom right. 10 A. Yes. 11 Q. And we see in the third paragraph in section 4 it says: 12 "There is a lot of information available on the 13 effects of radiation on human tissues and this means 14 that the basis for radiological protection is 15 ...(Reading to the words)... the basis for protection 16 against some chemicals for which there are no human 17 data." 18 Then you see a phrase that we've seen several times 19 in other documents: 20 "Risk estimates for radiation-induced cancers are 21 largely derived from studies of the effects of external 22 radiation, the principal source of information being 23 long-term studies of those who survived the immediate 24 effects of the atomic weapons explosions at Hiroshima 25 and Nagasaki."</p> <p style="text-align: center;">Page 114</p>	<p>1 survivor studies." 2 So do you agree that's yet another corroboration of 3 the risk data we get from the LSS study? 4 A. I'm not allowed to correct on here? Excuse me. I beg 5 your pardon. 6 MR JUSTICE BLAKE: What do you want to do? You want to look 7 at something else before you answer that question? 8 A. Yes. 9 MR HEPPINSTALL: What else would you like to look at, 10 Professor? 11 A. So you talk of the OSCC data, that they are compatible 12 and they are also data with external acute radiation. 13 And you may know that there was a big study in the UK 14 about leukaemia and background radiation in 2015 by 15 Kendall and others and they showed a much higher risk 16 figure for leukaemia in childhood. And the problem with 17 this is that it is 2010 and the INWORKS and the other 18 studies are 2015 and it is 6 years ago and this is 19 somehow updated now. 20 MR JUSTICE BLAKE: Right. Have you had sufficient 21 opportunity to refresh your knowledge of this section? 22 Do you want to read this section before answering 23 questions or do you have now enough to be able to answer 24 questions about this? 25 A. I think so, yes.</p> <p style="text-align: center;">Page 116</p>

<p>1 MR JUSTICE BLAKE: Okay, right.</p> <p>2 MR HEPPINSTALL: My only question is yet again we've got</p> <p>3 another compatibility, congruity, congruence, whatever</p> <p>4 word you wish to use, between the A bomb survivor</p> <p>5 studies and its results and yet another medium-sized</p> <p>6 population study, don't we?</p> <p>7 A. Yes.</p> <p>8 Q. Okay. If we turn over the page to page 7 and start at</p> <p>9 section 5, this paper goes on to review the challenges</p> <p>10 to UNSCEAR and ICRP?</p> <p>11 Now, are you currently the chair of ECRR?</p> <p>12 A. Yes, this is the critics to the ECRR.</p> <p>13 Q. I am just asking a question. I noticed from your CV</p> <p>14 that it said you were the chair of the ECRR. Are you</p> <p>15 currently the chair?</p> <p>16 A. Oh yes.</p> <p>17 Q. Yes. Here at page 7 there is first a critical analysis</p> <p>18 of ECRR's work from the British perspective. Then over</p> <p>19 the page you'll see that we are going to come to one</p> <p>20 from the IRSN, which is the French equivalent Government</p> <p>21 advisory agency. So that's just to give you your</p> <p>22 bearings.</p> <p>23 A. Mm.</p> <p>24 Q. So we can see here that it says:</p> <p>25 "As explained by ICRP 2007 ...(Reading to the</p> <p style="text-align: center;">Page 117</p>	<p>1 disagreement with the ICRP?</p> <p>2 A. Yes. What is the question?</p> <p>3 Q. Do you recognise that description that --</p> <p>4 A. I know this kind of critique, yes.</p> <p>5 MR JUSTICE BLAKE: But this passage has accurately</p> <p>6 summarised ECRR's disagreement with the ICRP risk</p> <p>7 factors?</p> <p>8 A. But they didn't mention the arguments which are used in</p> <p>9 ECRR.</p> <p>10 MR JUSTICE BLAKE: The fact of disagreement is what I think</p> <p>11 is being suggested.</p> <p>12 A. It's just a qualitative -- it's known to me already.</p> <p>13 MR JUSTICE BLAKE: Right.</p> <p>14 MR HEPPINSTALL: And we can see it says that most of these</p> <p>15 questions date from more than 5 years ago and were</p> <p>16 explicitly addressed by CERRIE and then more recently by</p> <p>17 ICRP 2007. That's right, isn't it?</p> <p>18 A. Yes.</p> <p>19 Q. "In both cases it was concluded that there was not</p> <p>20 enough evidence to support these differing views."</p> <p>21 A. Yes.</p> <p>22 Q. That's right, isn't it?</p> <p>23 A. Yes.</p> <p>24 Q. It says "HPA", but it then immediately corrects itself.</p> <p>25 It's actually NRPB at the time, its predecessor "has</p> <p style="text-align: center;">Page 119</p>
<p>1 words)... there are a number of uncertainties in the</p> <p>2 estimation of risk from radiation exposure."</p> <p>3 Then it says:</p> <p>4 "However, these are not as large as have been</p> <p>5 claimed by those wishing to challenge UNSCEAR risk</p> <p>6 estimates and the ICRP protection system."</p> <p>7 Just pausing there, it's right, isn't it, that ICRP</p> <p>8 risk estimates tend to be based on the UNSCEAR study</p> <p>9 information and UNSCEAR itself is a sort of compendium</p> <p>10 review of epidemiology relating to ionising radiation?</p> <p>11 A. Yes. 2006 is ten years ago.</p> <p>12 Q. Yes. They happen periodically. That's right, isn't?</p> <p>13 Sorry, the UNSCEAR studies happen periodically? From</p> <p>14 time to time they provide another compendium of the</p> <p>15 epidemiology?</p> <p>16 A. Unfortunately, yes.</p> <p>17 Q. "A particular focus has been on the applicability of</p> <p>18 ...(Reading to the words)... external radiation,</p> <p>19 situations of exposure to low doses of internal</p> <p>20 emitters, particularly radionuclides with short range</p> <p>21 emissions. This has led, for example, to the the ECRR</p> <p>22 disagreeing with the ICRP risk factors and suggesting</p> <p>23 that they contain large uncertainties for some</p> <p>24 radionuclides."</p> <p>25 Now, do you recognise that as the ECRR's</p> <p style="text-align: center;">Page 118</p>	<p>1 also reviewed the ECRR reports and disagrees with the</p> <p>2 ECRR views. The HPA response ... the website ..."</p> <p>3 a summary has been produced. And it says:</p> <p>4 "A critical examination of the ECR report has been</p> <p>5 undertaken by ...(Reading to the words)...</p> <p>6 epidemiological studies have been investigated in detail</p> <p>7 by ...(Reading to the words)... is arbitrary and does</p> <p>8 not have a sound scientific basis."</p> <p>9 Now, that is an accurate, hopefully, summary of the</p> <p>10 allegations levelled against ICRP by then NRPB?</p> <p>11 A. Yes, so --</p> <p>12 Q. It's right isn't it, Professor --</p> <p>13 A. It's not right.</p> <p>14 MR JUSTICE BLAKE: The question is coming. That was the</p> <p>15 middle of a question.</p> <p>16 MR HEPPINSTALL: So it's right, isn't it, professor, that</p> <p>17 ECRR and its risk analysis has been reviewed by both</p> <p>18 ICRP, CERRIE and the NRPB and it's been found to have no</p> <p>19 sound scientific basis?</p> <p>20 A. Yes. So what?</p> <p>21 Q. Well, Professor, that criticism do you not accept is</p> <p>22 being made by a very significant body of international</p> <p>23 scientific opinion? Is it not significant that those</p> <p>24 eminent scientists find no scientific basis in your</p> <p>25 organisation's theories and models?</p> <p style="text-align: center;">Page 120</p>

<p>1 A. Oh, we wouldn't be here if we agreed with this criticism 2 and what you want to know, I think, it's who defines the 3 standard of knowledge of science, and is it true that 4 such words define the standard of science? Because they 5 are a majority in between the scientists? Or is it not 6 true that all scientists have to draw their conclusions 7 from the same material of evidence and of research? 8 This is -- I think it's consensus that this should be 9 the way to come to the true result.</p> <p>10 And what we criticise is we use the same basis of 11 knowledge. What was published in the world was what was 12 found. And our argument it said these words did not use 13 the whole body of information which is available, 14 because they neglect, perhaps, the findings after 15 Chernobyl. They neglect -- they cannot really explain 16 why in European countries everywhere there is leukaemia 17 near nuclear installations. And they are not willing, 18 they are trying to depress the information that 19 diagnostic X-raying at the present level is harmful and 20 should be reduced.</p> <p>21 So what we demand only is a kind of fair debate on 22 equal levels and not that there is a board who says what 23 is the truth and what judges have to take for the risk 24 figures in order to decide if this person has been 25 damaged by this occasion or has been damaged by his</p> <p style="text-align: center;">Page 121</p>	<p>1 Q. Yes, the French nuclear advisory body: 2 "... considered that ...(Reading to the words)... 3 and unhelpful." 4 But it goes on to say: 5 "In agreement with IRSN, the HPA is fully supportive 6 of the need for more research to understand radiation 7 risks at low doses, including risks from internal 8 emitters. Interesting findings are emerging ..."</p> <p>9 A. Where are you now in the text? 10 MR JUSTICE BLAKE: Page 8. If you can turn to page 8 after 11 the quotation in italics do you see the French 12 institute?</p> <p>13 A. The French institute, yes. Did not agree, yes. 14 MR HEPPINSTALL: Yes.</p> <p>15 A. I didn't expect that, that they agreed. 16 Q. But what I want to explore is what they are saying is 17 the theme, which is perhaps summarised by that phrase 18 "poorly founded and unhelpful", is it not right that 19 they are not disagreeing in principle with you; they are 20 attacking your methods and evidence base as not being 21 soundly based? So perhaps I can give you an example. 22 You know, don't you, that Dr Busby produced 23 epidemiological experts about the incidence of leukaemia 24 near to nuclear power stations and that was heavily 25 criticised for its methods and approach.</p> <p style="text-align: center;">Page 123</p>
<p>1 life. 2 (Interpreted): Destiny?</p> <p>3 A. Destination. 4 Q. Destiny. 5 A. Excuse me. 6 MR JUSTICE BLAKE: You used the words a few moments ago, 7 "They are trying to depress the information". Did you 8 mean "suppress" or "depress"? 9 A. Leave out. They just -- I think that most of the people 10 believe what they do -- 11 MR HEPPINSTALL: Do you want to use the German word? 12 A. Yes. 13 MR JUSTICE BLAKE: Which German word do you want to use? 14 A. Both. 15 MR JUSTICE BLAKE: Give it to the interpreter. 16 A. I think many people of the board, they believe what they 17 say. So they are not aware that they suppress -- 18 MR JUSTICE BLAKE: Suppress. 19 A. -- information. This is our point. 20 MR JUSTICE BLAKE: Okay. 21 MR HEPPINSTALL: On page 8 it's recorded that the IRSN also 22 reviewed the ECRR report and it records it covered much 23 the same ground as CERRIE, less detail, and it says: 24 "Like HPA, IRSN ..." 25 A. You mean the French?</p> <p style="text-align: center;">Page 122</p>	<p>1 DR BUSBY: My Lord, can I object here? This is evidence 2 that has been excluded from this Tribunal from my side 3 and it's hardly fair for the Secretary of State to now 4 bring in an attack on my evidence when my evidence is 5 not there and I'm not allowed to answer or deal with the 6 issue. 7 MR JUSTICE BLAKE: Thank you, I have the objection, I'll 8 reflect upon it but we'll carry on for the time being. 9 This witness is being asked to deal with examples 10 and criticisms of ECRR methodology. 11 DR BUSBY: With respect, my Lord -- 12 MR JUSTICE BLAKE: No, Mr Busby. Thank you. 13 MR HEPPINSTALL: So what these learned international 14 institutions are criticising is the methodology, the 15 scientific basis for the opinion. They are saying that 16 they see the value in proper research being carried out 17 on these issues but what they are attacking is the 18 foundation of the ECRR's conclusions. Do you 19 understand? 20 A. Yes. 21 Q. Do you accept that there have been serious flaws in some 22 of the studies undertaken by members of ECRR? 23 A. No. Tell me an example. 24 Q. Well, I just gave you an example, but I can come to 25 a particular example if you wish, one that you rely on</p> <p style="text-align: center;">Page 124</p>

1 yourself and have also published about, which is the
 2 Busby and de Messieres paper at SB6/84. We can look at
 3 that as an example. If we turn to SB6/84.
 4 Now, my Lord, in terms of Dr Busby's objection, I am
 5 not admitting into evidence -- I am not relying on this
 6 report in any way. But Professor Schmitz Feuerhake has
 7 relied on it, has published in relation to it, and it
 8 has to be put to her as to her credibility and so forth.
 9 MR JUSTICE BLAKE: Yes, I haven't precluded questions of
 10 your experts about material upon which they have relied
 11 and that's what's going on here.
 12 DR BUSBY: No, my Lord, that wasn't my point.
 13 MR JUSTICE BLAKE: Right. We are going to carry on with it
 14 and then we can perhaps re-visit it tomorrow. Let's
 15 progress.
 16 MR HEPPINSTALL: So SB6, tab 84. This is a paper that you
 17 have referenced in your own expert report.
 18 **A. Yes.**
 19 Q. Then more recently in the paper that you published with
 20 Dr Busby on congenital malformations. That's correct,
 21 isn't it; yes?
 22 **A. Yes, yes.**
 23 Q. Yes. So can we just look at -- well, if we can just
 24 orientate ourselves with the abstract, what it's about,
 25 we can see:

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1 "A postal questionnaire of case control study
 2 examined miscarriage in wives and congenital ...(Reading
 3 to the words)... British Nuclear Tests Weapons
 4 Association, a group of ex-servicemen who were stationed
 5 at atmospheric nuclear weapon test sites between 1952
 6 and 1967."
 7 We can pick up the methodology underneath table 1.
 8 This is at page 2, the first column.
 9 **A. First column.**
 10 Q. First column, underneath table 1, the paragraph starts
 11 "A thousand questionnaires". Do you see that?
 12 **A. Yes.**
 13 Q. "A thousand questionnaires were posted to the last known
 14 address of members. The questionnaire asked details of
 15 the ...(Reading to the words)... past occupation,
 16 details about participation in the A bomb tests.
 17 "They gave details of any miscarriages, birth
 18 outcomes and their children's early health and later
 19 health, and the same details for the grandchildren. The
 20 method ...(Reading to the words)... approximately the
 21 same age to fill out a questionnaire which gave the same
 22 details."
 23 Now, Professor, I have to ask you, do you think in
 24 any way that is a proper basis to carry out
 25 an epidemiological study?

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1 **A. Why not?**
 2 Q. Well --
 3 MR JUSTICE BLAKE: Is the answer "yes", you think that is
 4 a proper basis?
 5 **A. I have yet to answer.**
 6 MR JUSTICE BLAKE: Quite. We need an answer to the question
 7 rather than a question back. Do you think that is
 8 a proper basis to conduct --
 9 **A. It's certainly a proper -- how would you look for those**
 10 **things?**
 11 MR JUSTICE BLAKE: Well, I'll record your answer first.
 12 **A. It's quite usual to take questionnaires and to ask**
 13 **people for their certain conditions at the time of**
 14 **exposure.**
 15 MR HEPPINSTALL: Well, it's not asking for that. It's
 16 asking for details of any miscarriages, birth outcomes,
 17 the children's early health and late health and also the
 18 same details for their grandchildren. So it's not
 19 asking about the veterans, it's asking about their
 20 partners, children and grandchildren. But can a proper
 21 epidemiological report be based on a self-report about
 22 health matters by the subjects of the epidemiology?
 23 **A. If you want to know -- if you see an effect which has**
 24 **occurred, all these things were not studied by**
 25 **researchers by a university in a prospective way. All**

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1 **these things were found in the people themselves, also**
 2 **in the veterans, and in Germany in the radar soldiers.**
 3 **Not the Government found the things for the cancers;**
 4 **they themselves found. So how would you, as**
 5 **a researcher, try to confirm these things, how to get it**
 6 **in a quantitative survey? How would we do that?**
 7 MR JUSTICE BLAKE: Well, no --
 8 **A. You must do that by questionnaires.**
 9 MR JUSTICE BLAKE: Yes. So as far as you are concerned, to
 10 ask an informant in a questionnaire to give
 11 a self-description of medical history of self and
 12 family, as this apparently did, is a perfectly
 13 legitimate way of getting the information?
 14 **A. It is not ideal, of course, but you --**
 15 MR JUSTICE BLAKE: Not ideal.
 16 **A. But if you look, perhaps, to severe malformations, so if**
 17 **you look to an effect which is clearly to be diagnosed**
 18 **by a (inaudible), you will see if you have a spina**
 19 **bifida child, you know it, so you can make a survey. It**
 20 **is quite --**
 21 MR HEPPINSTALL: Professor --
 22 **A. -- legal to do that.**
 23 Q. The risk is clear, isn't it, Professor? If you ask
 24 people to report about themselves the quality of the
 25 data will be inherently risky, won't it?

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<p>1 A. It depends on the effect. If you have leukaemia you 2 know it as a lay. 3 Q. Well, Professor, I understand from being involved in 4 this case that the diagnosis of leukaemia and different 5 types of leukaemia is one of the more difficult things 6 that you can do -- 7 A. They are all summarised in RERF studies and -- 8 Q. But you wouldn't ask a patient to diagnose themselves 9 accurately, would you, Professor? 10 A. He knows, he knows. 11 Q. So it cannot be possible, can it, that it can be a sound 12 basis for a piece of epidemiology that you ask people to 13 report about themselves, their partners, their children 14 and their grandchildren? That cannot be a proper basis 15 of a scientific study. 16 A. It is a basis. It depends on two things. 17 The kind of effect which is clearly to diagnose, 18 and -- let me -- I forgot what I wanted to say. 19 And if the effect is large enough so that you have 20 a significant -- you have an increase which is 21 impressive, you know? These things were big effects, 22 relatively big effects. So you can't make a very great 23 error if you take the results of the questionnaire. You 24 have -- you have to offer, you have to declare how you 25 got the information.</p> <p style="text-align: center;">Page 129</p>	<p>1 Do you agree or disagree with the proposition that 2 to conduct an epidemiological study with the informant 3 self-selecting the control is bad practice? 4 A. It is not ideal. It's better than nothing, you know? 5 MR JUSTICE BLAKE: It's not ideal but it's better than 6 nothing. All right. 7 MR HEPPINSTALL: If we follow on we see: 8 "To avoid the element of choice of the ...(Reading 9 to the words)... healthy, or to avoid the reverse of 10 choosing controls of children who were not, we listed 11 a sequence of choice of control as follows: friend, 12 work, colleague, neighbour, in-law, other. This 13 introduced an element of randomness to the choice of 14 control." 15 I mean, Professor, isn't this really beyond the 16 pale, giving that sort of guidance to people for the 17 selection of controls? 18 A. No, you must use the best information you can get. 19 Q. Isn't the point of the criticism that is being levelled 20 against this sort of epidemiology, Professor -- 21 A. May I remind you -- 22 MR JUSTICE BLAKE: Let him finish his question. 23 MR HEPPINSTALL: -- that if you can't do it properly it's 24 better not to do it at all because of the risk and the 25 danger inherent of a bad result?</p> <p style="text-align: center;">Page 131</p>
<p>1 Q. At the end of that it says: 2 "Each veteran was asked to ...(Reading to the 3 words)... fill out a questionnaire which gave the same 4 details." 5 Now, Professor, it cannot be right, can it, that 6 proper epidemiology can be based on the subject 7 selecting their own controls? Doesn't that cut across 8 every tenet of proper epidemiology? 9 A. Yes, but the problem is that those people who should do 10 such studies with the idea of epidemiology do not do it 11 and they need a lot of money and they aren't given, and 12 this is quite a correct trial to get information. 13 MR JUSTICE BLAKE: Right. So I just want to record your 14 answer. You disagree with the question, you think that 15 self-selection of a control by the informant in the 16 questionnaire is a correct way of getting this data? 17 A. Save correction of a control? 18 MR JUSTICE BLAKE: Self -- 19 A. No, the control are the other people, I think, in that 20 region. 21 MR JUSTICE BLAKE: Yes. Did you not understand the 22 question? Shall I repeat it? 23 A. No. Maybe. 24 MR JUSTICE BLAKE: I'll take it slowly, and if you want to 25 have it translated into German, let's do that.</p> <p style="text-align: center;">Page 130</p>	<p>1 A. Then you must exclude the RERF studies. They have no 2 reals controls. 3 Q. We are not looking at RERF, Professor. We're looking at 4 this study. 5 A. You would not ... 6 THE INTERPRETER: Avoid. 7 A. Anybody German? 8 THE INTERPRETER: You wouldn't do without. 9 A. You wouldn't do without the information from the RERF, 10 but the RERF collective is a catastrophic population, 11 a very certain population. Now we hope that we will 12 have no control group for such an epidemiological 13 situation. 14 Q. I understand your criticism of RERF. I'm talking about 15 the criticisms levelled at the epidemiology which has 16 been used by, or has been conducted by members of ECRR 17 and we're looking at particular examples here. 18 A. What members? 19 MR JUSTICE BLAKE: This questionnaire. 20 MR HEPPINSTALL: Wouldn't it have been better not to have 21 conducted this exercise at all, because of the danger of 22 an incorrect result? 23 A. No. No. The danger of an incorrect result is not 24 a danger because if you make a publication and everybody 25 who -- this is an important question. Yes? If there</p> <p style="text-align: center;">Page 132</p>

<p>1 were these people damaged, it's an important question 2 for similar situations. So this is the kind of debate 3 in science we should demand. If you do not, you publish 4 what you find, nobody can debate on it.</p> <p>5 Q. But --</p> <p>6 A. And this is correct enough to be --</p> <p>7 Q. Professor --</p> <p>8 A. -- published.</p> <p>9 MR JUSTICE BLAKE: Correct enough to be published?</p> <p>10 A. Yes.</p> <p>11 MR HEPPINSTALL: This publication has founded headlines in 12 national newspapers informing the public, including 13 nuclear test veterans, that there's evidence that their 14 children and grandchildren's congenital malformations 15 were caused by their fathers' and grandfather's 16 attendance at nuclear sites.</p> <p>17 A. I --</p> <p>18 MR JUSTICE BLAKE: Hang on.</p> <p>19 MR HEPPINSTALL: Do you think this so-called epidemiology is 20 a sound basis for making that sort of claim in public?</p> <p>21 A. Yes, but the argument that you punish the people by so 22 much negative results is not a good argument, because --</p> <p>23 MR JUSTICE BLAKE: What's the answer to the question?</p> <p>24 A. -- again what we demand is a debate on evident -- 25 effects are evident.</p> <p style="text-align: center;">Page 133</p>	<p>1 of occupationally exposed people. Perhaps in Britain 2 you had the Sellafield still births with neural tube 3 defects in Sellafield workers, the study by Parker and 4 co-workers. You had the nuclear workers' study of 5 Hanford with evident effects in the descendants -- 6 neural tube defects. A kind of effect very severely to 7 diagnose, to see already.</p> <p>8 So if you not talk about that and if you not follow 9 them up you will not inform the public correctly.</p> <p>10 Q. Can we look at the other loose paper, please, the paper 11 where the lead author is Mark P Little. It's from the 12 National Institute of Health entitled "Evidence relevant 13 to untargeted and transgenerational effects in the 14 offspring of radiated parents". I think you'll also 15 find that on your desk.</p> <p>16 A. Which?</p> <p>17 Q. It's also on your desk. It was handed up this morning. 18 Everybody has copies.</p> <p>19 A. Yes. I have one with some remarks on it.</p> <p>20 Q. Just to make sure everybody has it. So if we just -- 21 just a moment, Professor. It's an extraordinarily long 22 paper. The reason for that, if you just flick through 23 pages 26 to 38 you can see --</p> <p>24 A. We must only look at the abstract.</p> <p>25 Q. Well, if we look at 26 to 38 you can see that what this</p> <p style="text-align: center;">Page 135</p>
<p>1 MR JUSTICE BLAKE: I'll record that answer but can I just 2 get your answer for my benefit. Is this a sufficiently 3 sound basis of epidemiological investigation to make the 4 conclusions which you just have been asked about?</p> <p>5 A. Yes, it is legitimate.</p> <p>6 MR JUSTICE BLAKE: It is legitimate?</p> <p>7 A. It is legitimate to do such research because you show 8 that the effects are evident, and that is very, very 9 important information for the scientific community. And 10 if they say the methodology is too bad, so they have to 11 make a better study. But they have to consider it. 12 Many, many knowledge in science, in medical science were 13 gained simply by observation. You need not always 14 a very big epidemiological study in order to have 15 an effect described.</p> <p>16 MR HEPPINSTALL: Don't you think that scientists owe 17 an ethical duty, a duty to the public to make sure they 18 do not mislead the public?</p> <p>19 A. Please repeat.</p> <p>20 Q. Do you think that scientists have a duty not to mislead 21 the public?</p> <p>22 A. They have a duty not to mislead the results -- the 23 people, mislead the people. This is our argument. If 24 you leave out such important information as after 25 Chernobyl or you have also findings in the descendants</p> <p style="text-align: center;">Page 134</p>	<p>1 is a review of a large amount of other data and 2 information so this is what I think is called a review 3 paper in the literature.</p> <p>4 A. I know.</p> <p>5 Q. And in the abstract we can see the results of that 6 review. It says: 7 "In this article we review health effects in 8 offspring of human populations exposed as a result of 9 radiotherapy and some groups exposed to chemotherapy 10 ...(Reading to the words)... have not identified any 11 effects on health."</p> <p>12 A. You must read further.</p> <p>13 Q. "The available evidence therefore suggests that human 14 health has not been significantly affected by 15 transgenerational effects of radiation."</p> <p>16 A. Now there comes an important sentence. Read, please.</p> <p>17 Q. "It is possible that transgenerational effects are 18 restricted to a relatively short time post-exposure and 19 in human conception at short times after exposure it is 20 likely to be rare. Further research may help resolve 21 the apparent discrepancies between cellular animal 22 studies and studies of human health ..."</p> <p>23 A. Now this is example of the hereditary effects, radiation 24 induced. In this case the question of acute exposure or 25 chronic exposure is extremely important, because what he</p> <p style="text-align: center;">Page 136</p>

1 says here is right: it is possible that the effects are
 2 restricted to a relative short time post-exposure.
 3 That is the case. So let me explain that.
 4 The sperm cells and -- what is it? -- the hereditary
 5 cells which come to conception, they are originated in
 6 stem cells in the gonads, in men and in woman. The stem
 7 cells, we all know that ionising radiation is
 8 mutagenesis. We know that from studies in the files
 9 19 years ago. And the stem cells are very well
 10 protected against mutations in the DNA. The repair
 11 system is very good.
 12 But you know that there is -- the sperm are haploid
 13 cells. You have a family of cell divisions. The stem
 14 cells produce -- make divisions and they produce a chain
 15 of cells which end in the haploid and so on. And these
 16 stages, the haploid, they have only the half chromosome
 17 supply.
 18 These stages are extremely sensitive, and these
 19 stages are in men before conception you have to look at
 20 about three months. So three months before conception
 21 is the most sensitive state for genetic effects in men
 22 because these cells are not repaired, there is no
 23 surrounding to repair it.
 24 So if you have an acute irradiation as in bombs in
 25 Hiroshima, so every child which has been produced longer

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1 after the event than three months you will not think
 2 that in the catastrophe there will be many populations
 3 in the people, then you will leave this period of
 4 sensitivity. This is in men.
 5 So --
 6 MR JUSTICE BLAKE: Can you just pause there. Pause because
 7 I'll just try and get a note of what you said so far.
 8 **A. No, the most sensitive --**
 9 MR JUSTICE BLAKE: Pause, please. (Pause). Right, okay.
 10 Now --
 11 **A. So the main studies they looked here in humans was the A**
 12 **bomb survivors, and there are other restrictions I want**
 13 **to talk about soon, and people who had a radiation**
 14 **therapy, a therapy for disease, cancer disease. And**
 15 **these, the descendants of those parents also usually are**
 16 **living many years after the therapy. So you also have**
 17 **no exposure in the sensitive phase of the haploid cells.**
 18 So these findings they report on are not very
 19 sufficient to do a statement upon the risk, but in case
 20 of chronic exposure in men, these sensitive changes are
 21 always irradiated, always exposed, continuously exposed,
 22 and this is a very relevant factor. It's not a new
 23 thing what I tell you, the debate. It was also in the
 24 Sellafield leukaemia, the Gardner study. He
 25 investigated the short phase of exposure too.

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1 Q. Can we turn to page 14 of the document, please.
 2 **A. May I add something, please? The A bomb survivors, the**
 3 **statement of the ICPR that there is no evidence in**
 4 **humans is based on the A bomb survivors. The A bomb**
 5 **survivors are a very bad reference because of the fact**
 6 **that I just talked about, and because of**
 7 **an epidemiological problem we know from Japanese papers,**
 8 **we know that the A bomb survivors were a discriminated**
 9 **population in Japan. Nobody of the normal society would**
 10 **have contact with them and so the parents who might have**
 11 **a potentially damaged children would not talk to the**
 12 **doctors that they have damaged children because they**
 13 **feared that they couldn't be married, that they wouldn't**
 14 **find a partner for marriage. This is a situation which**
 15 **is described in the literature given by RERF. So you**
 16 **have a severe gap, a severe bias in these studies.**
 17 MR JUSTICE BLAKE: Right. Well I think we have that point.
 18 We are going to have to move on now.
 19 MR HEPPINSTALL: If you look at page 14, please,
 20 section 3.2, "Congenital malformations."
 21 It lists five studies: 99, 101, 103, 114, 115?
 22 **A. Yes.**
 23 Q. And says:
 24 "There were no indications of excess congenital
 25 malformations in the offspring of four groups of

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1 paediatric cancer survivors."
 2 It then says:
 3 "In particular ...(Reading to the words)... Japanese
 4 atomic bomb survivors."
 5 **A. Where is Chernobyl?**
 6 Q. It goes on. There's then a comment about there's
 7 a problem with the data in the updated version of the
 8 dataset in table 2.
 9 Then it says:
 10 "In summary, excess congenital malformations have
 11 not been detected in the offspring of irradiated fathers
 12 and mothers."
 13 Now my question, Professor, is that in your report
 14 you report the Busby and de Messieres study, but you
 15 don't draw any attention to any other study where the
 16 contrary has been shown, do you?
 17 **A. Yes, but you know that you cannot in such -- if**
 18 **an effect is found, this is a safer information because**
 19 **there are many, many problems to get information about**
 20 **the descendants. So that this -- now, let me turn**
 21 **about --**
 22 MR JUSTICE BLAKE: Perhaps if you just focus on the
 23 question.
 24 MR HEPPINSTALL: So when you report to this Tribunal the
 25 results of the Busby and de Messieres studies, page 9 of

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<p>1 your report --</p> <p>2 A. I did not report this only.</p> <p>3 Q. No. Do you think you have a duty to this Tribunal to</p> <p>4 record the fact that many other studies have not</p> <p>5 observed any congenital malformations in offspring?</p> <p>6 A. That is a trivial argument. You --</p> <p>7 MR JUSTICE BLAKE: It's a trivial argument --</p> <p>8 MR HEPPINSTALL: Wait, Professor, because we need to be</p> <p>9 clear that that is a true answer to what --</p> <p>10 A. We know that --</p> <p>11 MR JUSTICE BLAKE: Just pause because I just want to just</p> <p>12 make sure I have captured your answer correctly.</p> <p>13 The question is do you have a duty to point out</p> <p>14 studies which contra indicate the conclusion to which</p> <p>15 you refer by reference to a paper you put in your</p> <p>16 article. I thought your answer is that is a trivial</p> <p>17 argument.</p> <p>18 A. No. Of course I -- if the ICRP says there is no</p> <p>19 evidence then that means, in the UNSCEAR, that there are</p> <p>20 many studies showing the effect this is true. But why</p> <p>21 don't they show? Then you must consider all these</p> <p>22 single studies and look if there may be a reason why</p> <p>23 they -- if they have not enough cases, if they don't</p> <p>24 look enough long -- follow-up, if they look at the wrong</p> <p>25 classification of the effect and so on.</p> <p style="text-align: center;">Page 141</p>	<p>1 because they refer to such studies, but they are</p> <p>2 incomplete. They leave out things. And why have</p> <p>3 Little -- why did they not mention the Sellafield, the</p> <p>4 usual things (?), not the Hanford, usual things (?),</p> <p>5 which were confirmed in follow-up studies? And why do</p> <p>6 they completely leave out this Chernobyl data? Why?</p> <p>7 Q. You also mention in the same paragraph the 1998 Rabbitt</p> <p>8 Roff study. Can I ask you to turn to SB2/2.23, please.</p> <p>9 THE INTERPRETER: 2.?</p> <p>10 MR HEPPINSTALL: Sorry, I said 2.23. Sorry --</p> <p>11 MR JUSTICE BLAKE: Has this been updated?</p> <p>12 MR HEPPINSTALL: I hope so. It looks like there's a piece</p> <p>13 of paper there. Yes. I think we tried to solve your</p> <p>14 2.23 yesterday, my Lord.</p> <p>15 MR JUSTICE BLAKE: You did, yes. I have something called</p> <p>16 2.23 but it's supplementary report for Government.</p> <p>17 MR HEPPINSTALL: Yes. (Pause)</p> <p>18 MR JUSTICE BLAKE: Anyway, you have the document that is</p> <p>19 being referred to? The supplementary report. Yes?</p> <p>20 MR HEPPINSTALL: Professor, this is a commentary by</p> <p>21 Dr Richard Haylock, one of the Secretary of State's</p> <p>22 experts, about what Professor Howard has done in respect</p> <p>23 of the Rabbitt Roff material. I just want to take you</p> <p>24 to point 2, over the page, where he says:</p> <p>25 "The reliability of the results of the survey is</p> <p style="text-align: center;">Page 143</p>
<p>1 I refer on a German study by Hermann and coworkers</p> <p>2 which is not discussed here, they are also not</p> <p>3 discussed, as are -- the findings in this Hermann study</p> <p>4 in Germany was a very long study in survivors of</p> <p>5 radiation therapy people, and they studied over many</p> <p>6 years and they said that the other studies suffer, in</p> <p>7 radiation (inaudible), suffer from too short follow-up</p> <p>8 times. And there is a problem again that in these cases</p> <p>9 you will also find, if you find something, stem cell</p> <p>10 mutations, which are rare but they exist.</p> <p>11 MR HEPPINSTALL: Professor, the question I am asking you,</p> <p>12 you are quite entitled to mention a paper by Little and</p> <p>13 the over 100 papers that he and his team reviewed and to</p> <p>14 explain why you disagree with them. What I am asking</p> <p>15 you is why didn't you mention in your paper that the</p> <p>16 Busby and de Messieres finding is not compatible with</p> <p>17 over 100 other studies reviewed by some of the leading</p> <p>18 radiation biology experts in the world? Why didn't you</p> <p>19 not see fit to mention that to this Tribunal?</p> <p>20 A. So I understand that people who read the paper know</p> <p>21 that. We had a long debate.</p> <p>22 Q. Who knows it, sorry?</p> <p>23 A. Not you, but people who are the readers of scientific</p> <p>24 literature. They know that they study social effect.</p> <p>25 So the ICRP, UNSCEAR, of course, come to the judgment</p> <p style="text-align: center;">Page 142</p>	<p>1 directly related to the accuracy of the responses to the</p> <p>2 questions."</p> <p>3 Now, do you agree with that?</p> <p>4 A. I also answered that.</p> <p>5 Q. "The questionnaire requires the veteran or their widow,</p> <p>6 [that's the questionnaire in the Rabbitt Roff study] to</p> <p>7 accurately recall issues and events relating to the</p> <p>8 birth of their children" --</p> <p>9 A. I have no problems with the methodology.</p> <p>10 MR JUSTICE BLAKE: Perhaps just listen to the question,</p> <p>11 please, and then give us the answer.</p> <p>12 MR HEPPINSTALL: So Dr Haylock has a problem, Professor,</p> <p>13 because he says:</p> <p>14 "The questionnaire requires" --</p> <p>15 A. No, maybe --</p> <p>16 MR JUSTICE BLAKE: One second, please. Just wait.</p> <p>17 MR HEPPINSTALL: -- "or their widow to accurately recall</p> <p>18 issues and events relating to the birth of their</p> <p>19 children who may have been born 40 years in the past."</p> <p>20 The point he makes is:</p> <p>21 "The longer the events occur in the past the less</p> <p>22 likely the person is to recall them accurately. In this</p> <p>23 instance the survey is asking them to recall the</p> <p>24 possibly technical names of congenital abnormalities</p> <p>25 which may add to the difficulty."</p> <p style="text-align: center;">Page 144</p>

<p>1 Don't you think that's a legitimate complaint about 2 the Rabbitt Roff questionnaires? 3 A. Yes. What do you expect, what I say to an unknown paper 4 from Mr Haylock? 5 Q. Well -- 6 MR JUSTICE BLAKE: Could we have an answer to the question? 7 Is that point a legitimate criticism of the methodology 8 of the Rabbitt Roff paper? 9 A. I don't know, because I cannot go in all the details 10 which were done. I was convinced that the result is 11 correct. And -- 12 MR JUSTICE BLAKE: Well, I think -- 13 A. -- I cite many papers. So it's not possible to -- 14 I know that papers are different in their -- 15 MR JUSTICE BLAKE: Well, pause a second. Stop, please. 16 I asked the question, the question that is being 17 asked of you is do you agree with the criticism of 18 a methodology which asks an informant to give the 19 information going back over many, many years about 20 medical issues? As opposed to medical observations, 21 I suppose. 22 A. As far as I understood this was not the case in that 23 they -- they went to the families. This is -- 24 MR JUSTICE BLAKE: So you disagree that that is what 25 happened in the Rabbitt Roff. But if it is what</p> <p style="text-align: center;">Page 145</p>	<p>1 MR HEPPINSTALL: If I do one more point on Rabbitt Roff and 2 then I have one more topic area left which I could 3 finish off tomorrow morning. 4 MR JUSTICE BLAKE: I was going to ask you to choose a point 5 between now and 4.45 when I think I must pull stumps. 6 MR HEPPINSTALL: Why don't I do my last question on 7 Rabbitt Roff and then the final topic in the morning. 8 MR JUSTICE BLAKE: Can I just confirm, because we've had 9 problems with timing I don't think we are going to quite 10 finish your evidence off tonight. Are you able to come 11 back tomorrow morning at ten o'clock for an hour or half 12 an hour? 13 A. Yes. 14 MR JUSTICE BLAKE: I know you have a flight back to Germany 15 some time tomorrow, but I think I was told it's in the 16 afternoon. 17 DR BUSBY: It's 1.45, my Lord. She has to be away by 18 11 o'clock. 19 MR JUSTICE BLAKE: Absolutely you will. If we start at 20 10.00 and finish at 10.30. 21 DR BUSBY: That would be fine. 22 MR JUSTICE BLAKE: Is that going to work for you? 23 A. Yes. 24 MR JUSTICE BLAKE: Right. 25 So one more question tonight and we will continue at</p> <p style="text-align: center;">Page 147</p>
<p>1 happened, would it be a fair criticism of the 2 methodology? The question is about the methodology -- 3 A. I don't know if the criticism is right. 4 MR JUSTICE BLAKE: Well, assume it is for the purpose of 5 answering this question. 6 A. If it's -- 7 MR JUSTICE BLAKE: Assuming that what he has described is 8 what he has done. I don't know whether it is or it is 9 not, we may find out later. But if what he has 10 described there is what was done, would you have 11 problems with that methodology? 12 A. I can only confess on my own, I cannot speak for ... 13 I -- 14 MR JUSTICE BLAKE: Are you able to give us any expert views 15 on how to conduct -- 16 A. I did not study the -- 17 MR JUSTICE BLAKE: Please can you just wait -- Professor, 18 can you wait until I ask the question and then please 19 answer it. 20 Are you able to give us any expert opinion on the 21 methodology of conducting an epidemiological survey of 22 this kind? 23 A. No. I cannot judge spontaneously. I must go in detail; 24 I must have time. 25 MR JUSTICE BLAKE: Right.</p> <p style="text-align: center;">Page 146</p>	<p>1 ten o'clock tomorrow, but we will finish at 10.30. 2 MR HEPPINSTALL: You wrote in your report at page 9, 3 Professor -- well, let's look at page 9, section 8, the 4 final paragraph of section 8. 5 A. I have no section numbers. Ah -- 6 Q. They are your section numbers. It's genetic damage and 7 chromosome damage in -- 8 A. Ah, yes. 9 Q. You wrote, after talking about Busby and de Messieres: 10 "The same level of congenital effects in offspring 11 were reported in the 1998 Rabbitt Roff study." 12 Do you not think you were under an obligation to 13 look at that study and to look at its methodology? 14 A. No. The author is obliged. I am not the author of 15 this. I report on results which I am convinced of that 16 they were done. 17 Q. How can you be convinced if you don't know the 18 methodology? 19 A. I know the methodology because I read the paper, of 20 course, but I didn't ask -- prove it. So ... 21 MR HEPPINSTALL: All right. That completes the questions on 22 that topic. 23 MR JUSTICE BLAKE: Right. 24 MR TER HAAR: Before we rise can I just raise the question 25 of timetable?</p> <p style="text-align: center;">Page 148</p>

1 MR JUSTICE BLAKE: Yes.
 2 MR TER HAAR: As I understand it Professor Thomas will not
 3 be available after Friday.
 4 MR JUSTICE BLAKE: Yes.
 5 MR TER HAAR: I think we are going to be very tight on
 6 timing for cross-examination of Professor Thomas on the
 7 present timetable. I rise in case my learned friend
 8 thinks that at any point of his cross-examination of the
 9 other two witnesses coming tomorrow might push into
 10 Friday, because that would cut into my effective time on
 11 behalf of my clients for cross-examination.
 12 MR JUSTICE BLAKE: It won't. If we don't finish the
 13 witnesses tomorrow they will have to come back on
 14 another occasion.
 15 MR TER HAAR: I am very grateful.
 16 MR JUSTICE BLAKE: I am keeping Friday.
 17 MR TER HAAR: I'm very grateful.
 18 MR JUSTICE BLAKE: Yes? Right. Thank you, Professor.
 19 Let's break for this evening now. We will come back and
 20 complete your evidence at ten o'clock tomorrow, please.
 21 I take it you would prefer to have the assistance of the
 22 interpreter tomorrow, as you have had this afternoon,
 23 just in case any questions of translation arise?
 24 THE WITNESS: (Nodded assent)
 25 MR JUSTICE BLAKE: Yes. Thank you very much. If you could

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1 come back tomorrow as well. It would just be for half
 2 an hour.
 3 THE INTERPRETER: Yes, I was booked for two days.
 4 MR JUSTICE BLAKE: Good, thank you.
 5 Again, you can't discuss your evidence with Dr Busby
 6 and his team overnight because you are in the middle of
 7 giving evidence. Do you follow?
 8 THE WITNESS: No.
 9 MR JUSTICE BLAKE: You are in the middle of giving your
 10 evidence. It's a rule of English procedural law that
 11 a witness cannot discuss the evidence which they have
 12 not yet completed with anyone else who is interested in
 13 the matter.
 14 THE WITNESS: Yes.
 15 MR JUSTICE BLAKE: You can say hello and good evening and
 16 where is the way out of the building, but not talk about
 17 your evidence.
 18 THE WITNESS: Thank you.
 19 MR JUSTICE BLAKE: Okay, thank you.
 20 MR HEPPINSTALL: Your Honour, may we resolve a practical
 21 problem which is we swapped round the name plates of the
 22 two other members of the Tribunal. I see they have been
 23 swapped back, but are they in the right place?
 24 MR JUSTICE BLAKE: Yes, yes, this is Dr Rayner.
 25 MR HEPPINSTALL: Ah, we are all learning something on Day 3!

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1 I think we now know where we stand. Yes, thank you very
 2 much.
 3 MR JUSTICE BLAKE: Before the advocates go, it's not
 4 necessary overnight reading but here is the reasons for
 5 the ruling.
 6 MR HEPPINSTALL: I am grateful, my Lord.
 7 MR JUSTICE BLAKE: Can I ask you to hand them out in due
 8 course. Thank you very much.
 9 (Handed)
 10 10 o'clock tomorrow then.
 11 (4.40 pm)
 12 (The court adjourned until
 13 Thursday, 16 June 2016 at 10.00 am)
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