

Christopher Busby Closing submission Day 10

(Cecilia Busby Closing in a separate file).

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Closing submissions by DR BUSBY

DR BUSBY: This is the final submission now on the part of the appellants Battersby and Smith. The Tribunal will have been given our final submission document which was handed up.

MR JUSTICE BLAKE: This is the table of issues for closing statement?

DR BUSBY: Yes. It was an attempt that we made to try and follow the valuable suggestion your Lordship made about laying out the cases in a way that appeared to be related to sequences of issues which were relevant to the final understanding of the case.

MR JUSTICE BLAKE: Right.

DR BUSBY: And this we've done. Although I have to say it isn't quite finished in terms of the references, and we can finish that later on. We are a bit short-staffed. But I won't be speaking directly to this table. The table is more of our case in the format that your Lordship suggested we present it. Instead I will be speaking about the scientific issues and some of the issues which are raised and which are listed in this table.

But before I go there, I first want briefly to address the issue of documentary evidence about what happened at the test site.

MR JUSTICE BLAKE: Is that one of your topics between 4 and 11?

DR BUSBY: No, this is quite separate. What I am going to say now I won't need to -- I will only refer to this document when necessary and probably not at all.

MR JUSTICE BLAKE: Right.

DR BUSBY: But my concern is this. It's about the issue of the documentary evidence that was or was not available and made available by the Secretary of State from the previous First Tier and Upper Tier hearings. We have attempted throughout these appeals, and indeed from the time of the AB and Others case when I was commissioned by Rosenblatts, my Lord, to obtain information about the
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measurements made at the test sites. And your Lordship knows that there have been various directions made to the Secretary of State to release documents which would enable us to obtain information about this but we have been told by them and by a representative which was brought in from the Atomic Weapons Establishment that these documents just do not exist, either that or they are secret.

So we've had to fall back on the Bevis Parker gist which was obtained following a letter that I wrote to the previous judge in the First Tier, Mr Justice Stubbs, to tell us that there were 8 tons of uranium dissipated over Christmas Island cumulatively over the time of the testing. And we were grateful to Mr Hallard to do that calculation but it's a fairly straightforward one which you can derive from the Bevis Parker gist. So what I have to say is that documents relative to our case having been submitted, even those ones that have been obtained have often disappeared from the bundles and even from the index. We saw this most recently in the case of the Morgan meeting, the Karl Morgan meeting at Harwell, which I would just like to take you to which is SB22/11.

MR JUSTICE BLAKE: Yes.

DR BUSBY: This document was originally obtained by me from Rosenblatts and then it was submitted to the First Tier and it disappeared from the First Tier bundle and then --

MR JUSTICE BLAKE: I don't quite know what you mean. Are you taking us to this document for a proposition contained in it?

DR BUSBY: I am, my Lord, but --

MR JUSTICE BLAKE: Or for a proposition that is being -- inadequate disclosure? I've just lost what I am --

DR BUSBY: I'm sorry, my Lord. Well, then in that case let me take you to what it says, the important thing that it says at the bottom of the page.

MR JUSTICE BLAKE: Yes. "Other subjects were touched upon."

DR BUSBY: Yes. Essentially what it says is this: that the hazard from enriched uranium is a radioactive hazard rather than a toxic one and relates to the presence of U-234.

Well, we submit this is extremely important for our case, an extremely important statement. What we say is that we don't understand how it could have disappeared from all of these bundles on several occasions and even in this hearing it also disappeared from the bundle and from the index and had to be put back by Mr Heppinstall which is why it's in SB22. So what we say to this is that this difficulty in

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obtaining documents and then the volatility of the documents –

MR JUSTICE BLAKE: It's not apparently the difficulty in obtaining the document. You had the document –

DR BUSBY: One point is the difficulties of obtaining the documents, and the other point is their apparent volatility in that they appear to keep disappearing.

MR JUSTICE BLAKE: I have no idea, and I don't imagine my colleagues do, as to the process which went from the library to the SBs, but everyone was able to make their selections of material and if things were missed out that were important, that was capable of supplementing or correction. But I don't understand this is now a topic at this stage in the proceedings that's going to be worthy of further investigation and debate.

DR BUSBY: I'm not expecting anybody to investigate anything, my Lord. I am just making the point that it makes it more difficult for us to conduct our case, given that we haven't been able to find documents which show the presence of radioactive materials at the sites and we frankly don't believe that such documents didn't exist at one time. That's the only point I wanted to make, my Lord.

So we can put that one to bed.

My second point is this. It seems to me that the respondent has refused the direction to reply to our statement of case and to the specific issues that it raises. Nor, it seems from the cross-examination of his witnesses, has the respondent asked them to comment or refute the evidence and the arguments. These arguments from the two sides are almost like ships that pass in the night, but not quite. One of the ships -- our ship -- has all its navigation lit up and is signalling away but the other one steams silently on in the darkness, its track and purpose defined by instructions based on, we say, an obsolete, incorrect and unsafe system of radiation protection.

All of the experts brought by the SSD have agreed that if the ICRP risk model is unusable for explaining or predicting the health effects of internal exposures, all of their reports are worthless. They have all agreed this from the witness box. I don't intend to go through every piece of evidence which we have drawn attention to regarding this issue and as I said earlier in the table we list the main evidence and refer to the transcripts as we were asked to by your Lordship.

The table is there, as you suggested, to ensure that none of the evidence we point to is overlooked by the Tribunal. That was the purpose of putting this down,

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making that table.

So, as I said, despite being directed to, the Secretary of State has not responded to any of our evidence or the arguments which were set out in the original statement of case and in the final revised statement of case.

The SSD's experts were clearly instructed -- clearly instructed -- not to address the many examples of important, relevant and critical peer reviewed evidence which showed the ICRP model on which all of their work depends to be incorrect when applied to the kinds of internal exposure to particles, to uranium suffered at the contaminated test sites.

What could the SSD strategy be here then, we asked ourselves, if not to depend upon ad hominem attacks on the credibility of the witnesses? Our witnesses are eminent scientists as --

MR JUSTICE BLAKE: I think we had submissions on that topic, yes.

DR BUSBY: -- Dr Cecilia has pointed out. With respect, my Lord, if I'm allowed to repeat that at --

MR JUSTICE BLAKE: I don't think it's a good idea. I mean I gave you the leeway to have two advocates directing, if you divided the issues up, so I don't think repetition is going to be helpful to us.

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1 DR BUSBY: Right. I'm sorry, my Lord.

So what I would like to take us to now is the SSD's arguments to dismiss Professor Schmitz Feuerhake's research.

MR JUSTICE BLAKE: Right.

DR BUSBY: Now in her genetic effects paper which I now seem to have lost the reference of ...

(Pause)

MR JUSTICE BLAKE: Do you want to take us to the Secretary of State's or ...?

DR BUSBY: It's SB6/89.

MR JUSTICE BLAKE: You want to go there. Right.

DR BUSBY: Yes.

MR JUSTICE BLAKE: All right, we'll go there.

DR BUSBY: Yes, that's right. I don't want to do more than here just take the Tribunal to the references at the back of this paper. I don't ask them to do anything more than just to look and see how many references there are here that Professor Schmitz Feuerhake's paper -- that this paper relies on.

MR JUSTICE BLAKE: Yes.

DR BUSBY: Professor Schmitz Feuerhake's paper concludes that there are serious problems in the ICRP risk model as it applies to genetic effects and congenital malformations following Chernobyl and from other

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MR JUSTICE BLAKE: I understood that in respect of one or two of these papers the suggestion is that a wrong conclusion is being drawn from the paper read as a whole and there have been selective fillets for bits which support the direction in which ECRR witnesses want to go and other material is missing. Are you telling us that we've got to read all these 37 papers?

DR BUSBY: No, my Lord.

MR JUSTICE BLAKE: Sorry, 84 papers.

DR BUSBY: No, but eight of those papers were actually submitted, handed up during the hearing.

MR JUSTICE BLAKE: All right. Well, we have those eight papers.

DR BUSBY: Those eight papers all show that there was an increased risk of congenital malformations following the Chernobyl accident.

MR JUSTICE BLAKE: So if we can focus upon that submission, you say: here is a review paper, reviewing a number of papers, eight of them you've made available to us. If, therefore, those eight papers are sufficiently identified and abstracted in this review article that is evidence of some independent scientific basis for the opinions contained in the article?

DR BUSBY: Correctly put, my Lord. That is my point.

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MR JUSTICE BLAKE: Right. But by contrast, if the review of the eight articles doesn't support the use or the conclusions sought to be abstracted from them in this debate, then so far, so bad.

DR BUSBY: Absolutely. Absolutely, my Lord, yes.

MR JUSTICE BLAKE: Okay, so the eight papers concerned with the testing ground, yes?

DR BUSBY: Yes, that's the sort of background. There are more papers than that --

MR JUSTICE BLAKE: Well, I appreciate there are more papers than that but the question is, what homework are you setting us?

DR BUSBY: Well ... I think my point here is that, rather as Dr Cecilia pointed out, that there is an addition of evidence. A lot of papers which each perhaps might on their own be considered to be only hypothesis-forming, when there are an lawful of them, the hypothesis that they point at becomes more likely to be real, to lead to some sort of change of assessment of the health effects.

MR JUSTICE BLAKE: Yes, but it may not just be numbers, it may be what the papers contain.

DR BUSBY: Well, of course, my Lord, yes. Of course that's true. That's when we come back down to the argument that is advanced by Professor Schmitz Feuerhake, where she says that they do actually suggest very strongly, all things together, that there is a...

MR JUSTICE BLAKE: All right.

DR BUSBY: Now, I think my point, my Lord, is that Professor Schmitz Feuerhake and indeed our other experts were in a way categorised or classified or attacked by the Secretary of State as being part of some campaigning group.

MR JUSTICE BLAKE: Yes.

DR BUSBY: On the basis that they -- well, in some cases that they were just friendly with me, but I think what I am saying is that these people who they rely upon, if you like the eight papers which we chose, those people are not part of a campaigning group. They cannot be, I mean we don't know who they are --

MR JUSTICE BLAKE: I have the point. So I put to you earlier what I understood your submission was, that those eight papers were evidence, independent evidence, of scientific support for the propositions advanced in this and one or two other papers.

DR BUSBY: Yes, that's the point.

MR JUSTICE BLAKE: I have the submission.

DR BUSBY: Okay.

The SSD has also said something that has gone further, as I understand him. He has said that the Tribunal itself cannot assess the importance of any fact

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that has been presented in the peer review literature because the Tribunal is not an expert. But I was a bit confused by this, I must say, so it would be good to have some kind of response to it from the Tribunal. I mean, the way I see it is that if the Tribunal is not allowed to listen to any of the BS appellants' experts --

MR JUSTICE BLAKE: Don't worry about what we're allowed to do. We'll decide that ourselves. But the problem is that one may only be able to go so far with a paper before that leads off to a paper trail elsewhere which will take us beyond what we can effectively do. But --

DR BUSBY: Yes, I understand that --

MR JUSTICE BLAKE: -- don't worry about us feeling constrained from doing what we think we need to do.

DR BUSBY: Well, the SSD, although he argued that the European Committee on Radiation Risk was a campaigning group has not brought an evidence to that effect. None of his experts have stated that it's a campaigning group, nor is there any evidence that the ECRR is a campaigning group.

MR JUSTICE BLAKE: I seem to remember Dr Lindahl making some fairly strong comments below, but perhaps that was directed at you and Professor Sawada.

DR BUSBY: Well, I don't see that Sawada is a member of a campaigning group, and indeed his original report on this issue -- not report, his original scientific paper that he wrote on this issue when he first presented his evidence that there were these increases in epilation and other radiation-associated effects at distances from the hypocentre that couldn't possibly be associated with gamma radiation, he wrote that in 2007 into a scientific journal.

MR JUSTICE BLAKE: Yes, I know he wrote the paper. It's got quite a loaded title, hasn't it?

DR BUSBY: I don't know about loaded title. His title referred to what he showed in his paper, surely.

MR JUSTICE BLAKE: Well, it starts off, doesn't it, with an interesting hypothesis about suppression of evidence by the US Government after the Second World War? For us I can perfectly understand how, given his biography, Professor Sawada has more than an interest in these matters and a strong sense of personal connection with them. Given the experiences he had as a child that's perfectly understandable. But that's the way in which the paper is couched.

DR BUSBY: Well, if somebody finds something which shows that there's a significant problem and then he goes to look at that problem and finds that it has been covered up by various people at some point --

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MR JUSTICE BLAKE: That's quite strong words. That's the point.

DR BUSBY: You are saying it's intemperate, but I don't think being intemperate, especially since he's Japanese and they have a different culture, being intemperate in the paper as you might see it doesn't detract from the --

MR JUSTICE BLAKE: Well, it might be evidence of a crusading campaigning role. Nothing wrong with that per se, but it's the kind of commitment to a direction, a cause or a proposition which makes it difficult to accept the maker of such statement as a dispassionate expert on these very difficult issues into which we are being drawn. I think that's really the point.

DR BUSBY: Well, as to that, my Lord, I have to say -- I don't have to say, but I will say -- that no scientist, and in fact no person, is independent of their culture and so the set of interpretations that any

scientist makes on a selection of evidence, so long as they all select the same evidence, their interpretation can be different. So they could be members of a group who believe a certain interpretation on the basis of a certain way of looking at it, or another group that have a different interpretation because they've looked at it differently. Of course then various experiments can be advanced so as to try and distinguish between the validity of either of these two ways of looking at things. And I've always had a problem, in fact I suggested this when I was cross-examined in the Upper Tier, and in fact many reports and books have been written about this, about how people are emotionally attached or even attached as a result of their group or their employment or, as I said, their interpretation of the facts to a particular way of seeing things. In that regard I would say that it's almost impossible for a scientific expert to be entirely unbiased. The bias may of course be quite -- well, I would say innocent, but unknown even to the person who has the bias, but nevertheless they have a particular position on the interpretation of the facts. I won't go any further.

MR JUSTICE BLAKE: Just for your benefit, I believe that I haven't seen the transcript of evidence from the Upper Tribunal. I am not asking for it but it's only those passages that are cited in Mr Justice Charles' decision that I have picked up on so far.

DR BUSBY: Would it be helpful to the Tribunal if we asked the SSD to provide the transcript?

MR JUSTICE BLAKE: Well, I don't know.

DR BUSBY: I know it's a lot more stuff to read, my Lord.

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MR JUSTICE BLAKE: Well --

DR BUSBY: It does make these points at some length, to save me boring on about them.

MR JUSTICE BLAKE: I think it's better in your present role as advocate for you to make points rather than us trawl through whatever you said as a witness. But I am just alerting you to the fact that if you'd imagined that we'd read it or that you were able to cross-refer I don't think that's a supposition you can rely upon.

DR BUSBY: I think I have in fact condensed more or less the position.

MR JUSTICE BLAKE: I think I have the proposition and I understand it. So if that's what it's directed to, if you have the essence, the distillation, across to us just now, I've recorded it.

DR BUSBY: Yes. It's really quite simple. What I'm saying is that there is no such thing as an unbiased expert.

MR JUSTICE BLAKE: I have that point.

DR BUSBY: In the United States it's accepted that that is the case so they always go through a sort of oppositional process

MR JUSTICE BLAKE: Quite. That's not the way we do it or the Australians do it.

DR BUSBY: I know, my Lord. I would say actually the United States system is probably better if one wanted to get to the truth.

MR JUSTICE BLAKE: Well, there's debate about that.

DR BUSBY: Yes.

MR JUSTICE BLAKE: If you have infinite resources and an infinite amount of money and an infinite amount of time there might be something to be said for it. But ...

DR BUSBY: I was going to say with regard to this issue of the campaigning group and the ECRR, and so on, that in fact a lot of this work was done -- this work criticising the ICRP model for various reasons goes right back to the '60s.

MR JUSTICE BLAKE: The '60s? You are pushing it back. I thought it was some time in the '90s it was emerging, that then led to the CERRIE report debates which you have taken us to, but then your daughter told us it was 1973 but it's going right back, all this had become visible by the mid '60s?

DR BUSBY: It does go back. It goes back much further, it goes back to the '60s. Probably the first person to raise attention to it was Professor Ernest Sternglass of the University of Pittsburgh, but this is really another matter. But just for the interest of the Tribunal the concerns about the ICRP model go right back to the '60s, and in fact Dr Karl Morgan, who we have just seen talking at Harwell about uranium-234, resigned from the

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American BEIR committee over the issue of tritium. In fact Morgan wrote a book about this in 1997, called *The Angry Genie*, in which he pointed out that it was the pressure from the nuclear industry on the ICRP, if you like, to prevent them from increasing the risk coefficient of tritium by a factor of 10,

which all of the evidence he says showed that they should have done, and he actually was told, and he writes this in his book, that they couldn't do it because it would seriously have affected the ability of the nuclear industry to continue to function because the nuclear industry produces a very large amount of tritium as a result of making energy.

That was in 1997. But Morgan retired, resigned, was kicked out of the BEIR Committee in the '70s. So this sort of thing has been going on for a very long time and various other people have been involved in it who you could hardly call campaigning groups.

Professor Ed Radford also resigned from the BEIR Committee and Dr Gofman, Dr John Gofman, who was a very senior person in the Atomic Energy Commission, and went right back to the Manhattan Project. He was in charge of chemistry, the biochemical radiation health effects for the Manhattan Project. He also was kicked out because he started to complain about the fact that the risk model was not correct.

These are not people who are anything to do with me. In fact, I only started my interest in this in about the 1990s, the beginning of the 1990s and I was lucky enough to talk to Michael Meacher, the Environment Minister, and you know all about the CERRIE Committee.

MR JUSTICE BLAKE: Yes, well, I think we have how that led to the CERRIE minority report, et cetera.

DR BUSBY: So let me just move to say a few words about science and scientific method. My daughter said some things about this but I have something to say which is not quite the same thing and it's relevant. This case is entirely or mostly dependent upon science. It's a case where there is a very large number of scientific facts and frankly, I mean I'm not sure if I can imagine there has ever been a case with quite so many scientific facts and bits of paper that I really do sympathise with your Lordship and the Tribunal having to make sense of. I mean, it's a task which has taken me 25 years to work my way through and to be --

MR JUSTICE BLAKE: I hope we might just be able to beat that!

DR BUSBY: So the arguments are or could be -- I mean the arguments between us and the experts of the SSD, if you

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like our experts and the experts of the SSD, the non-ICRP versus the ICRP, those arguments are essentially arguments between sort of armchair predictions using mathematics and complex theoretical models based on a simplistic modelling method of dose, and on the other side a sort of biological and epidemiological evidence as shown in literally hundreds of peer reviewed reports, many of them cited in this by us in this Tribunal and many of them handed up. There were for example a very large number of reports written in the Russian language which never made it into the United Nations or the ICRP --

MR JUSTICE BLAKE: There has to be a limit. You have identified the reports which you referred to, and that at least we can examine for the propositions. We're doing so, but if you are going to refer to a report in Russian which is not in the bundle --

DR BUSBY: My Lord, I am not --

MR JUSTICE BLAKE: Try to deal with the material you have, please -- you have quite a lot of it -- rather than material we don't have for one reason or another, otherwise we'll never finish the task of setting the target.

DR BUSBY: I am just referring to the quantity of these papers, that's all, my Lord. I certainly don't expect anyone to go and look at the Russian language literature. Well, I am sure -- I mean there is no way I would have suggested any of these. But the CERRIE minority report, and indeed the CERRIE report itself, should have referred to a very large number of Russian language peer reviewed papers which showed significantly high health effects occurring in the territories contaminated by the Chernobyl accident and these were brought to the CERRIE meeting in Oxford, St Catherine's College, Oxford, in 2004. There was a big international conference called by CERRIE and four Russians or -- yes, Russian-speaking experts, including the Head of Biological Radiation Effects of the Russian Academy of Sciences we invited to come there and they presented a lot of these papers but they simply did not get considered. They were not taken in by the main CERRIE Committee as evidence, although we've listed them as brief abstracts in the minority report, and they just sort of disappeared. They have not been considered by those people if you like on the other side, on the ICRP side.

In a discussion that I had with the ex Scientific³ Secretary of the ICRP, Dr Jack Valentin, and I won't take you there -- it's in the bundle.

MR JUSTICE BLAKE: I've read it.

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DR BUSBY: In that discussion Valentin, as he had then retired as the Scientific Secretary of the ICRP stated quite clearly two things. The first thing was that the risk model was possibly insecure for internal radionuclides by as much as 100-fold, and he states this and he is the Scientific Secretary. You can read it in the transcript and in fact many people, many activist friends of mine have put the video up because it was videoed so it's actually on the Internet and we give the place where you can see it if you want to. The other thing he said was that he thought it was quite wrong that the ICRP had not considered all of the evidence of these increased ill-health occurrences in the various countries that were exposed to the Chernobyl fallout.

So these two things were things that were clearly absent from the ICRP discussion, which goes to my point, and one that was made in the paper by Professor Schmitz Feuerhake, that if you see the world through a particular prism, through the prism of the ICRP approach, then anything that doesn't fit that approach is dismissed. As we've seen, many of the papers were dismissed by the experts for the SSD in a sort of offhand manner, or else they are just simply ignored, they are invisible, because the risk model doesn't allow to accommodate the existence of them in some way, do you see?

MR JUSTICE BLAKE: Well, the impression I personally have is that on a number of occasions, including in the CERRIE report, consideration was given to critiques of the methodology and predictability of the ICRP model, but they concluded that on analysis the model remained sound, good and the critiques were unsound.

Now, that seems to be the conclusion. They then go on to say such studies, epidemiological studies and others, have tended to support in broad terms the model. So I just don't get a sense of a type of mentality established in the early '60s of refusing to engage with criticisms or other comments and simply ignoring the onward march of scientific critique, which is the picture you are painting to us now.

DR BUSBY: I think that's my point, my Lord, that they don't see it because they refuse to see it. For example, again and again in this area of the adequacy of safety of the model we see the calculations of dose are held up as evidence that the epidemiological observations cannot be real. We see that in the case of all of the clusters of child leukaemia around nuclear sites of which there are a very large number of papers now that show there

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are clusters of childhood leukaemia in nuclear sites, but what always happens is that those who are the agencies, who are if you like the official agencies in this area, they say that these increases cannot be caused by the exposure to radiation because the doses are too low.

Professor Thomas told us, for example, that the huge increase in thyroid cancer after Fukushima -- she says it's not a real increase but let's leave that to one side, whatever it is -- it cannot be real because again the doses are too low. The SSD's position with the veteran cancers is also the same one.

So there's evidence for instance in the Pearce study of the New Zealand veterans, we see a 5.6-fold excess of leukaemia. Now, the doses to those people, I think we would have to assume that the SSD would say that the doses to those people were very low, that they couldn't have caused a 5.6-fold excess of leukaemia. But we also see in a selection of those New Zealand veterans, we see in the Wahab and Rowland chromosomes study, again we see a very large increase or at least a significant threefold increase in evidence, objective evidence now, of prior radiation exposure and we're told that that's not possible because the doses are too low, or another way of putting it that the doses cannot be as high as those results might indicate.

I'll come back to that.

So what I'm saying really is that the analysis always goes from the dose to the results. It doesn't go from the results to the dose. If the dose is too low, the results must be wrong. This is the argument of the ICRP and of the agencies that support it. They always go from the dose to the effect. If effect is flagged up, even by 10 or 12 or 15 or 100 studies, it is always ignored because the prism through which they are observing these very real pieces of evidence is one that does not admit the possibility that these are causal effects; they cannot be because the dose is too low. So on what basis do they say

that the dose is too low? It's because their relationship between the dose and the amount of cancer is based on the LSS model, it's based on the risk model, essentially on the risk model of the Japanese survivors.

Well, we will put aside for now the fact that there are some studies of nuclear workers and so forth but those are external dose studies, by and large. In fact they all are external dose studies. So their position that the dose is too low and they are therefore able to deny what is in front of their eyes in the peer review literature, that is based

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entirely on a study which Professor Sawada shows quite clearly is faulty. Professor Sawada's study might seem technologically abstruse, it might look a bit mathematical, but really, as Mr ter Haar said, it's quite simple.

What Professor Sawada did, and in fact the SSD seems to have tried to divert the attention of the Tribunal from what he really did by suggesting that it was some kind of abstruse mathematical chicanery, what he did was he took real data on epilation and diarrhoea and immediate effects of radiation, data that was published by the Atomic Bomb Casualty Commission Radiation Effects Research Foundation, so these are real numbers -- he started with the numbers, he started with the evidence -- and what he did, I mean in a very simple way is he looked at the rates of epilation, let's say 6 kilometres from the hypocentre, somewhere where there couldn't be any immediate radiation from the bomb. When these bombs explode they produce gamma radiation which goes out approximately as an inverse square law. So when the Americans tried to figure out what the doses were originally, the initial dosimetry, what they did is they put various kinds of dosimeters in a desert and they blew up another bomb of about the same capacity, a similar bomb -- they knew how to make one because they dropped the original one -- and then they measured the radiation, the gamma radiation dose at different distances from the bomb. So they placed all sorts of shielding in the way too, so they could tell how much the radiation would be reduced for example if someone was behind a wall and so forth and that produced the dosimetry.

But what it also showed is that nobody at a distance of more than 3 kilometres, 3,000 metres from that particular bomb -- and it was quite a small bomb compared to the ones we're talking about at Christmas Island; it was 15 kilotons, the Grapple Y bomb was 3 megatons, so we're talking about quite a small bomb and the effects -- there were no gamma radiation effects measurable in the Nevada Desert or in the dosimetry further than 3 kilometres. Well, let's be conservative and say 4 kilometres. But Professor Sawada came along and he had a look -- he started to quite cleverly look at the immediate effects of radiation. Now one of the immediate effects of radiation -- the gamma radiation that is -- is to cause epilation and to cause diarrhoea and immediate what they call deterministic effects. So Sawada discovered that 6 kilometres, 7 kilometres, 8 kilometres from the bomb people were suffering from these same effects, from

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these effects of radiation, which could not have been caused by the gamma radiation from the bomb. Now it's the gamma radiation from the bomb that defines the groups that are used to determine the risk model for the ICRP. Therefore the risk model of the ICRP cannot be valid, he argues, because all of those people were exposed to whatever it was and at that point we -- let's not ask what it was but something that was causing these radiation effects, 6 kilometres up to 10 kilometres away from the bomb.

Then he had a look to see -- well, of course he already knew, but he then argued that the reason that these people were suffering these untoward effects from a long way away when they couldn't have been exposed to the initial radiation is they were being exposed to the black rain. So it was the black rain that had a very, very much higher effect on the basis of its apparent dose as calculated by the ICRP, if you like, than it should have.

People were exposed to the black rain, and a later paper which we submitted by a different Sawada shows quite clearly that the black rain contained the uranium that the bomb had been made from and those bombs when they explode, as Professor Regan tells us, the actual fissioning is only 10 per cent of the bomb so 90 per cent of the uranium in the bomb gets dissipated

as uranium. Then of course there are various quite well known mechanisms described in Glasstone and elsewhere and by our expert Dr Ash and by Mr Nicholson and Mr Stretch, where you get self-induced rainout. So in other words in tropical climates these bombs cause an enormous suction of air,

the air is moist, it comes off the sea, it goes up and it cools as it gets colder with altitude and it then picks up particles of the bomb casing which have been dissipated as nanoparticles and down it all comes.

It was that black rain which Professor Sawada makes his little maps of and which he puts his maps into the PowerPoint which we never showed that explains these unusual and anomalous health effects from the exposure to this internal radiation from -- well, we say uranium but presumably also there were various other radionuclides.

The point not being any more than the exposure to this to material carried a very, very much larger hazard than would be accountable for on the basis of its dose. Of course, we saw also that in the case of the test veterans -- I'll come to that too and it's a major platform of the Hogan Lovells argument -- there was

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an equivalently and extremely unusual apparently high level of congenital -- of chromosome aberration in the New Zealand veterans. By using a sort of ICRP approach on the basis of dose -- and this is how they come to this assessment, the Wahab/Rowland assessment of dose where the SSD has said these doses are far too high to be credible -- they write down doses of 1,400 millisieverts, 700 millisieverts, very, very large doses. The point is that if Sawada is right, if we go to Sawada's argument, you do not have to have a very large dose of 1,400 millisieverts to get that chromosome damage. All you have to do is to be exposed to the internal uranium.

MR JUSTICE BLAKE: I have the headline theory.

DR BUSBY: Right.

Now I want to just say that we are concerned about the fact that the SSD did not respond to the arguments advanced by our experts in our statement of claim because if the SSD had done that, as he was directed to, then our experts could have responded point by point. This was kind of the way in which the previous -- of course I'm not suggesting -- the Tribunal can make its own decision about how it conducts the case, but that was the way in which the Stubbs First Tier seemed to work is that it was what Judge Wikeley referred to as "expert ping pong". But the advantage of expert ping pong is at least it enables the Tribunal to see the evidence from one side and then the response to that evidence from the other side and the response to the response and possibly only the response to the response to the response because by that time whatever has been discussed becomes clear. But in this case we didn't have ping pong, we had ping, that was it. We didn't get any more response from the -- so we pinged our ball over the net and it never came back.

So we were at a loss to understand quite how we could deal with this, until we came to the point where we realised that what the Secretary of State intended to do was merely to conduct an ad hominem attack against our experts so they didn't need to pong because they just shot them all, if I might put it so crudely. So the Tribunal is apparently invited to do what the Upper Tier asked it to do; it's asked to merely rule on whether to admit any evidence whatever from the eminent scientists who gave evidence on behalf of the appellants.

MR JUSTICE BLAKE: We have admitted the evidence, it's there before us. What we I think are going to have to do is to evaluate what support it gives to the propositions⁵ that you advance. But if it turns out not to be

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evidentially supportive and it remains therefore a hypothesis that has arisen since 1973, if it doesn't have support outside the community of scientists that you referred to, and if the conclusion is that the epidemiological or other data upon which you rely as support doesn't support, then that will be highly material in driving the evaluation process.

DR BUSBY: Of course, my Lord. Let me turn to Mr Battersby.

MR JUSTICE BLAKE: Yes.

DR BUSBY: I want to draw attention to what I see as some logical problems with the Secretary of State's case. Mr Battersby, whose appeal was and is for chronic lymphocytic leukaemia, died last year from pancreatic cancer. The Secretary of State awarded him a pension for this on 23 April 2014.

MR JUSTICE BLAKE: Yes.

DR BUSBY: Therefore the Secretary of State conceded that, firstly, pancreatic cancer is radiogenic, and secondly that he received a sufficient dose to raise reasonable doubt.

In fact, Mr Williams in the previous First Tier also had his appeal allowed for pancreatic cancer. Therefore it seems logical to me that the Battersby appeal now devolves into a question of the radiogenicity of chronic lymphocytic leukaemia.

We've heard evidence that three out of five experts advising the United States Center for Disease Control have decided that CLL is radiogenic. But we would argue on the basis of the Article 45 test that even if one out of five had argued that CLL was radiogenic that should raise reasonable doubt. But here we actually have a majority. In addition, there are several scientific papers in the peer review literature that we have submitted and which Professor Howard has drawn attention to that give epidemiological evidence that CLL is radiogenic.

Therefore, we feel that apart from any other arguments about scientific credibility of experts and so forth, in awarding Mr Battersby a pension in April 2014 that the6 SSD has essentially shot himself in the foot if I might put it quite so crudely.

MR JUSTICE BLAKE: Well, in the light of what I understand to be the position before us they say that was an overgenerous response. They say that we are not bound by that decision -- it's not a question of irrevocable estoppel or some such concept -- we have to evaluate the evidence for ourselves. What do you say as that response to the "get out of the bind" point, which I understand, for the reason that

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we raised it ourselves at the outset.

DR BUSBY: I'm not a lawyer but to me as a scientist it seems like a very curious position and I go no further.

MR JUSTICE BLAKE: Well, curious, I think you might strike a chord somewhere there. Is it curious enough to say that there is a flaw in the arguments that are now being presented to us? Because if it's not then we've got to deal with what we've got to deal with.

DR BUSBY: Right.

MR JUSTICE BLAKE: We did explore whether there was a potential shortcut at the outset. There isn't.

DR BUSBY: I say no more about that, my Lord. I just thought I would raise the issue.

MR JUSTICE BLAKE: Well, we are aware of it.

DR BUSBY: Of course the other thing is that if Mr Battersby's pancreatic cancer -- and of course again I'm just taking this forward from what I was saying earlier, but if Mr Battersby's pancreatic cancer is sufficient to give him a pension award, it must surely follow that in the case of Mr Smith's pancreatic cancer the issue devolves on to whether he received sufficient dose or indeed, as we argue, a sufficient internal exposure to residual radioactive contamination at Christmas Island.

MR JUSTICE BLAKE: If it helps, at the moment my personal and entirely provisional thoughts are that even with CLL and pancreatic cancer if you blast enough radiation at a human body you might well get a cancerous response. But that may depend, therefore, on whether you are in the sievert or half sievert category or something even above that, rather than what I'd understood to be, although you will no doubt clarify this in your submission, the problem of low dose cause and effect. And I know you are riding two horses. The radiation may have been considerably higher than others have assessed it to be and (2) at low levels of radiation, for the sake of argument we'll define that as below 100 millisieverts although I appreciate there are further debates within that category, medical causation moves in a different way.

16 But to some extent, in order to unpack the argument you are putting to us, I suppose we'd welcome clarification as to whether you are saying there was a high dose but it was somehow missed by the measurements or the calculation and the assessments, or they may well have been a very low dose but a very low dose of uranium ingestion can nevertheless cause cancerous defects. Yes?

I think that's the territory in which we have to engage rather than saying: well, you gave an award to

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him, therefore give it to -- if you gave it to X you must give it to Y.

DR BUSBY: Very good. I think we need to try and nail this point now because I think it's perhaps the critical one. You see when these issues of dose are discussed they are always discussed in terms of high dose and low dose. And as soon as we are in the area of high dose and low dose we are in the area of the ICRP way of looking at the world: this is what dose is and this is high dose and this is low dose.

It's very important in our submission, and in fact indeed this is the core of our submission, that the concept of dose for internal radionuclides, particularly for uranium, should be abandoned. The effect would be the same. So in other words the ICRP would say "Oh this guy only inhaled 1 gram of uranium and therefore his dose was only 1 millisievert". I mean I am making these figures up now, but we say that if he inhaled 1 gram of uranium his dose was the same as if he had received an external dose of 1,000 millisieverts. This is the essence of the results that were obtained by Sawada.

Those people who were 6, 7, 8 kilometres from the hypocentre, the ICRP would say that they had a very low dose exposure but what we say is let's throw away this whole concept of dose; let's assume, like Professor Thomas said, that uranium is a heavy metal and we're dealing with heavy metal toxicity. Now we don't believe that but it's a convenient way of explaining what it is we are saying. We're saying that the effects of exposure to low amounts of these internal radionuclides are the same as if they got high doses from external radiation. I think that's the most important point because we get lost again and again in these arguments about high dose and low dose. So when we look at the nuclear workers and they show us these straight lines going down to low dose, that is accurate, those are low doses because those people's doses were established in terms of actual measurements where they had film badges and they could go to the film badges and say "Hey, this guy his dose was 5 millisieverts, it's really small."

What we're saying is that when Professor Canu, when Irena Canu went to the French nuclear workers and she studied leukaemia and lymphoma in these people who were not just nuclear workers but actually were only uranium workers, what she found is that they had significantly high levels of leukaemia and lymphoma even though their doses were really small, about 15 millisieverts as her papers show, and as Professor Hooper related.

So it's very important. I mean I urge the Tribunal

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to sort of get a handle, and if I haven't explained it properly please ask me and I'll go through it again, that what we're talking about is the apparently high dose effects of exposure to small amounts of uranium particles. This is what Professor Sawada found. It actually also relates very importantly to this Wahab/Rowland study because, as I said earlier, one of the concerns of the SSD is that the apparent doses are so high and what they say is: look, if these doses had really been 1400 millisieverts all the alarms on the ships would have gone off, everybody would have been screaming and yelling and running about the place, all the red lights would have been flashing and they weren't.

Of course they weren't because it wasn't a high dose; it wasn't a high amount of radioactivity. What we say is that there was a sufficiently high amount of uranium particulates for these people to inhale.

MR JUSTICE BLAKE: My understanding is that is a comment you are making on the Wahab/Rowland debate which is pretty central to the Hogans appellants. The second part, having got the evidence of mutations in the DNA, is the attempt to work out how much dose caused that in millisieverts.

DR BUSBY: Yes.

MR JUSTICE BLAKE: And since they come up to a mean figure over our 100 millisieverts level, that was considered to be high. So that paper doesn't seem -- at least part of that paper is about what level of dose, what degree, i.e. a dosimetry-based estimate as opposed to simply saying we chuck out the concept of dosimetry because you can get these genetic mutations on microsieveverts --

DR BUSBY: Yes --

MR JUSTICE BLAKE: -- or very, very, very, low levels. So I mean that doesn't seem to be your case, so why don't you leave that bit alone, but I mean --

DR BUSBY: I think I can't really leave it alone because it may be that the Tribunal will think that the submission by the SSD that these doses were too low, or too high to be credible, as I just said, with all the alarms going on, that it doesn't have to go there. You see when you --

MR JUSTICE BLAKE: So you say to strip Rowland and Wahab of its dosimetry, retrospective dosimetry, and you say that that might be caused by --

DR BUSBY: Yes, I do.

MR JUSTICE BLAKE: -- a different form.

DR BUSBY: The dosimetry that Wahab and Rowland used is based on studies where they irradiate animals with

external radiation. So in other words, just like with the A bomb, in order to get a threefold excess of chromosome translocations in the animal you have to whack it with 1400 millisieverts external radiation. Our point is you could achieve the same effect by feeding it uranium particles. Does that make it clear where we are coming from?

MR JUSTICE BLAKE: Mm.

DR BUSBY: So the argument about all the alarm bells going off and whatnot is a spurious one, because apart from the fact that uranium particles do not emit gamma radiation so they wouldn't set off the detectors anyway, the fact is you don't need to have that enormous external dose in order to get the effect that they got. Also the other thing about those New Zealand veterans is that we know from the studies by Rabbitt Roth, which I won't go to but they're in the bundle -- in fact I asked Professor Thomas about this -- that they suffered an enormously high level of congenital malformation and birth defects in their children, a truly astonishingly high level.

MR JUSTICE BLAKE: Obviously you are aware that Rabbitt Roth is heavily criticised as a form of reliable epidemiology because of self-reporting, self-selection and other matters.

DR BUSBY: Yes.

MR JUSTICE BLAKE: I won't try to reproduce it. It was dealt with in Mr Haylock's report and you didn't actually ask him any questions about it.

DR BUSBY: Yes, my Lord. Anyway, I agree that's part of the general ping pong and I'll come to that issue about the different views of the same pieces of evidence. If I could get a glass of water I would be grateful.

MR JUSTICE BLAKE: Do you have water down there?

DR BUSBY: Yes. Because that conveniently brings me to a point about the experts and the Article 41 test which is not the same point that my daughter made. Now, as I understand it -- I mean the way in which I categorise the Article 41 test as laid down by Judge Charles is the binomial gate -- you either get through or you don't get through. The two items which you have to fulfil in order to get through or not go through are: is the evidence fanciful or worthless, or is it not fanciful or worthless? In other words, if it's fanciful or worthless it doesn't get through the gate. If it's not fanciful or worthless, even if it might be opposed by people or, you know, for whatever reason, if it's not fanciful or worthless it makes it through the gate. Now, I would argue that rather than arguing about

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whether a particular fact is fanciful or worthless in this way of going across the stepping stones, starting with the first stepping stone and then jumping to the second and so on and not falling down into the chasm, the first question that you need to ask or the Tribunal might have to ask is: is it fanciful or worthless to assume that, say, Professor Sawada is a genuine expert in the area he is giving his evidence on in the case?

So rather than asking whether or not the evidence itself is fanciful or worthless, given that the Secretary of State has raised the issue of the expertise or bias or, you know, various credibility issues relating to the expert, should we not ask ourselves whether the question of their expertise might be considered to be fanciful or worthless? In other words, if someone said, "Look here, Professor Sawada is obviously a member of a campaigning group" and you said, "No, she's not", is the second statement fanciful or worthless? Because if it's not, if there's some possibility, any possibility that Professor Sawada is not a member of a campaigning group, is not biased, is actually a genuine scientist who has worked on this issue almost since her first PhD, then she makes it through that binomial gate and then you can put that to bed, you don't have to ask any more about whether Professor Sawada or Professor Schmitz Feuerhake or any of these experts are biased or not credible. You can then just only deal with their evidence, and say "Well, look here, this evidence that she's brought forward, is that fanciful or credible?" The fact she refers to 18 papers that say that there was an increase of congenital malformation --

MR JUSTICE BLAKE: I really think you have probably made this point.

DR BUSBY: I won't bore on then. I was just getting going there. All right.

MR JUSTICE BLAKE: Well, I mean I'm just conscious that we'll take a break in 20 minutes and then if you are still on target you've got another hour when we get back, and you probably should decide how best to use your time, you see.

DR BUSBY: Thank you, my Lord. I will bear that in mind. I'm pretty sure that I will be able to finish by the time. (Pause)

Well, I've covered the issue of Sawada's evidence, I think. (Pause)

So as I argued, the concerns about the LSS model and the Hiroshima basis -- not the LSS model, the ICRP model and the Hiroshima concerns raised by Professor Sawada, pointed us to the idea that it was the fallout and

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rainout of uranium from the Hiroshima bomb that caused the apparent high doses. Now this is relevant to the test sites. We submit that there was contamination of the test sites and that the veterans were exposed to internal radioactivity from the uranium. I believe that this is accepted now by the SSD, and indeed Mr Hallard has made an attempt to quantify the dose from this. In fact the only differences between us -- that is Hallard and the opposition -- are firstly some issues with missing routes, principally sea-to-land transfer of material which had fallen in the sea and contaminated the seashore later on, and the problem with the ICRP dose co-efficients which do not include the various aspects of local dose from particles and local DNA dose from the DNA seeping nuclides like uranium and strontium 90.

So that leads me to the anomalous radiogenic toxicity of uranium. As Mr Hallard calculated, and as I said earlier, the quantity of uranium cumulatively exploded over Christmas Island by the time Mr Smith arrived there, for example, was 8 tons. It was therefore arguably a significant possible 23 exposure, and as you know our experts have presented a large amount of evidence that uranium causes anomalous genotoxic effects, for example in cell culture shown by the work of Professor Miller, and Professor Miller by the way works for the United States military. And then I mentioned Dr Irina Canu, who worked for the French nuclear industry, and her 2008-2010 study shows a significant excess of leukaemia in uranium workers, and incidentally I met Dr Canu in Paris in 2010 and she said to me then that she was finding great difficulty in getting these results published in the peer review literature and asked if she could give me as a reference for a paper so that I could write a review and I told her that it's probably best not to because if she gave me as a reference they would be less likely to publish it.

MR JUSTICE BLAKE: That might have been a wise move on your part, Dr Busby, but I'm not going to --

DR BUSBY: I thought that might entertain you, my Lord. But I mean we can't argue that these two scientists are members of campaigning groups, just to come back and make that point, you know, rather tediously again.

MR JUSTICE BLAKE: Well, is that the best way you are going to use the time? Because I think I have just about got your submission. If they've got good science, the fact that they are campaigning in support of good science is irrelevant.

DR BUSBY: Very good.

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MR JUSTICE BLAKE: Right? Got it. If the science isn't bad and they are campaigning with nothing then it is relevant.

DR BUSBY: Very good, right. To go on -- yes, I'm sorry, I couldn't resist this, but chromosome aberrations, as we've pointed out, have been found in uranium miners also and in Gulf War veterans and, as I said, in radiation workers. So this suggests that uranium causes chromosome damage, and this is perhaps another stepping stone or binomial gate, where the Tribunal have to ask the question whether this is fanciful or worthless evidence, especially since chromosome damage in the New Zealand veterans is a pivotal issue in these hearings. Of course, as I said earlier, the New Zealand veterans will have shared an exposure to uranium which raises a connection with the doses calculated by the Wahab team.

So I've already covered the issue of this question of dose and the doses that were referred to or deduced from the chromosome studies by the Wahab team and pointed out that we have to be cautious about the concept of dose as related to the idea of exposure to internal radionuclides.

Whilst I'm addressing this Wahab study, I just want to return to the issue since Dr Rayner raised the question of the controls. I think on Day 9 on 23 June at page 88 -- oh, Cecilia says she's already done that.

I was going to take you to the HPA's review, but do I need to do that, my Lord? It was just that the

controls were carefully selected and the lower levels relative to the national background population might have been a consequence of the healthy soldier effect. You have that, do you, from the earlier discussion?

Okay, I'll leave that.

Well, the dose calculations by Mr Hallard are the starting point for the Secretary of State's case.

Mr Hallard agreed that he was a kind of sophisticated calculator. He subjectively decides on all the possible inputs and turns the handle, as it were, to get a dose which then pops out of the calculations algorithm. He has agreed already that if the ICRP model fails his results also are wrong and it then follows, as we say, that all the subsequent calculations and conclusions of Dr Haylock and Professor Thomas are similarly insecure. So this whole case of the SSD actually sits upon the shoulders of poor Mr Hallard.

But there are also concerns about his calculation. First of all, he omitted some very major inputs. As my daughter says, he excluded, he left out carbon-14 and he

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agreed there had been exposure to carbon-14 and it was potentially a very significant hazard as we are all made of carbon and our DNA is made of carbon-14. He told the Tribunal that there were 1,500 moles of carbon-14 produced in all the Christmas Island tests. The Tribunal might wonder why -- MR HEPPINSTALL: Well, I in re-examination made sure that Mr Hallard was taken back to that document, which did not say that. So his evidence in the end was confined to the document that he was recollecting and then put to him in re-examination. It wasn't the Christmas Island tests.

DR BUSBY: It wasn't at Christmas Island?

MR HEPPINSTALL: No, it was the earlier Australian tests that the moles were based on.

DR BUSBY: I wanted to point out that in my calculation, but I'm not allowed to make one, it was certainly as much as that and if it were 1,500 moles it would be a very significant exposure, it would be 10 to the 15 becquerels, so it would be quite good to find out how many moles or how many becquerels of carbon-14 were involved in the cumulative production of carbon-14 by the various tests at Christmas Island. If it was 1,500 moles in Australia we know that the total quantity of bombing in Australia was absolutely tiny compared to the quantities that were exploded in Christmas Island so at the very minimum we have 10 to the 15 becquerels and it probably is multiplied by the ratio of the quantity of material or the megatonnage ratio between Christmas Island and Australia. So we're talking about even more -- even more carbon-14. This is a substance which can become a component of exposure through the method of carbon production or carbon dioxide or getting into plants that they eat, coconuts and so forth, or fish.

We would say that Mr Hallard, who said he did not model these doses as he did not know how to, ignored or omitted to include a significant exposure. Secondly, Mr Hallard originally omitted a number of exposures, including the hair cutting, from Mr Smith --snip, snip. Mr Smith in his statement and his wife's statement also complained about the dustiness of where he cut people's hair and of course it's quite obvious that lots of people whose hair he cut would have been people who might well have visited parts of the Island that were significantly contaminated. So the fact that he was not himself stationed somewhere which might have been very contaminated is not necessarily evidence that he wasn't exposed through inhalation to the material from the hair of people who had been in areas which were

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highly contaminated. So after his first report we asked Mr Hallard about uncertainties. His second and third reports which were also very large, 250 pages, 170 pages, whatever, had had new and revised sets of doses, so the doses all went up. So what we would say now is: what weight is anyone to put on a dosimetrist who significantly increases the results of his calculations after being asked about uncertainties? I mean, perhaps if we were to make some other question and ask about something else the doses would increase again. So it doesn't sound to us like this is a terribly secure set of calculations.

Astonishingly -- and this was not clear in the reports he wrote -- he did not include the uncertainties that we had asked him to provide, and the ones that he put down in a table in his report. In that table -- and we have gone to this in cross-examination -- he cited was not clear from his report that he hadn't done so.

So let's take Mr Battersby's dose as eventually calculated by Mr Hallard. This was 38 millisieverts.

But the inclusion of an uncertainty of eight-fold, to take the most conservative -- I mean that's, as I understand it, what the law states in these appeals, in these pensions cases -- the inclusion of the Environmental Protection Agency uncertainty of eight-fold would take the dose of Mr Battersby from 38 millisieverts to 300 millisieverts.

Right. But we don't have to go there either --although we do ask why he didn't use that uncertainty -- because there's more. Now, the CERRIE main report -- so this is not the dissenting report by the campaigning group or whoever -- stated that for some internal exposures an uncertainty in the dose coefficient of ten-fold might be possible. So this could, in principle, take us to 3,000 millisieverts. The Lesvos Declaration of the European Committee on Radiation Risk, also in the bundle, and also signed by Professor Mothersill, amongst other eminent scientists, takes us to a minimum error in ICRP for internal radiation of ten-fold. So again they agree with CERRIE. So that would take us to the 3,000 millisieverts.

MR JUSTICE BLAKE: Yes.

DR BUSBY: This is a map of Grapple Y produced by Mr Johnston for the First Tier.

MR JUSTICE BLAKE: Yes.

DR BUSBY: If you look at this you'll see two circles, one of which is the start of the explosion off the south southern tip of the Island. Then, after a while, we see another circle which on this is written: trajectory of main cloud at 50,000 feet. So this is the spread-out cloud that --

MR JUSTICE BLAKE: I'm not sure I've studied this before.

DR BUSBY: Right. Perhaps I should just wait a minute.

MR JUSTICE BLAKE: I have the plan. Are you looking at the solid red circles or the circles with the white middle? Or the As?

DR BUSBY: No. We're looking at the two circles that -- oh, sorry, this is figure 2 I'm looking at, my Lord. I'm sorry, I should have said. Figure 2.

MR JUSTICE BLAKE: Cloud trajectories.

DR BUSBY: Yes, that's right. Well, you can see there are two circles here. One is the cloud as it was first produced, and that's approximately the radius that Mr Johnston gave it. Then what happened is that the upper winds carried it off to the east. That gives us the trajectory of the main cloud as it spread out. You

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can see it has moved away to the east. In passing may I point the Tribunal to the red square which says "aerial radiological survey area" on the left-hand side. There was considerable discussion earlier in the Tribunal about the Shackletons that flew to measure the radioactivity. I think they were part of the presentations made by the Secretary of State about the levels of radio activity and so on.

MR JUSTICE BLAKE: Yes.

DR BUSBY: You will see quite clearly that actually -- that whilst the radioactivity moved to the east the Shackletons flew to the west. So the radioactivity that was detected by the Shackletons was not radioactivity which was really relevant to the fallout.

MR JUSTICE BLAKE: I don't know about that.

MR HEPPINSTALL: Well, this is, you know, almost expert --expert interpretation of --

MR JUSTICE BLAKE: Right. I mean, this is the raw material. I think we're going to have to take a break here. We'll come back in ten minutes.

You have got to point to the evidence behind this plan if you are going to make a point about it rather than you giving your analysis. Yes?

DR BUSBY: All I was --

MR JUSTICE BLAKE: I am going to rise now. Okay? These are minimum effects.

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The question is, then, what weight should we put on the doses produced by Mr Hallard which are the rock upon which the SSD's arguments stand? We would argue very little.

Now, let's look at another missing route which Mr Hallard overlooked. This is sea-to-land transfer, an issue raised by Dr Ash, and can I take you now to SB1/2.10.

MR JUSTICE BLAKE: Which tab do you want to take us to?

DR BUSBY: SB1/2.10.

MR JUSTICE BLAKE: Yes. Right.

DR BUSBY: A short way down, on page 13, Dr Ash says: "A factor that appears to have received limited attention is the capacity for dissolved radioactive solids entrained in seawater to be deposited on the atoll. Some of this material may have been the result of fallout into the sea. The predominantly west set south equatorial current, which has a velocity of up to 1 knot for much of the year, could have washed irradiated material back towards the atoll. Indeed, any contamination in the sea to the east of the atoll could have been so transported."

Now, let's have a look and see what that means in terms of Grapple Y. If I could take you to SB13 -- we can put that aside now -- and go to SB13/40B.

(3.28 pm)2 (A short break)

(3.40 pm)

MR JUSTICE BLAKE: Right.

DR BUSBY: Well, this chart, my Lord, figure 2, cloud trajectories, is a chart that was prepared by Mr Johnston in response to other charts that were put in by Mr Williams.

MR JUSTICE BLAKE: Does Mr Johnston explain what it is somewhere?

DR BUSBY: Well, if you go to SB13/37, the chart itself --

MR JUSTICE BLAKE: One moment. (Pause) Yes.

DR BUSBY: Whilst this does not -- at section 5.3 Mr Johnston says this:

"The recorded results of the various measurements and surveys support a self-consistent picture of minor radioactive fallout derived from residual debris in the cloud stem being transported west or south west of the Island by the intermediate level winds and falling out mainly in the predicted sea area around 100 kilometres to the south west of Christmas Island. The northern edge of this very dilute fallout cloud was responsible for the only very significant deposition at the Decca master site."

MR JUSTICE BLAKE: That is in Vaskess Bay.

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DR BUSBY: Right. We go on:

"The vast bulk of the debris from Grapple Y contained in the main cloud around 55,000 feet and consisting of sub-micrometre particulates would have been transported well to the east of the Island falling out progressively over a period of weeks to the east of the Island."

He put in this figure 2, as I understand it, as part of his evidence about where the main cloud at 55,000 feet and consisting of sub-micrometre particulates would have ended up, travelling to the east of the Island.

MR HEPPINSTALL: My Lord, could I try and assist. If you look at paragraphs 1.6 and 1.7 of that report earlier on, at 1.6 he explains what his figure 1 is to this report. At 1.7 he explains what his figure 2 is to this report.

If you turn to figure 1 and figure 2 you get the two components of the diagram which Dr Busby is now taking us to. So figure 1 is actually correcting a diagram that Dr Busby had attempted and he is showing the actual position of the clouds that move east.

Then in figure 2 he is showing how the recorded wind trajectory is cut into the stem, and that is how the Shackletons discover radioactivity in their survey area and it's also how the deposition on Vaskess Bay --

MR JUSTICE BLAKE: Well, I had certainly seen a plan of Mr Johnston, showing, I think, the black arrow line clears(?) to the Island showing movement to the west with a deposition -- yes, yes -- yes, figure 2, is it in this report? In tab 37.

MR HEPPINSTALL: So --

MR JUSTICE BLAKE: So --

MR HEPPINSTALL: -- it's a difference between stem contamination and of course the canopy which has long since crossed the tropopause.

MR JUSTICE BLAKE: So the stem is moving --

MR HEPPINSTALL: Well, the stem and canopy are moving together, but --

MR JUSTICE BLAKE: But then they end up on different sides of the Island.

MR HEPPINSTALL: Well, that's because the low level winds cut across through the stem, as you can see happening in figure 2, and push the radioactivity the other way. Because it took quite a long time to analyse the meteorological data and get to the bottom of this, but the winds are going in different directions at different heights. It took us to get to Mr Stretch at the Met Office --

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MR JUSTICE BLAKE: I certainly don't think we looked at this before.

MR HEPPINSTALL: No. I have no idea what is going to happen next and why we are going to it, but that is what it is.

MR JUSTICE BLAKE: I will try and absorb that information.

MR HEPPINSTALL: I don't know what point is being made.

MR JUSTICE BLAKE: Are we going to finish in the next hour now?

DR BUSBY: Yes, my Lord, absolutely, I promise you. Scout's honour.

MR JUSTICE BLAKE: Let's get on.

DR BUSBY: I mean, I can take your Lordship to the different wind directions at different heights, but I think we can just accept that that is happening –

MR JUSTICE BLAKE: Just tell us the points you are making.

DR BUSBY: Right. Well, the point I am making has to do with Dr Ash's concern about sea-to-land transfer and the fact that Mr Hallard didn't model it. Because if the trajectory of the main cloud, if we look at figure 2, moved to the east, then all the time it was moving to the east the particulates that we see Mr Johnston talking about, what he calls "the vast bulk of the debris from Grapple Y", and he says: "Consisting of sub-micrometre particulates would have been transported well to the east of the Island, falling out progressively over a period of weeks."

Now, what Dr Ash is saying is that the equatorial current over that part of the ocean flows as 1 knot to the east to the west; in other words, it's flowing towards Christmas Island. It would seem, therefore, that what he is saying, that whatever proportion of that vast bulk of Mr Johnston's debris actually landed in the sea over the next few weeks would have been transported at 1 knot back towards Christmas Island where it would have ended up on the beach and been transported ashore through sea-to-land transfer, which Mr Hallard conceded under cross-examination was in fact a very real phenomenon. And that he said was -- or I think he agreed was a factor in exposure to plutonium in the Irish Sea from Sellafield where it got brought ashore by sea-to-land transfer and contaminated the 1 to 2 to 3 kilometre region from the sea coast in the Irish Sea.

So we might therefore assume that all of this material, or it's certainly a proportion of the material, would have ended up on the eastern coast of Christmas Island, which you can see here is a sort of hook, and ended up in that sort of bay there, to the north of which was where all these people were living and in the sea nearby where everybody was swimming. This, I submit, is an entirely missing component of

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Mr Hallard's dosimetry, which may well have been extremely significant. Now, as I say, Mr Hallard was aware of sea-to-land transfer through his work at Sellafield where the plutonium particles end up on the coast. It is somewhat of concern that Mr Hallard didn't consider this exposure, especially since it had been -- well, I'm not sure if it had been raised by Dr Ash at the time that he made his report, so perhaps that's unfair. That finishes my point about sea-to-land transfer and Mr Hallard's dosimetry. So our overall submission with regard to dosimetry is, first of all, that it misses an awful lot of components; secondly, that it uses the ICRP risk co-efficients, which we argue are uncertain; thirdly, that it didn't include the uncertainties that Mr Hallard had agreed existed; and, of course, finally, the point about the sea-to-land transfer.

MR JUSTICE BLAKE: Well, that, I thought, was a missing pathway to exposure. That's your first point.

DR BUSBY: Yes. I have already referred to -- I won't bother to refer to these again, I've more or less covered that. So, finally, I want to deal with the area, the field of scientific method and causation, because that's actually what this case is about, it's about causation and it's about scientific method. So may I take you to John Stuart Mill at SB10/163.

MR JUSTICE BLAKE: Well, what do you want to get from John Stuart Mill?

DR BUSBY: John Stuart Mill talked -- he writes about scientific method and causation, my Lord. So in the area of understanding the ways in which scientists approach the concept of causation -- and I am not talking about the way in which the ICRP approach it but the way in which science approaches it, I just felt it might be valuable to just briefly cover this issue as it applies to the evidence that's been before this Tribunal.

So if we might go to chapter 3 of the ECRR report, which is page 9.

MR JUSTICE BLAKE: Yes.

DR BUSBY: This lays out the classical exposition of the scientific or inducted method which was originally due to the English Oxford philosopher William of Ockham. These were laid out by John Stuart Mill in his system of logic in the late 19th Century, which is a cornerstone now or, if you like, the rock upon which all philosophical theories of causation are set. What Mills' canon say is, firstly, that the first

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one, the canon of agreement, states that "whatever there is in common between the antecedent conditions of a phenomenon can be supposed to be the cause or related to the cause of the phenomenon". In other words, if you have lots and lots of instances, he would say, or this would say, of increased levels of cancer or genetic damage, congenital malformation, or chromosome defects, or other objective evidence of genetic harm following exposure to small amounts of internal radiation, this would suggest that that phenomenon can be supposed to be the cause of these effects, or related to the cause.

That's simple logic of science; that's how science works.

The power of science derives from its reliance upon empirical data. In other words, you cannot take as the Spanish inquisition, as the inquisition did, you cannot go to Galileo and say, "Look here, what you are telling us as a result of looking through your telescope cannot be right because our theory says it is wrong because God does not allow this to happen", you have to go to the empirical evidence and say, "Well, what does this tell us about the theory that we have?" As I said earlier in my submission, what happens again and again in this area is that we go from the dose to the effect. We are told the effect cannot exist –

MR JUSTICE BLAKE: I have the point, yes.

DR BUSBY: -- because the dose is too low. So this is the canon of agreement. Now, I will leave the canon of difference, because although it applies I don't want to bore everybody with it, but the most important bit here is just below, in the third bullet point, is it says: "The principle of instance confirmation that the degree of belief in the truth of a law [or, if you like, an interpretation, in our case] is proportional to the number of favourable instances of the law..." Which I would interpret in this case: the number of scientific papers or studies which point to the possibility or the likelihood that there is some major error associated with the interpretation of the effects of internal exposure.

So there we are, if we apply the principles of science and what has now become the classical philosophy of causation, we must conclude that the case is made that the ICRP model is wrong, or at minimum questionable on the Article 41 test.

So there are two possibilities here, it seems to me, or I submit. The first possibility is that all the hundreds of scientists and experts in this area who believe that the ICRP model is wrong is false for

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internal exposures, and these include also those at least on the Article 41 test who decided to throw a lot of money at research at the uranium genotoxicity project, the CURE process, the MELODI process that we have referred to, are also her(?) friends of Dr Busby and part of a campaigning cabal -- I am sorry to bring this up again, my Lord, but it is a major point that we want to. The alternative, of course which we embrace, has to do with the consideration of the dismissal by the SSD and his experts of the many pieces of evidence we have brought to these hearings, which have all been different, controls were wrong in one case, methodology was suspect in other cases, the numbers were too low in another case, or statistical procedures were incorrect, we were told by Dr Haylock in the case of the Wahab study originally, and most often that the doses are too low for the effect. What we say is that we apply Occam's razor to this, which is *entia non sunt multiplicanda praeter necessitatem*, which is to say that if there is one explanation for all of these things then that is the most likely explanation for them. We don't have to have all of these different reasons why each particular instance of evidence is wrong or can be dismissed.

We submit that in ten years the ICRP model will have been swept away when the effects of Fukushima and Chernobyl become manifest, and that the veterans have been treated shabbily, we say, through questionable behaviour by those who have used many tricks to cover up evidence.

MR JUSTICE BLAKE: I don't know what that means, but if it's making an allegation of bad faith by somebody you are going to have to either plead -- put up by particulars or withdraw the suggestion.

DR BUSBY: I withdraw it, yes, it was just a little bit of irritated spin-off.

MR JUSTICE BLAKE: That isn't going to help your submissions.

DR BUSBY: No, and in fact that ends my submissions, my Lord, I have nothing further to say on this issue and I leave it at that.

MR JUSTICE BLAKE: Okay.

DR BUSBY: Oh yes. Well, Cecilia reminded me that I haven't covered all of the arguments that I could have made and there was clearly insufficient time to do so, but essentially we rely upon the arguments that we put in our statement of case, which none of which have been –

MR JUSTICE BLAKE: Do you mean the closing statement or something else?

DR BUSBY: No, I mean the statement of case that we

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provided. The final revised statement of case that we provided, I think it was in April, that one.

So all of the points that we made there we believe still stand, and we hope that the Tribunal will be able to gain some assistance in this area from the table that we produced where we lay out the various arguments in the different areas that your Lordship helpfully suggested that we approach this issue through.

So thank you very much for your patience, my Lord, and members of the Tribunal.

MR JUSTICE BLAKE: Thank you.

DR BUSBY: I have finished my submission.

MR JUSTICE BLAKE: Right. Well, if that's the conclusion of your submissions, thank you for getting there. We've noted that and we might as well finish tonight and come back tomorrow. Yes?