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Wednesday, 25 September 2019
(2.49 pm)
CHAIRMAN: Yes, Mr Pennicott.
MR PENNICOTT: Sir, good afternoon.
Before we get to the evidence of Dr Barrie Wells, who was sat in a seat in front of that fireplace on the screen, in London, a short while ago but has temporarily disappeared -- sir, before we get to his evidence, you will be aware that there are essentially two applications before the Commission, both of which relate to Dr Wells' evidence. The first application is an application by the government to invite the Commission to expunge a number of identified paragraphs in Dr Wells' COI 2 report.
The second application is an application by Leighton to resist, at least at this stage, the admission of Prof Yin's second report which is a report which is responsive, essentially, in our submission, to Dr Wells' reports both in COI 1 and COI 2.
Sir, I don't know precisely how you wish to deal with those applications. I know you've seen them, you've had a think about them, but logically I think probably in time Mr Khaw's application for the government was first, and that's the expunging application. I have my own views, which I will express,

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if necessary, to the Commission, but perhaps it would be appropriate, in the first instance, to hear briefly from Mr Khaw.
CHAIRMAN: Yes.
MR KHAW: Yes, Mr Chairman and Mr Commissioner.
I fully understand that the Commission may not always welcome interlocutory applications in an Inquiry, but we believe this is an important one that we need to make.
If I can first of all take the Commission to the relevant paragraphs of Dr Wells' report regarding the Extended Inquiry. That is in ER1, item 2.
CHAIRMAN: Sorry, bear with me a second.
MR KHAW: If we can take a look at internal page 3, starting from section 3, about rebar testing.
CHAIRMAN: Mm-hmm.
MR KHAW: The relevant paragraphs that we object to start from 3.1. Mr Chairman and Mr Commissioner can see that 3.1 actually is about the quality assurance standards relevant to rebar testing are CS2.
CHAIRMAN: Yes.
MR KHAW: And the updated standard CS2, et cetera.
Then 3.2 we say starts to contain Dr Wells' interpretation of CS2, because he says:
"There are many points of detail not addressed

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directly in ... CS2 ds and many requirements are stated without derivation, reference or context. It is therefore necessary, if seeking either context or clarity on points of detail, to refer to the overarching principles set out in international standards, of which the foremost are the collection of standards published [in ISO]."
Then he went on to cite certain paragraphs in CS2 which refer to ISO.
Pausing here, Mr Chairman and Mr Commissioner, it is quite clear from what Dr Wells is trying to say here that he was trying to say that, well, despite the express or explicit terms as set out in CS2, there are certain standards which would need to be incorporated or implied into CS2, and that is his understanding and his interpretation of CS2.
But when we look at the two passages that he cited regarding CS2, it says, first of all, under 3.2:
"A system of third party certification of the manufacturer to the quality standards of ISO 9002 is designed to ensure [compliance with British Standard ...] is being carried out."
Then he went on to say:
"Review of the CS2 comprises two stages. Stage 1 of the review is to update the technical specification and

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quality assurance system for steel reinforcing bars to align with the quality and performance levels as stipulated in the latest international standards ..."
Again, pausing here, there is nothing in CS2 which states or even indicates that if certain international standards had been complied with, then you don't need to comply with the standards as set out in CS2. There have never been any provisions in CS2 to that effect.
So what Dr Wells is trying to say is that despite the express provisions in CS2, the failure to carry out all the rebar testing as required under CS2, in fact does not amount to a breach. That's essentially what he is trying to say.
Because if we look at 3.4, he is trying to set out the long-term goal of CS2:
"... is to reach the situation extant in most other countries, where the national standards do not require purchasers' testing provided manufacturers' testing is deemed adequate. This is in line with the ISO overarching standard ISO 3951 ..., which states that standards should allow for a reduction in testing ..."
Then he went on to say:
"What this is saying is that the ISO committee, ie the community of experts, advocates a flexible approach for quality assurance when applying standards, rather

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than dogmatic adherence to rules."
Now, the question arises on what basis can Dr Wells talk about what was the underlying thinking of the ISO committee? It's clearly not stated here.
Then if we look at his conclusion at 3.14 on the next page, page 5, and the conclusion in question appears at page 6, (b). He then said, after his interpretation of CS2 and also the reference to international standards in trying to interpret the requirements under CS2 -- he said:
"even though some batches of rebar were not re-tested after delivery to the site, both the spirit and the intention of the applicable standards were met overall."
We can then look at the next page, 3.18, where he has said, in that case:
"The adequacy of the testing should be assessed by reference to the relevant quality assurance standards. I have presented this assessment in my answer to question 1."
Then he went on to say:
"... the relevant quality assurance standards clearly means CS2:1995 and CS2-2012 but may also be interpreted as including other national and international standards. As stated previously, CS2 ...

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states", et cetera.
Then he repeated the two paragraphs contained in CS2:1995 and 2012.
MR SHIEH: Before my learned friend goes further, I can see from the computer screen that Dr Wells is actually seated.
CHAIRMAN: Yes.
MR SHIEH: I don't know whether he can hear the submissions currently being made, because it actually impinges on his report. I'm just raising it so that the Commission can decide whether we need to mute it or whether the Commission sees no problem about Dr Wells being able to hear what's being said about his report by Mr Khaw.
MR PENNICOTT: I think he should be able to hear.
MR KHAW: I have no problem either way.
MR PENNICOTT: If he were in Hong Kong, he would be sat here, listening to this, and I think he should be able to hear.
CHAIRMAN: All right. I'm happy to go with that.
MR KHAW: Thank you.
Then I was at 3-point --
CHAIRMAN: Yes. Because we are talking about an expert's opinion. We are not talking about a factual witness who suddenly is giving evidence on a wrong basis and should be outside the courtroom.

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MR PENNICOTT: I'm inferring that he can hear, although you might like to confirm it because he is making some notes. But I don't know.
CHAIRMAN: Let me just see.
Dr Wells? Ah, yes.
DR WELLS: Good afternoon.
CHAIRMAN: First, thank you very much for your attendance to give evidence in London. I think you've come from North Wales; is that right?
DR WELLS: That's correct.
CHAIRMAN: A bit of a journey. We are -- as you know, courts are inclined to this kind of, including Commissions of Inquiry -- we are having a brief inter-exchange concerning certain aspects of your technical and expert evidence. We are quite happy for you to listen to it, if you wish to do so. I don't know if you've been able to hear what's being said.
DR WELLS: I have. Thank you.
CHAIRMAN: Good. So we will continue on, and thank you very much indeed for your presence.
MR KHAW: Thank you, Mr Chairman.
CHAIRMAN: Yes, Mr Khaw.
MR KHAW: I was at 3.20, where Dr Wells said:
"It is therefore necessary to include, as being relevant, the guidelines given by the ISO and

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specifically ISO 3951 ... which states that it is acceptable '... to reduce inspection costs (by means of a switch to a smaller sample size) should consistently good quality be achieved'."
So that in fact tallies with my earlier point, that is when he said it was necessary to include standards, international standards, for the purpose of understanding the overarching requirement under CS2. He was in essence saying that certain other requirements should be implied or incorporated into CS2. That is his position.
In fact, that is the main point of our objection, because that really involves a statistical expert's views on the interpretation and construction of a document, and we believe that should not be allowed.
If I could take you to our written submissions in ER item 7.1.
CHAIRMAN: I see the point you are making, and obviously, if we were to agree to this remaining and being spoken to by Dr Wells, it would be with a good deal of caution and bearing in mind what you say. But subject to being corrected -- and I don't often deal with statisticians -- it seems to me that it's not pure mathematics. It has to be discussed within a context. If you are doing statistics about sheep, for example,

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and their health and wellbeing, et cetera, et cetera, the weight they put on over periods of time, you have to look at things like weather, grass patterns and things like that.

So what we are saying here is, for example, "to reduce inspection costs (by means of a switch to a smaller sample size) should consistently good quality be achieved" -- you are saying if you are getting -- if you have a record of consistently good quality materials coming before you, then you don't have to have the same sample size. "I have therefore taken, for my mathematical approach, a smaller sample size." Then I can either say I don't accept that or Prof Hansford can say he finds difficulties with that.

It's not so remote, is it? He's not suddenly delving into the niceties of trying to understand Middle French, you know, or something like that.

MR KHAW: No. Mr Chairman, we would like to point out this fundamental difference, that is the difference between asking a statistical expert to comment on the adequacy of rebar testing by referring to international standards. That I can perfectly understand and that is what we need.

CHAIRMAN: Yes.

MR KHAW: But it is quite another question, an entirely

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different question, when you are asking a statistical expert to actually give his own opinions on, "Hey, CS2 should not be interpreted just on its own terms; it should be interpreted by actually taking into account this and that, and the overarching principle, what is actually the underlying thinking of the ISO committee" -- this is a matter of interpretation, which is miles away from a question regarding the adequacy of rebar testing simply by referring to certain international standards. I think that's the main objection we have.

CHAIRMAN: All right. Thank you. I have your point, yes.

MR KHAW: In fact, we have cited an authority, and I don't wish to really spend time on that, but in essence what that authority says is that if the court is asked to, for example, consider expert opinion on company law in respect of Cayman Island law, then obviously, if there is an issue as to whether a director of a company had the power to do certain things under articles of association, the Cayman Island lawyers could give their opinions on Cayman Islands company law. They could give an opinion on how documents should be interpreted, the rules of interpretation according to Cayman Island law. But they cannot give their evidence on the actual interpretation of that foreign document.

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That is rather trite, I believe, and in fact if Dr Wells -- is not saying CS2 should be interpreted in a particular way. We have no objection to that. In fact, we have actually considered proposing a middle of the road by suggesting that all parties and also the Commission should now consider Dr Wells' report on a de bene esse basis. But the problem that we face is that once we do so, and unless we have the assurance that this rebar testing issue actually would not be visited at the end of the day, then once this evidence is put in, we are deprived of an opportunity of asking an expert on, for example, quality assurance or international standards, to give his or her own opinions as to whether this is the correct way of interpreting CS2.

CHAIRMAN: Okay. Yes.

MR KHAW: So this is the problem that we face if this part of his evidence is not excluded at present.

I believe that Mr Chairman and Mr Commissioner have seen our arguments by referring to Leighton's two letters, because Leighton was trying to say, in the two letters, "Given what we have said, you should be aware that Dr Wells would be asked to give evidence on the matter of interpretation." But if we look at those letters carefully, what they said was simply question 1

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that I postulated earlier, that is the adequacy of rebar testing by referring to international standards. They never indicated that they would ask Dr Wells to give his own opinions on the actual interpretation of this document. That is wrong, as a matter of fact.

So we say they cannot rely on their letters to say we should have been aware of this coming.

And also, they rely on the list of issues in saying the list of issues actually refers to the words "based on international quality assurance standards", et cetera. Again, that was premised upon the issue that they were asking the expert to comment on the adequacy of rebar testing by referring to international standards, not by asking a statistician to give his opinions on what this requirement in the local industry actually meant. It's two completely different matters.

CHAIRMAN: Yes.

MR KHAW: So I hope I have registered sufficiently my objection. The last point that we wish to raise is that in fact everyone knows and Leighton has actually acknowledged that in fact no suitable measures would need to be taken due to the lack of rebar testing. So in fact what they are trying to ascertain here is a rather theoretical point, regarding whether the strength reduction test or factor is overly

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conservative. That's what they were trying to ascertain by referring to international standards.

But we say, in fact, this whole exercise would serve little practical purpose, given the fact that we have now the conclusion that no special measures would be needed due to the lack of rebar testing.

CHAIRMAN: Sorry is, what was it you said? I missed the phrase, "that we have now reached the conclusion that no" --

MR KHAW: Suitable measures would be required because of the lack of rebar testing.

CHAIRMAN: Thank you.

MR KHAW: So in fact this issue would serve little practical purpose, but now they are asking us to jump one step further, by actually not just ascertaining whether there should be suitable measures or not because no suitable measures would be necessary. They are asking us to actually study the requirements at present to see whether the requirements comply with international standards, whether it should be interpreted. Why would that be within the terms of reference of this Extended Inquiry? We have serious doubt about it.

That is why we believe it is more important to have those paragraphs excluded for the time being, to save everyone's time.

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CHAIRMAN: Yes, I see what you mean.

MR KHAW: Thank you.

CHAIRMAN: Thank you.

MR SHIEH: Mr Chairman, it's ironic that the last sentence of my learned friend should be to the effect that he wants to save everybody's time, when we had in fact encroached upon the time that could have been used for Dr Wells' evidence.

Can I just make a few points first? It is slightly unreal in a commission of inquiry to hear submissions citing case law on rules of evidence when we all know strict rules of evidence do not apply.

Secondly, Mr Chairman has it spot on when you intervened to say that matters very much turn on context. If Dr Wells is to give evidence in relation to whether testing complied with applicable quality assurance standards, then as part of the context Dr Wells would have to explain what he understood the relevant applicable standards to mean, before he could express a view as to whether or not the testings that have been done complied with the relevant standards.

Now, the ascertainment of the relevant standards could well be simply looking at plain English on CS2. It may be a matter of looking at matters extraneous to CS2. That exercise of construction could well be simply

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a matter for the Commission. The Commission could very well say Dr Wells has got it all wrong; the Commission actually thinks the standards don't mean that. In which case, fine, Dr Wells has expressed his opinion on a wrong basis. Or the Commission could well say it is assisted by Dr Wells' interpretation.

So the matter is always in the hands of the Commission.

It's far better for disputes like that to be dealt with de bene esse. We've had numerous incidents in COI 1 when, for example, government witnesses went on and on about their own view as to whether or not certain rules had been complied with, whether certain record-keepings were up to scratch or whatever, and those matters had all been dealt with sensibly de bene esse by counsel saying, "I'm not going to cross-examine on that because those are really matters of law, matters of submission for the Commission." The fact that a witness had mentioned his own view as to what certain rules meant wouldn't bind the Commission and not cross-examining or not calling a witness to contradict that wouldn't really prejudice that particular party.

So I would simply commend to this Commission that the matters which Dr Wells has mentioned in his report

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concerning his views on what the applicable standards actually meant should be dealt with de bene esse.

There's also one practical matter because, if Dr Wells is going to express his opinion, as he is entitled to because leave has been given, opinion on whether testing complied with applicable quality assurance standards, he then says, "In my understanding/opinion", or whatever word you call it, "the applicable standards mean the following", then how on earth is one going to redact that? If one redacts that sentence where he sets out his view/opinion/understanding of what the applicable standards mean, then the Commission would be completely at a loss, because the Commission will not know by reference to what Dr Wells is expressing his opinion on.

So, for all these reasons and to save time, I would simply invite the Commission to look at the letter of O'Melveny & Myers in CO2 bundle AA1 at page 392, which basically encapsulates what I have just said.

For all these reasons, I would respectfully submit that there should be no expunging. The Commission can perfectly well deal with the matter de bene esse. Parties can take their own view, whether or not they leave the matter to be argued or whether they need to cross-examine a witness. If my learned friend says it's

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all a matter of law, submission, fine, have the courage of your conviction, don't cross-examine; deal with it as a matter of interpretation.

CHAIRMAN: Thank you.

MR KHAW: Mr Chairman, just one point of reply. In fact, there is one point that I entirely agree with Mr Shieh, that is the matter of interpretation should be a matter decided by this Commission, and usually will deal with it by way of legal arguments. That spells out the need for this application, because if that is the case, as Mr Shieh has acknowledged, Dr Wells' views on interpretation do not bind this Commission, do not bind anybody. Why should they be here? Why should they be here to confuse everybody?

Also, he goes not just in terms of the literal meaning of the words in CS2. He goes even further because he goes on to discuss the thinking behind ISO committee, and then he tries to extract this overarching principle for the purpose of his own interpretation. But if one is trying to ask somebody to say something about trade practice or trade custom for the purpose of interpretation, then you need someone from that particular field to speak about those matters but not a statistical expert.

That's all I wish to reply.

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CHAIRMAN: Mr Pennicott, do you have any observations?

MR PENNICOTT: A number, sir, but I'll try to be as short as I can.

Sir, clearly Mr Shieh is correct, as, sir, you have indicated, that this is a Commission of Inquiry. This is not a piece of litigation, it's not an arbitration, and we are not bound by the strict Rules of Evidence.

Secondly, as everybody has acknowledged, what this issue goes to is the testing or the non-testing of 7 per cent of the rebar. It is common ground, as has been indicated already, that no suitable measures are recommended as a consequence of this omission.

CHAIRMAN: Sorry to interrupt. Please forgive me, but just approaching this on a good, common-sense basis.

MR PENNICOTT: Yes.

CHAIRMAN: If you have 7 per cent not tested but 93 per cent tested, and if you have all those testings done over an extended period of time, and if they are all obtaining the necessary pass mark, if I can use that term, can't you reach certain conclusions from that?

MR PENNICOTT: Yes, and indeed the statistics evidence that you will be hearing does indeed reach those sorts of conclusions.

CHAIRMAN: Yes.

MR PENNICOTT: Indeed. And you don't actually need all of

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this, some of this evidence --

CHAIRMAN: You've made it --

MR PENNICOTT: Can I say --

CHAIRMAN: Yes.

MR PENNICOTT: -- clearly there's common ground that this is ultimately a matter of interpretation. It is not, strictly speaking, for the experts, but occasionally, and this may be one of those occasions, it may not be, that background and context is required to understand where the expert is coming from. But again whether you determine that is the case or is not the case is for a later stage, in my respectful submission, and I agree with Mr Shieh that the proper approach is for the Commission to consider all of this de bene esse and take a view at the end of the day.

Sir, there are other factors which may be peripheral but I mention them anyway. Mr Rowsell's report for COI 2 has about seven or eight paragraphs that deal with this very issue as well. He comes at it from a different perspective, but nonetheless is covering very similar ground to that which is covered by Dr Wells. So one of the points that has been highlighted when Mr Khaw read out certain paragraphs from Dr Wells' report was that it is hoped that there will be a move away, as we go to the future, from

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Hong Kong requiring two lots of tests, one by the manufacturer and one by the purchaser, if I can put it that way, and it is hoped over time that the second testing, ie by the purchaser, in this instance Leighton, will no longer be required, and that would then start to accord with the practice that happens in many other parts of the world.

I think it's that point that Mr Rowsell draws attention to. After 24 years, we are still apparently in the initial stage and still requiring manufacturers to test and purchasers to test, and query when is that initial stage going to come to an end? That's the context in which Mr Rowsell looks at it. But nonetheless it's all part of the same story, if you like, or subject matter.

Also, one points out that one of the government's witnesses, Mr Lok Pui Fai, also in four paragraphs in his fifth witness statement, DD9/12281, also covers this ground again, not -- and I don't suggest that he delves into questions of contractual interpretation and so forth, but again it's more evidence about the same subject matter.

So, at the end of the day, we've got at least three sources or will have three sources of evidence, factual evidence from Mr Lok Pui Fai, Mr Rowsell's evidence,

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Dr Wells' evidence, that you will have to consider.
Sir, in my respectful submission, the proper approach is to look at this on a de bene esse basis. I have to say I also rather agree with Mr Shieh that having looked at the various paragraphs that are objected to and try to do a rather detailed textual analysis of them, just striking those paragraphs out will be difficult or give rise to complications. One might find oneself striking out the odd sentence but leaving the rest of the paragraph, either because the rest of the paragraph is not objectionable, or if you do take it out, some of the other paragraphs are not going to make sense. So there is a practical issue there as well.
Sir, as I say, without wishing to be, as it were, taking sides, I'm bound to say that it seems to us that the de bene esse approach is the right one.
CHAIRMAN: Mr Khaw, I confess that, a bit like the man who has to have a rhinoceros described to him, I may have difficulty conceptually with what I am supposed to see, but on a day-to-day judging basis, when I see it, I can recognise it.
What I think is the case here is if Dr Wells started to talk about a particular matter in a context which is not permitted for an expert, I like to think that I'm in

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a position to be able to say, "Sorry, Dr Wells, you are in no position to interpret that. That's not the extent of your expertise. Let's leave that and move on." And remember, in this particular case, I've got the assistance of a professor of engineering who is also in a position to say to me, "Look, we just don't need this; it doesn't have to go here."
So I've got that difficulty of making sure that sufficient context is allowed, that we can talk about matters on a realistic basis, but at the same time not allowing people to stray into areas which are not areas of their true expertise.
So I'm inclined, subject to what you say -- and I do wish to give you the last word, of course -- towards the de bene esse approach.
MR KHAW: I have nothing further to add. I believe I have said what I could say.
CHAIRMAN: Yes.
MR KHAW: Save and except that I highlighted the issue that in fact we had considered this approach previously.
CHAIRMAN: Of course.
MR KHAW: But we are having a practical difficulty. That is: how are we going to address this issue of interpretation if it really becomes an issue at the end of the day?

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CHAIRMAN: If it's an issue at the end of the day, then that can be debated, and I think you can take it that from my perspective, I will do my utmost to ensure that impermissible evidence is not allowed, bearing in mind that this is a Commission of Inquiry, and what the public I think want at the end of the day, or in the initial instance, what the executive of this government wants, is some plain, clear understanding of the matters that counted and how we deal with them.
MR KHAW: I'm grateful.
CHAIRMAN: So, from that point of view, the approach is somewhat different from determining, for example, contractual liability.
MR KHAW: I'm grateful.
CHAIRMAN: But I'm aware of your concerns, and both Prof Hansford and myself will bear them in mind.
MR KHAW: Thank you.
CHAIRMAN: Prof Hansford I think also feels that a de bene esse approach would assist him the most.
MR KHAW: Thank you.
CHAIRMAN: Thank you.
MR PENNICOTT: Sir, thank you for that.
The other application is Leighton's application to, at least for now, invite you to say that Prof Yin's second statement, that was received last evening,

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possibly in the early hours of the morning -- I can't remember exactly now -- should not at this stage be admitted.
MR SHIEH: I apologise for whispering -- because it was put by Mr Pennicott as if it's my application, but it's --
MR PENNICOTT: Sorry, Mr Shieh is quite right. We'd better get things in the right order. It's the government's application to adduce Prof Yin's second statement, which is opposed by Leighton. That's the correct way of putting it and I apologise.
CHAIRMAN: All right.
MR KHAW: Sir, I'm afraid it's me again.
CHAIRMAN: That's all right.
MR KHAW: First of all, Prof Yin, despite his teaching and other commitments, managed to come up with his response which we believe is helpful about one week after we actually received Dr Wells's report. We appreciate his hard work and efficiency.
We can all see from Prof Yin's response that he was simply trying to respond to various points raised in Dr Wells' report. In the present case, one has to bear in mind that given the time constraints on all parties as a result of the application for expert directions earlier, it was not possible for Dr Wells and Prof Yin to actually meet in order to map out their differences

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and agreements. It was rather unfortunate, but in view of that, Prof Yin found it necessary to actually produce this response, in the hope that he could kindly assist the Commission in trying to identify and also understand the differences in opinions and also the analysis between the two experts. This is the whole purpose of having his response.

In fact, Prof Yin was originally hoping to canvass the points which might be raised in the further information that Dr Wells was directed to give by last night, but since the information only came this morning, he thought that it would be helpful to submit his report first, before he actually had a chance to comment on the further information supplied by Dr Wells.

In fact, we have to say most of the points raised in Prof Yin's response would be referred to in our cross-examination of Dr Wells. In fact, we could have simply put the points to Dr Wells during our cross-examination, without actually providing any written materials in advance. But the reason why we do so is that in view of the rather technical nature of the analysis provided by the two experts, we believe that it would be helpful for everyone to have something in writing to refer to, before Dr Wells actually gives evidence.

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If Mr Shieh's point is that Dr Wells has not actually had a chance to see the report, so we should not be referring to that report -- but we believe that the artificiality of that argument is that, in any event, there's no reason why we are not entitled to put the points orally to Dr Wells during cross-examination. So what practical differences would that make if we provided everyone a copy of the written documents in advance so that we could actually understand what we were trying to discuss with Dr Wells during cross-examination?

So that's in fact the basis of our application and we believe that there is no question of any procedural unfairness, because even without the written documents we would just start our cross-examination of Dr Wells.

CHAIRMAN: Yes. Thank you. So the document at this stage, it may metamorphose into something else later, but at this stage would be a sort of aide-memoire?

MR KHAW: Exactly. And also, in all fairness to Dr Wells, if say after today, after he had a chance to look at the response, if he has something to add, or he wants to make his further observations on Prof Yin's response, he's perfectly entitled to do so tomorrow.

CHAIRMAN: Yes, Mr Shieh.

MR SHIEH: Mr Chairman, can I start by saying, lest it be

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thought that we are being obstructive, because this is going to come out in any event, we perfectly accept that if there are matters in that document that Mr Khaw for the government wishes to put to Dr Wells, he is perfectly entitled to do so, after having tried to understand it himself obviously, and some of those matters, insofar as it tries to anticipate what might be asked of Prof Yin in cross-examination, then that would come out in any event. I'm not trying to gainsay any of these propositions.

But the point I am taking is a more practical or, one may say, forensic one. If the document is admitted -- you can call it a statement, you can call it what you want, but it would be a document on the record. It would be in the nature of let's say a supplemental report. Conventionally, if a supplemental report is put in, the party against whom that report is put in would be expected to have a chance of studying it and formulating a response before putting a certain witness in the witness box. That is the difficulty we are facing.

I mean, fine, if you want to put it to the witness when he's in the box, without it forming part of the record as I say, so be it. But we just are concerned, if it actually is already in as a government document,

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we can't preclude in future, for example, people saying, "The document has gone unanswered, it's an uncontradicted report"; or "You ought to have a chance of dealing with it but you don't."

Of course, Mr Chairman may remember the context within which it was put in and be able to put in all kinds of safeguards to prevent that kind of point being made. But what Leighton is concerned about is the government being able to stack up the kind of documentation or reports on its side, so as in future to be able to say, "There's a report which you have not dealt with."

More importantly, one may ask whether it actually assists, because everyone, upon seeing what the other side has said by way of an expert report, would obviously ask his own expert how to deal with it, and obviously we have also considered what to do to deal with what Dr Wells may wish to say concerning Prof Yin's report.

The Commission has not had any application on our part to put in what Dr Wells wanted to say, and I can tell you part of which is here (indicating), forming part of what I had prepared by way of cross-examination of Prof Yin.

And the pre-existing directions did not cater for

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meetings of experts; Mr Khaw said unfortunately, because of the practicalities of the matter. It did not provide for responsive reports.

So, rightly or wrongly, we have proceeded on the basis that we would just do our best, take our judgment call, be helpful to the Commission, rather than ask the expert to say, "Can you actually do a supplemental? It doesn't matter whether they understand it, just dump it in". We have actually tried to understand the point and tried to assist the Commission, in my cross-examination, to put what we believe to be the really germane points in as easily understandable as possible.

In a way, we are feeling we are penalised for trying to be helpful, because in trying to assist this Commission to try to distil the very obtuse points of statistics into understandable propositions on our part, we now see the government saying, "It doesn't matter, we just put in this supplemental report", which has the effect of stacking up the documents on the side of the government, putting us at a disadvantage because we do not have an equivalent document to speak to, and that, we would respectfully submit, puts us at a disadvantage in terms of presentation.

Put it this way: when it comes to closing submissions, they would be able to say, "Look at Yin 1,

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look at Yin 2." It's treated as if it's already part of their case. For us, we have Wells 1, we have my best attempt to put questions, using my best judgment, to Prof Yin, and his answer, without the equivalent of Wells 2. That, we respectfully submit, puts us at a disadvantage.

We respectfully submit that the proper way to deal with it would be, if there are points which counsel or the legal team regarded as really germane to distilling the differences between the parties, let the legal advisers do their work, crystallise them, put the questions and let the witness answer, rather than to allow the government the chance of putting in an extra report and putting us at a disadvantage.

These are the points I wish to make.

CHAIRMAN: Thank you.

MR PENNICOTT: Sir, I -- probably like you -- find myself on the horns of a dilemma, in this sense. Obviously, I have received and, because we were not sitting this morning, have read Prof Yin's second report. I am bound to say, as I indicated earlier, my view is that it is truly, it doesn't introduce many new matters; it is responsive to Dr Wells, and to that extent it seems to me to be helpful. But for the constraints of time, and the practicalities of the fact that Dr Wells is about to

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give evidence, I have little doubt that, all other things being equal and in other circumstances, the Commission would give leave to allow Prof Yin's second report in.

However, I am bound to say that I see the strength of what Mr Shieh says, and I think it's really a dual point. One, perhaps Dr Wells himself has not had an opportunity, or at least not a proper opportunity, to look at this report. It's one thing to have a question put to you by counsel orally, another thing to have something in writing, in a document, "Please read this; what do you say about it?" That's a rather different proposition, it seems to me.

Again, although -- I'm not sure whether Mr Shieh did say this -- it's not clear to me whether part of the complaint that Leighton make is that they've not had an opportunity of speaking to Dr Wells about this second report, which seems to me would be perhaps another legitimate complaint, if it were being made.

So, sir, I think it's difficult. As I say, in other circumstances I would suspect the Commission would allow this report in. But I'm bound to say the safest course seems to me, at the moment at least, is for the report not to go in formally but for the cross-examination simply to continue, and to what extent the application

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to introduce the report might be renewed, perhaps tomorrow, if it is then indicated that Dr Wells has had an opportunity of looking at the second report and Leightons have had an opportunity of considering it in more detail as well, with or without Dr Wells -- and of course that raises this point: we would then have to give Leightons permission to speak to Dr Wells about that second report, even though he had started his evidence, but it seems to me perhaps the government -- it seems to me I don't know what the government's position would be if that situation arose.

So it's not a straightforward application or the answer to the application is not straightforward, in my view. There are a lot of countervailing considerations. Ultimately, however, it seems to me that it is what is fair to Dr Wells that matters, and I do on balance conclude that one has this fear of unfairness to Dr Wells at this moment in time.

CHAIRMAN: Yes. Thank you.

Mr Khaw, is there anything you would like to add?

MR KHAW: Yes. Mr Chairman, in fact we do not intend to actually put what is stated in Prof Yin's response verbatim to Dr Wells and ask for his views. Obviously, as Mr Shieh has pointed out, we would have to digest his report before we can put relevant questions to Dr Wells

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for his views.
So we are not actually relying on the written report for the purpose of putting all parts of the report to Dr Wells for his comments, but this is in fact to facilitate everyone's understanding of the lines of cross-examination that we intend to put to Dr Wells, when you have something in writing to refer to, given the rather technical analysis which has been produced by both experts. In fact, that is our intention.
So, on that, we could not see any practical difference between putting the matters stated in the response by referring to a written document and putting the points without referring to written documents.
The second point I wish to make is that, as I made earlier, if there are points that Dr Wells would want to address in relation to Prof Yin's response, he certainly would feel free to do it tomorrow, after today's cross-examination. There will still be time for him to consider this response. And I would have no objection if Leighton's legal advisers would seek leave so that they would be allowed to discuss with Dr Wells on matters arising from Prof Yin's report.
CHAIRMAN: Yes. Thank you.
It is a difficult one, but I do accept the strength of Mr Shieh's proposition that there is always

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a difference between a written expert report and questions put in cross-examination by counsel. And while it may be, as Mr Pennicott has suggested, that by the end of today and into tomorrow we are in a position where we can say, "Right, we understand what's going on. Let Dr Wells have a look at this statement and we maybe have to agree it tomorrow; we may not."
I think we have to work within the constraints of time. It's one of these situations where unfortunately we are not in a position to say, as we would be in ordinary civil litigation, "Fine. You now have ten days to consider that statement and give a response. You've got a further ten days", et cetera. It's all been rather pushed up against each other, and I think I'm looking generally at the ability to get both sides' point of view in the fairest way possible.
On that basis, I'm inclined at the moment not to put in the statement but let us revisit that this afternoon, to see whether anyone has any changes of mind, particularly the tribunal.
Thank you.
MR SHIEH: Mr Chairman, with the applications dealt with, may I now call Dr Barrie Wells --
CHAIRMAN: Yes.
MR SHIEH: -- who has now been seated, as we can see, in

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London?
Dr Wells, good afternoon.
DR WELLS: Good afternoon.
COMMISSIONER HANSFORD: Can we turn the volume of Dr Wells up, is that possible? Is that at this end? If we can't, that's okay, but it would be better.
MR SHIEH: Good morning, Dr Wells. Testing.
DR WELLS: Okay. I can hear you. If I speak up a little, perhaps you can hear me better.
COMMISSIONER HANSFORD: That's fine.
CHAIRMAN: We can hear you fine now. Thank you. Excellent.
DR WELLS: By way of testing the volume, I would normally stand for the witness affirmation. I fear that if I stand, you will only see me from the waist downwards.
CHAIRMAN: You can take it seated, thank you, if you would.
DR BARRIE TREVOR WELLS (affirmed)
Examination-in-chief by MR SHIEH
MR SHIEH: Dr Wells, thank you very much for being the expert witness on statistical matters for Leighton and for assisting us.
You remember you have -- hello?
A. Hello. We can see your shared content.
Q. Dr Wells, you have given two expert reports for the purpose of the Commission, one in what is called COI 1, specifically on the holistic report, and one in COI 2,

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specifically in relation to the verification report.
Can you confirm that?
A. That is correct.
Q. Just for identification purposes, can you look at the bundle of expert reports in COI 1.
Can that be shown to Dr Wells. There's a bundle of expert reports in COI 1. Yes.
That is entitled, "Expert report prepared by Barrie Wells", dated 13 September 2019. That is for the Original Inquiry, COI 1.
Do you recognise that, Dr Wells?
A. I confirm I recognise that.
Q. Can we then turn to -- I don't think we need to identify signatures, because you are an expert and obviously this is your report.
Can I ask you to look at the bundles in COI 2. There's a bundle called ER1, and in this bundle we have your report on the Extended Inquiry, also dated 13 September.
A. I confirm I recognise that.
Q. In the same bundle, there is your oral synopsis which you will be dealing with in due course. It's just for identification purpose so don't start yet.
Lastly, in response to certain requests for information from the Department of Justice -- it's

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actually in bundle AA, I think.
MR PENNICOTT: COI 1, ER1, tab 13.
MR SHIEH: COI 1, I'm sorry, because there was a response to the request for information by the Department of Justice. It's in the expert witness bundle in COI 1.
A. I recognise that.
Q. It's a document called "Dr Wells' response to government questions", and you can see a series of questions followed by your response.
A. I recognise that.
Q. And those responses are prepared by you?
A. Those are the answers which I prepared, yes.
Q. Before asking you to develop your synopsis, Dr Wells, there is one point which perhaps I should make clear to the Commission, which is this.
Prof Yin gave us -- the Department of Justice gave us the document from Prof Yin last night. We had to prioritise what we were doing, because Dr Wells was actually preparing his responses to the requests for information from the Department of Justice, and so we did not want to bother him or trouble him with Prof Yin's document, until he had finalised his response to the government's request for information.
So Dr Wells has had extremely limited time to look at that document from Prof Yin. Now, Prof Yin's

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document made some suggestions that Dr Wells might have got some facts wrong or might have misunderstood something, this or that. We have not had a chance to go through those matters in detail with Dr Wells. He may or may not accept certain points put by Prof Yin that maybe he might have misunderstood something or got something wrong. So I am going to ask him to put forward his expert reports, but what I don't want to do it, as part of the hurly-burly of a hearing, for it later to be put to him, "Oh, you have been told about Prof Yin's criticism of this work; why didn't you correct it immediately?" I wish it to be known that Dr Wells has had extremely limited time. So while I ask him to confirm his reports, I hope that it will not be said against him if, for example, eventually it's put to him, "You might have got it wrong" and he accepts, then the point is taken against him, "Why did you then affirm your expert report to begin with?" just because he has had limited time. We could have actually asked him, "Within the time available, can you point out the limited responses by you could", but that would not be productive; that would be a half-baked attempt.
CHAIRMAN: I understand the point. I think the point works for both sides in the sense that it also works for the professor. Both parties have been under considerable

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time pressure.
MR SHIEH: So I just wish to sort of reserve the position of the expert or the experts so that it can't be put against them that they had somehow still put forward their reports, despite having seen some suggestion somewhere that they might have got one thing or two wrong. That's all I wish to say at this stage.
So, Dr Wells, you've heard what we have said here. Without further ado, perhaps I will hand the stage over to you, for you to develop the synopsis that you had prepared.
Oral synopsis by DR WELLS
WITNESS: Thank you.
My name is Barrie Wells. I am a statistician. I think I was approached to undertake this work by recommendation from the chairman of the Concrete Society, with whom I sit on various standards committees. My expertise is primarily in statistics -- the FRIS stands for a Fellow of the Royal Statistics Society -- but actually my PhD is from the department of theoretical mechanics at Nottingham University, and so I do know a little about stress and strain, which is probably why I've been involved in the meetings with the chairman of the Concrete Society.
The next slide, please. The holistic report first

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and then the verification report later. So the holistic report addresses sampling strategies to obtain the data, and then the use of the data. I want to address those two points. That is what I understand I was asked to look at.
The key points -- next slide -- are these six main points that I address in my report: sampling prior to testing couplers, in other words the desk exercise; what shall we do?
Then points 2 to 6 subsequent to that -- "Having obtained the data, what shall we do with it? How shall we analyse it?" So we have acceptance and rejection. A specimen that has been identified and examined, is it defective or not defective? There are various tests involved, including the PAUT test, the direct measurements and the number of threads. So there are various reasons for rejection, and the rejection criteria, therefore, I feel need to be examined.
Having done that, there was a large amount of discussion of defective rate and therefore necessary strength reduction resulting from the defective rate. Since that was also within the statistical remit, I have tried to address that question.
Then, finally, I have made some points on the consideration of the appropriate confidence level.

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If I go through those in detail, one at a time. Next slide. That's point 1: sampling prior to testing the couplers. My point here is that the outcome shows a significant discrepancy between the expected proportions. Actually I've said the word "significant" there, and significance will come up a lot in statistical discussions because it is a technical term in statistics, but it's also a general English language term, and I feel I've used it there in both its technical and non-technical senses. But you can see quite clearly that there is a discrepancy, hence it is "significant" in the non-technical sense, but then I also want to show that statistically it is significant, that we can say with a certain level of confidence that we have in making that non-technical statement about significance.

So the specific numbers involved which I believe have been already discussed earlier in the week -- we have a ratio of 26 per cent, which we were expecting, that is to say before anything has actually been looked at. All we know is the design documents, and the design documents tell us that there ought to be 26 per cent. When we actually go and look, we actually find that there's 8 per cent, 7.78 per cent, the actual ratio.

My first thoughts when I saw that was they look

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rather different and I would have expected any statistician to have done the same thing, to have looked at them and said, "These look different". It is normal practice in fact, after having undertaken a sampling exercise, to back-check, just very quickly look and see whether or not you think the assumptions you made at the beginning were justified. And here I think it doesn't really take a statistician to look at those two numbers and say, "Mmm, perhaps not; we do need to have a closer look."

In my opinion -- so far I think what I've said is simple arithmetic but we now get on to my opinion -- so if we look at the next slide, I'm beginning to develop opinions rather than just crunch the numbers. The fact that the bias was towards the smaller number, the smaller part of the sample, so that type A was 175, type B was 62, and it's the 62 that's under-sampled, that is likely to lead to bias towards a higher number of defectives. So it's not just that we suspect that the sampling regime was not truly random and it's not just that a proper mathematical statistical test confirms our suspicions and says that we have a high probability that this is not random. We can also say that any results that come from analysing this data will necessarily lead to a more conservative result.

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Next slide, moving on to point 2. We are moving into the acceptance and rejection. So we have now done the sampling, we've looked at it to ask, "Is it really adequate? But we have to make do with the data we've got, so what can we do with the data?" Here, I was trying to address the point that the acceptance and rejection -- "Is it defective? Is it not defective?" -- was not strictly a binary measure, and therefore the whole assumption of the binomial approach is incorrect, because there are two measurements that have to be passed. There's the number of threads exposed and the engagement length. And actually there's a third part to this which is the visual assessment of whether or not the coupler is actually connected and hence whether or not it's even worthwhile taking a measurement and counting the threads.

So it's a multi-part process. It is clearly not just a binary distinction.

But my point here is more that the results are simply incompatible. You could argue that this isn't statistics, this is just numbers, but I would like to propose that statistics really is the simple things as well as the more complex ones such as hypothesis tests, and so on and so forth. As we approach the anniversary of Florence Nightingale's birth, it should be remembered

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that Florence Nightingale made dramatic improvements to nursing care simply by drawing pie charts. The simple statistics should not be overlooked in search of the more complicated.

All I've done here is said if we add up all of the ones where the two measurements, the number of threads exposed and the engagement length, don't match, having of course already ruled out ones with cut rebar because obviously you can't accurately count the number of threads exposed, so having made all necessary adjustments to the data set we find that 36 per cent of the direct measurements and 20 per cent of PAUT measurements simply weren't compatible with the count of threads exposed.

So the actually criterion used for deciding defective is logically incorrect. It's incompatible. It's internally inconsistent.

The next slide goes on to further analyse this idea of binomial, that actually there were at least three outcomes: defective, not defective, and discarded. This is something that I have addressed in detail in one of my notes, where I've given an example which I was hoping would be illustrative. The point being that something is only discarded in this sense: if it has already passed the first part of the test, it has already been

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classified as "not defective" on the first part of the test, which is the visual test. So the discards only come from that "not defective" pile. They don't come from the "defective" pile. So we are discarding some of the "not defectives" or, rather, discarding what, under the testing regime has at this stage decided is not defective, because it is a multi-stage process; it's not simply binary.

So obviously if you are only discarding from one pile and not from the other pile, I think it should be fairly obvious that that will lead to a bias in results, a bias towards a higher number of defectives.

Going on to the next slide, which is trying to emphasise this point, because I think it is an important point, that the binomial analysis rests on the assumption that only two outcomes are possible. I hope I have shown that actually there are more outcomes than that, if you look at it in detail. By example, for instance, if you were doing a drug trial, you might say, "It's binomial, the patient either dies or survives." Yes, but what about if the drug were to, for instance, significantly increase the lifespan with a high quality of life? Yes, the patient still died of the disease, but it's an effective drug because it had a positive effect on extension of lifespan; similarly, remission,

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and so on.

So whenever you lump things into two classes when actually there's more classes really there, you are necessarily going to bias the data.

The next slide, please. Then we have the internal inconsistencies; that direct measurement, for instance, of engagement length wasn't given an allowance for error whereas the PAUT measurement was. Number of threads exposed doesn't agree with either of those in a large number of cases, and so on and so forth.

So rather than being binomial, it's at least multinomial, and in my opinion it should actually have used a continuous assessment model because these are continuous variables. We are looking at how much of the thread was engaged, how much is this component of the structure contributing to the overall strength of the structure. It doesn't suddenly become zero because the direct measurement was 39.999 millimetres instead of 40 millimetres.

I've tried to illustrate what effect this has in the next table, where we have acceptance and rejection criteria, and I've tried to illustrate -- I should emphasise at this point that I am not trying to design a structure here. I'm not saying these numbers should be used as the actual answers. I took my remit as being

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to look at the statistics and try to make suggestions as to how the data could and perhaps should have been analysed more efficiently to give a more scientifically reliable and justifiable answer and outcome.

So where, for instance, I have adopted a 28 millimetre engagement length, I'm not straying into engineering here. I'm not saying, "I believe this." It's a number I took from previous testimony, but I do not feel competent to say, "Yes, you must use these numbers." The numbers are not intended to be correct in the sense of, "Please use these numbers to go away and design a structure or to design remedial measures, or decide whether certain measures are required." I'm trying to indicate what might happen if the data were properly re-analysed.

The next slide, please. We then move on to the capping beam.

COMMISSIONER HANSFORD: Sorry, Dr Wells, can I interrupt you for a moment. Can you take us back to point 4 and the table. For the benefit of those in this room, could you just explain or take us through what your findings are in these various columns and what they mean?

A. Certainly. I do apologise. I had written notes to go with all these slides and then I was told I'm not allowed to bring notes into the room so I'm trying to do

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it from memory. And you are right: I meant to say here that -- for instance, assuming missing values have mean of the remainder of the sample -- now, this simply means that on a previous slide, I said that the samples which were discarded had already been passed on the first part of the multi-part test for defective or not defective. So somebody has looked at these and said, "Yes, they are definitely connected", so they had already passed that first threshold, and then they were discarded because somebody couldn't get the measurement.

Now, I've no idea why. Could it be that the PAUT equipment couldn't be lowered into that part of the structure? Who knows? We have insufficient information.

What I know from the statistical point of view is that those are missing values. If you were to discard them, then you deliberately bias the sample towards a higher number of defectives. So trying to compensate for this in the best way available statistically, the correct way, I believe, is to say that those values which you cannot obtain a measurement should be given the average of the measurements that you could take.

So that is the best information we have. It's standard practice. You assume that the missing values -- so what the report refers to as "discarded"

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I have here referred to as a missing value, and where we have a missing value I have simply given it the mean of the remainder of the sample of its type.

So if it was discarded because you couldn't take a PAUT measurement, then it takes the average or mean of all the PAUT measurements, not of everything, only of ones of its type. We don't want to start assigning values which aren't appropriate.

So what I've done here is try to progressively improve the analysis -- or maybe not improve, I can't say that 28 millimetres is actually better or worse than 37 millimetres. That is outside my expertise. What I've tried to do here is part-improve or part-change and say there are other ways of doing this; it's up to somebody else to decide whether this is the correct way, or which one of those is the correct way, or maybe none of those are the correct way, but I felt it was incumbent on me to illustrate what those assumptions would entail or what would happen if you make those assumptions.

So we start off with the left-hand column -- 366, 332, 350 -- that's what was in the holistic report. Then, if we replace it with the mean of the remainder of the sample, we get the next column. Then, if you adopt an engagement length cut-off but still discard the

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samples, then you get the next column. Then, if you do both, you get the final column. So the final column is doing both the correction for discarding -- introducing bias but discarding previously passed samples, and also changing the cut-off to 28 millimetres.

COMMISSIONER HANSFORD: So, Dr Wells, forgive me again for interrupting -- so just to understand that by way of example, if you take the bottom line of your table, just the bottom line at the moment, the holistic report tells us there should be a 35 per cent strength reduction factor. Is that correct?

A. Yes. This is calculated as being a 95 per cent upper bound.

COMMISSIONER HANSFORD: Yes.

A. So all I've done is adopted exactly the same convention as in the holistic report. So I'm not trying to pass judgment here on whether that method is correct.

COMMISSIONER HANSFORD: Okay.

A. But yes, that's correct, the 0.35 means that the holistic report then went on to say this means there is the 35 per cent strength reduction due to the number of defectives.

COMMISSIONER HANSFORD: And sticking with the logic of the holistic report -- I know you are going to come on to other points later -- you are then showing, through

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these next three columns, how that 35 per cent changes ultimately to 9.4 per cent, if you adopt the points you have previously made about correction of the data. Is that correct?

A. That is correct, yes.

COMMISSIONER HANSFORD: Thank you. That's very helpful.

A. Moving on now -- this is a different part of the report, and this is a part of the report that I had some difficulty with, because it seems to me to be introduced without background.

I have since understood a fair bit more about it, having read some of the documents that I have received in the last week or so, but initially it did seem to come a little bit from nowhere.

But the main point that I could say, given the information that I have received, is the data set here was very small. The actual data set which was used in the report was seven points or couplers on one side and 11, from memory, on the other side. And the assumptions behind the analysis method used to calculate the strength reduction factors are flawed; that's my middle point there.

One of the reasons for this -- I don't want to get into details of statistical methods here, but I understand from reading the background materials that

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the method that was used employed the Delta method. It's actually a very complicated piece of statistics that has been undertaken to come up with this, and somewhere in the middle of it there was the recourse to the Delta method.

The Delta method is basically a large-sample approximation and it works well when the samples are above 30, and here the sample sizes were 7 and 11. So I think it's fair to say that 7 and 11 are not above 30, and therefore the use of the method is not valid.

I'm just saying that to give you some indication of my reasons for saying that the method was flawed.

I say it's a really complicated piece of mathematical statistics. I think it's actually very difficult to get right. So I would tend to sidestep the whole thing and suggest the Monte Carlo approach, which I did just to see how it worked. I'm not saying that my results should be used to construct a structure, to make decisions. I'm simply trying to indicate a more scientifically accurate, better way of analysing the data.

Next slide, please. Then finally, there's this whole consideration of appropriate confidence level. So the Standing Committee states -- and here I'm simply quoting CS2:1995 and CS2:2012 -- that a threshold value

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should be an upper limit of the statistical tolerance interval at which there is a 90 per cent probability that 95 or 90 per cent of the values are at or below the upper limit, at which point one would naturally pause for breath and ask, "What does it mean?"

It does touch on some quite arcane points of statistics, but the main point I would say here is that the only consistency in that is 90 per cent. So we have 90 per cent probability, there's no 95 per cent probability, it only says 90 per cent probability, and that either 95 per cent or 90 per cent of the values are at or below. Why do we give the choice? For context. How do you choose the context? Well, it doesn't actually help reading the CS2s, but if you read the ISO standards then there are tables which help you decide. Hence my point elsewhere that I feel the ISO standards are useful in helping to interpret the CS2s.

But regardless, where there is no choice, it's 90; where there is a choice, it's 95 or 90. So I think that it behooves us to at least look at how the figures would have panned out had we used 90 per cent, and so I did actually include that in my slide after next.

But the next slide I simply included because I thought this might come up and I wanted to be able to say, "Can I please refer to this?" This is my rather

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crude attempt at trying to separate out that 90, and 95 or 90. The whole point is there are two separate statistical concepts being bundled into one there: that you get a confidence interval, which is how much of the data do you expect to lie within a certain interval. So that's the red line on this graph. Then, having set that confidence level, there is this upper bound, there is then actually a statistical confidence in the data that is available to predict that upper bound. And what we find, in the data set we've got at the moment, is that that data upper bound is not symmetric, and therein lies a lot of the problems with the methodology that was used to derive the capping beam statistics.

Moving on to the next slide --

COMMISSIONER HANSFORD: Sorry, Dr Wells, before you do, what's the reference to "Wilson" on that slide?

A. Sorry, it's just because I didn't redraw it. I stole it from a reference which I think I originally put in.

Wilson is another technique for doing what the holistic report did to come up with the confidence in the binomial. It's variously referred to in supporting documentation as the Clopper-Pearson method or the "exact" method.

COMMISSIONER HANSFORD: Right.

A. It's just a way of trying to calculate the confidence

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you have in that upper limit, once you've set the upper limit, based on how much of the data you want to be within a certain interval.

COMMISSIONER HANSFORD: That's helpful. Thank you.

A. So all of that was simply by way of justifying the fact that I've reworked the numbers with 90 per cent and found that the value in the holistic report, which previously was 0.366, comes out to 0.304 on a 90 per cent limit, and then so on and so forth for my successive changes, so that if we more correctly use the missing values however many the sample, we 0.308. I actually have a feeling that I've made an arithmetical slip there and I will hopefully get an opportunity to explain that later. Because I would have expected it to have been less than 0.304. I think I may have transcribed a number incorrectly in my haste. Sorry about that.

But then when we get down to the 28 millimetres, and 28 millimetres plus assigning the mean, we actually get substantially lower strength reduction factors.

Now, I'm not actually advocating that we use those strength reduction factors. I was asked for a statistical opinion, and my statistical opinion is that the references tend to favour a 90 per cent limit, and therefore you might consider it surprising that the

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90 per cent limit was never actually addressed in any of the reports. So I was simply trying to redress the balance.

Then the next slide, again, is still 90 per cent, but this time looking at the capping beam data and trying to introduce a more scientifically justifiable usage of the data so that instead of discarding values which have already passed a part of the test, instead replace them with the mean, and hence my row there, "Missing values"; that simply means I have assigned the mean value where previously it was ignored, and re-incorporated it into the analysis, to have a mean, variance, type A, type B, and combined.

So again this is not intended to be a table on which I would like anybody to go away and construct a building. I am trying to illustrate alternatives because I felt that was my brief. That is pretty much all, I think, I have to say on the holistic report.

So we then have the Extended Inquiry verification report, which is all to do with the quality of rebar, which has been touched on already in this session.

So we have: the level of confidence in the quality of rebar that was not re-tested on site; and a calculated strength reduction factor.

If I could quickly go through those. The next slide

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is simply an extract from CS2:1995:

"The long-term objective is to rely on the third party certification ..."

I shouldn't need to read this because it was already read out to the tribunal earlier this session, and somebody pointed out that this was 25 years ago -- or 24 years ago, according to 1995, but of course that's when it was published; it was actually written at least a year before that -- so hence at least 25 years ago we were supposedly moving towards a single testing regime and we are still moving towards.

So the next paragraph: "Level of confidence in the quality of rebar that was not re-tested on site" -- this is I think the key point. I put it in quotes because it is a quotation directly from CS2:1995. How much confidence do we have in the quality of the rebar that was not re-tested on site? I think this is key, this is critical, and the word "confidence" I am interpreting in a statistical sense, so we should be able to put a number on this, a figure: are we 90 per cent, 95 per cent, 99 per cent or whatever confident?

The way I approached this was by saying we have the mill test certificates, we know what the manufacturer has measured for these samples, and there are three sets of measurements for each sample, for each batch.

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There's the yield stress, the ultimate tensile stress and the ratio of the two, and all three measures have to pass in order for the sample to pass.

Then there are various subclauses which say that if one fails, one specimen fails, then you are allowed to take two more and re-test those. It doesn't actually specifically state whether, if one of those fails, you can also replace that with another two. The implication is you can, but it's not actually clear on that point, and certainly there's nothing that says that you can't.

But anyway, back to the numbers. So we have the manufacturers' numbers and we have the purchasers' numbers, where by "purchasers' numbers" I mean the numbers as supplied by MTRCL's HOKLAS-accredited laboratory, in accordance with CS2:1995.

So in megapascals, we have the first three numbers, 507, 496 and 518, which give you a mean of 507 and a variance of 121. Test results supplied by the manufacturer: 516, 508, 527, a mean of 517 and a variance of 91.

The question is do they confirm each other or do they not confirm each other?

This brings us to another interesting point of statistics. Statistics never actually proves anything. It can simply give us an idea as to what is the most

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likely situation. So the correct way of approaching this is to ask the question: could those actually be different? What's the chances that a mean of 507 and a mean of 517 were obtained from completely different batches or by a completely different method or whatever, given that amount of variance?

Now, 507 and 517, you could say they are fairly similar, or you could say, actually, they are quite different, they are 10 megapascals' difference. The key point is to look at the variance. If we have a variance of 121 on 507, that means that number, 507, could vary quite a lot on either side. Similarly, a variance of 91 on 517, it could vary quite a lot on either side.

So what are we to do? Well, we -- the next slide, I think -- what we do, or should do, as statisticians, is apply a hypothesis test. This removes the need for any assumptions. We don't need to ask are all the rebar homogeneous? Well, we know we are not, but we know how much they are not, we have calculated the variance. So we know this, we have a number, we can account for it.

Differences among manufacturers? Easy. We simply do the statistics for each manufacturer separately. It automatically accounts for natural variation in rebar. This is the basis of most statistical analysis, the hypothesis test. Is it likely that two slightly

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different numbers are disagreeing with each other, or could most likely come from the same parent population? It's a basic tool, the hypothesis test. It's used every day, for everything from building bridges to planning economies. It was actually described by one eminent scientist as the most dramatic scientific advance of the 20th century.

And if we use it on this data, it shows that within the tolerances specified by Hong Kong's Standing Committee on Concrete Technology, we can state that the untested rebar would have passed, had it been tested. Okay, we can state that. It doesn't mean that it would have done; it means that the statistics say that. So we have confidence, in other words. It's not a statement of fact in the same way as two plus two equals four. It simply says there is no evidence, no credible evidence, that the untested rebar would have failed, and I believe that that is the correct way of undertaking the analysis.

The next slide. The way the analysis was actually undertaken, as I understand it, as is written in the holistic report, is that it was based on the assumption of a worst-case scenario. In other words, if 55 out of 110,000 samples had failed in the last ten years, then if we assume that all of the rebar that wasn't tested

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also failed, then the probability of that situation, that worst-case scenario, can be calculated by -- so the first one failing, that would be 55 over 110,000, so the second one failing, that would be times 55 over 110,000, and if there were about 130, from memory, untested samples, then we multiply this 55 over 110,000 by itself 137 times, and that's where I come up with the figure of: this is so unlikely that it's actually more likely that two of us would accidentally, purely by chance, pick the same atom from all the atoms in the known universe.

In other words, I feel that it is an incredibly unlikely worst-case scenario and therefore not really usable.

By way of comparison, whenever the HOKLAS-accredited laboratory tests a batch of rebar, it takes three specimens as a sample and tests them. Now, it's just possible that those three specimens were the only ones in the entire batch which were going to pass the test. Highly unlikely but it's possible. And if you take that worst-case scenario, you actually find -- do the maths, crunch the numbers -- that that situation is more credible than this worst-case scenario that was used to come up with strength reduction factors of 4 per cent and 13 per cent.

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So I believe that those factors are simply not credible and that a correct analysis is based on the hypothesis test that the manufacturers' and purchasers' tests for the available rebar are compatible and likely to come from the same population.

So that is a quick run-through of what I think I was asked to do, and I presume now I am to take questions on it.

MR SHIEH: Thank you very much, Dr Wells, for your exposition.

What follows next would be counsel for other parties to ask you questions. I believe the government would ask you questions first, followed by the MTR, and then counsel for the Commission, Mr Ian Pennicott, would go last in asking you questions, a sweeper, so to speak.

Mr Chairman and Mr Commissioner may ask you questions any time they wish to, and after that I will have a chance, if I wish, to ask you questions in re-examination.

I hope that is all clear and please remain seated while other counsel ask you questions.

WITNESS: Thank you.

Cross-examination by MR CHOW

MR CHOW: Good afternoon, Dr Wells. I act on behalf of the government and I have a few questions for you, Dr Wells.

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First of all, Dr Wells, I don't pretend to know much about statistics, and for this reason, in my questioning, I may have to pause from time to time so as to allow myself to digest your answer, gather my thoughts and prepare for my next question. So please forgive me and bear with me.

The other point I would like to make before I start is that we have received your supplemental information this morning. I myself haven't had the time to go through all the details or to seek advice from Prof Yin, so it is quite possible that some of the answers of my questions may have been provided by you in your supplemental information. So, if this happens, please just let me know; okay?

A. Okay.

Q. Now, the first topic that I would like to discuss with you is about the issue of randomness. On this particular issue, you deal with it in paragraphs 4.3 to 4.5 of your reports.

Just to make sure I understand your reasoning, your way to develop this point, isn't it, that first of all you consider the total number of diaphragm wall panels, which in this particular case is 237, and you take the number of panels without capping beams of 175 panels, and 62 of the other panels are with capping beams, and

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on that basis you work out that the number of panels with capping beams represents about 26 per cent of the total number of panels; is that right?

A. I believe so.

Q. Then you look at the number of specimens. Now, there are altogether 90 specimens, and after the sampling exercise 83 specimens were from panels without capping beams, which you describe as type A samples; correct?

A. Yes. Sorry, just a point: I don't think I describe them as type A samples. I think I'm quoting there from a document which was supplied to me. So that isn't actually my description. I'm simply copying it from somebody else's. That's why it's in quotes and in italics.

Q. That's fine. Now, we know that 83 per cent specimens were taken from panels without capping beams, and seven specimens were from panels with capping beams, which you work out the ratio and you arrived at 7.7 per cent of samples of specimens from panels with capping beams; right?

A. I believe so.

Q. Then you compare the 26.1 per cent of the diaphragm wall with capping beams, with the 7.7 per cent of specimens that come from panels with capping beams; right?

A. I believe so.

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Q. And because of the apparent disparity between these two percentages, 26 per cent and 7.7 per cent, you then try to determine the probability of these happening, and you arrive at a probability of about 1 in 1,000; right?
A. Yes.
Q. Now, you then say because the probability of this happening is small, then in turn it suggests that perhaps the sampling exercise was not random. Is that your point?
A. Yes.
Q. So, as I understand it, you are using the end result of the sampling exercise to assess the randomness of the sampling process; is that right?
A. Yes.
Q. Please help me to appreciate this reasoning, and I would like to apply it to a real-life situation. In Hong Kong, we have a lottery. As I understand it, in the UK there is a similar lottery. In the UK it's called the National Lottery. You know that?
A. That is correct.
Q. The way it works is that a certain set of numbers will be drawn, under the lottery systems. In Hong Kong, each time we draw six out of 49 different numbers -- so each ball will bear a certain number, and I understand the UK is of a similar system. I was told that in the UK you

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have 59 numbers, so 59 different balls.
MR SHIEH: My junior says you draw seven numbers in Hong Kong.
MR CHOW: The last time I participated in the Mark 6 was some years ago, because, as I never won any Mark 6, so I gave up.
Now, every time a set of numbers is drawn, if you look at that particular set of numbers and try to calculate the probability of that particular set of numbers being drawn, we always arrive at a very small probability.
Now, I was advised that if, as in Hong Kong, if we have to draw six numbers out of 49, the probability of getting it right is one in 12 million, around one in 12 million; this is the chance. Right?
But as a layman, I would not -- although the chance of getting that particular set of numbers is so small, I would not consider the lottery process is in any way not random. Would you agree?
CHAIRMAN: I don't understand.
A. The lottery process has been designed to be completely random.
MR CHOW: Right. If I go a step further, if the same set of numbers repeatedly comes up in a subsequent lottery, then perhaps, in such circumstances, we may start to

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doubt about the randomness in the process; do you agree?
A. Yes, I would agree.
Q. So, now, if we then go back to Prof Yin's sampling exercise. According to the evidence, he only carried out the sampling exercise once, and he arrived at a ratio of 7.7 per cent. Now, you say that because the chance of this happening is so small, then it suggests it is not random.
Applying the same analogy that we have just discussed, if Prof Yin carried out another sampling exercise the following week, and if the result of the second sampling exercise gives the same percentage, 7.7, then perhaps, in such circumstances, we may have a reason to doubt whether the sampling exercise was not random. But the fact that Prof Yin has only carried out the sampling exercise once, if you agree with me in relation to the lottery, then I would suggest to you that that is no reason for us to doubt the randomness in the sampling exercise carried out by Prof Yin. Would you agree with me?
A. No.
Q. On the basis of one set of results, you said --
A. I think the point you are missing is "one set of results". You are referring to one specific result from the lottery and then trying to draw a conclusion about

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a set of 90 results by looking at rebar.
If you were to look at 90 lottery results and you were to find that, of those 90 lottery results, 83 of them had come up with exactly the same numbers, you would probably be demanding your money back if you had bought a ticket because you would think it had been fixed.
Q. Dr Wells, but your complaint is in relation to the percentage, 7.7 per cent rather than 26.1 per cent that you expect. So we don't have 90 lottery. We only have one lottery.
A. Exactly --
Q. Prof Yin carried out the sampling exercise once and he arrived at 7.7 per cent.
A. No. I think you're missing the point. The random sample is of size 90. If you took a random sample of 90 lotteries -- they do the lottery every week in the UK, I don't know how often it is in Hong Kong, but let's -- you introduced the UK one so I will concentrate on that. If you look back on the last 90 weeks of lottery and you find that, of those 90, a large number of them have got very similar numbers, then you might begin to doubt the process. You might begin to think that perhaps the mechanism had gone wrong or got stuck. I'm not saying we prove anything by doing this analysis.

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If you read 4.5, for instance, which is on the screen in front of us, it says:

"The probability that this sample was random can be estimated using a hypothesis test ..."

At no point do I say this is not random. I cannot say it is not random. There is no concept of saying something is or is not random. All we can say is that, having undertaken a sampling exercise, it is normal procedure to back-check.

The lottery example isn't appropriate. What you might like to consider, for instance, is polling in front of an election. If you were to poll a number of people and after polling them you found that 90 per cent of the people you had asked were male and 10 per cent were female, you might begin to think that the results you had got would possibly not accurately predict the results of the election because, in the election, you would expect 50 per cent of the electorate to be male and 50 per cent to be female. So you might think that something's gone wrong, and what you would do, probably, is go back and look at the way you chose your sample, and you might say, "I wonder if we only canvassed people who were coming out of" -- and I'm trying to think of a venue where you would get more males coming out than females and I'm afraid I'm failing, but hopefully you

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get my gist.

COMMISSIONER HANSFORD: Perhaps a rugby match.

A. Sorry, you don't prove something is or is not random. What you do is you start off by saying, "I'm hoping to conduct a random test, I'm hoping to get a random sample." Afterwards, it is normal procedure to at least back-check. Maybe there's nothing you can do about it but it is extra information which you get for free so you should do it.

What I'm saying is that (a) that wasn't done in this case, so I try to draw attention to the fact that in my view this was a major omission, and (b), had it been done, it would have cast doubt on the actual randomness of the data. I've never said and never would say that the data is not random. I couldn't say that, nobody could. All I can say is that the numbers statistically cast doubt on it, and that is not my view. That is simply first year undergraduate statistics.

MR CHOW: Thank you, Dr Wells.

My next question is the diaphragm wall panels that we have been talking about, do you know the number of couplers in each diaphragm wall panels?

A. No, I don't think so.

Q. So am I right in thinking that when you compare the two percentages, you should be comparing apples with apples?

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Now, the 26.1 per cent is the ratio of the two types of diaphragm walls, one with capping beams and the other diaphragm walls without capping beams; whereas the 7.7 per cent is the ratio of couplers. Am I right in thinking that what you ought to compare the 7.7 per cent with is the corresponding number of couplers in diaphragm wall with capping beams, and corresponding number of couplers in other set of diaphragm wall without capping beams?

A. I'm sorry, I simply read the documents and, using your simplification and referring to these as apples and oranges, I read it as 175 apples and 62 oranges, and 83 apples and seven oranges, and I simply, without knowledge of how many or whatever or the structure, I simply said that if you went to the grocers and randomly picked from 175 apples and 62 oranges and you actually came out with 83 apples and seven oranges, then I would say that you were disproportionally sampling the apples.

Does that answer your question?

Q. I have to confess that I'm totally confused. I need to take some time to digest this part.

COMMISSIONER HANSFORD: I think that was quite clear.

MR CHOW: Right.

175 -- if I read the transcript, what, Dr Wells, you

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have just said is 175 apples and 62 oranges, but if I try to correlate with these two figures, the 175 are the panels without capping beams, whereas 62 is the panel with capping beams; right?

So the ratio of 26 per cent is the ratio between apples and oranges; is that right, according to your definition?

A. Yes. It might be helpful to introduce a little bit of statistical jargon here.

Q. No, please do not!

A. Simply because it will make it easier, I think, to understand.

The 175 numbers of them are without capping beam details and 62 numbers of them are with capping beam details would, in statistical terms, be referred to as "the population". So that is everything, everything that we know about. So, from the construction record, the population is 175 and 62. And then, after my ellipses, it says by the total number of samples, the random sample size is 90 and the number of type A samples is 83 and the number of type B samples is seven. Technically, that's rather sloppy use of terminology because they don't mean samples, they really meant specimens. The sample is actually whole thing, the 90.

So the population is 175 and 62. Whether they are

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apples, oranges, capping beam details or whatever I don't think is important for the statistics. The sample is size 90, made up of 83 of one and seven of the other. All I'm saying is that if you follow a very basic statistical technique which is universally recognised for judging whether or not a sample is a likely example of its population, then you find that because 83 to seven is so different to 175 to 62, the probability that you've got it right is low, in exactly the same way as if you were polling for an election and you had asked 90 males and ten females, you might reasonably think that you'd made a mistake and that your results are unlikely to be useful in predicting the results of the next election. That's all I'm saying.

Q. Dr Wells, just now you said you don't have the number of couplers in the diaphragm wall panels. Now, when you talk about one population, 175 panels without capping beams and 62 panels with capping beams, the ratio you determined -- if you simply compare 175 with 62, you have 26 per cent, but if you compare the total number of couplers within this group of 175 panels, with the total number of couplers within another group of 62 panels with capping beams, you may not have the same percentage, 26.1 per cent, because the number of couplers in each panel are different. Do you agree?

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A. I can neither agree nor disagree. All I can do is tell you that if what you say is correct, then it completely pulls the rug out from underneath all of the mathematical analysis that followed on from this, because everything that followed on from this then assumes that you could multiply these numbers up by assuming a ratio of 175 to 62.

So, if you can't assume the ratio of 175 to 62 is actually the ratio in population, then yes, you are right that my subsequent analysis in 4.4/4.5 might need to be revisited, but unfortunately everything in the holistic report then gets thrown out as well.

So I'm really not competent to say whether 175 to 62 is the correct ratio to use for applying elsewhere, but I would suggest that for the benefit of the holistic report you should hope so.

Q. All right. I think that's enough for the present purposes.

Can I just ask you a few more quick questions and then I think it's time for us to adjourn. Earlier, in answering my question, you mentioned about the sampling process. Do you agree with me that a more accurate to consider whether the sampling exercise is random is to look at the actual sampling exercise performed?

A. I had tried to just look at the numbers here. What I'm

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saying here is that based on the numbers, there is very strong evidence that the sampling procedure was biased; furthermore, that it was specifically biased towards being used to generate a higher number of defectives. That much is simple arithmetic.

The question as to how the sampling process was arrived at is something that I did not address in any of my reports, but if you are asking me specifically now then I would say that the sampling process is actually incompatible with the analysis which was done to calculate a sample size for a given confidence level.

So we have these figures of 50 having been originally suggested and then it increased to 84 as being a minimum number in order to obtain a result valid at a 95 per cent level.

Now, that analysis assumes that the process was a single-part sampling process. So, for instance, to take the polling analogy, you simply stop people in the street and you ask them. What was actually undertaken, as I understand it, was a two-part process whereby there were 28 random locations and, at each random location, three random specimens were chosen. That's a two-part process, and the analysis which was used to arrive at the number 84 does not apply.

MR CHOW: Thank you, Dr Wells. I understand we have some

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actual constraints here, we need to stop at 5.00.

Mr Chairman, I see that we are --

CHAIRMAN: Just after 5.00. All right. Okay.

MR CHOW: Perhaps we need to continue tomorrow then.

CHAIRMAN: Yes.

Dr Wells, unfortunately, even though it's bright and early in the morning for you, or reasonably early, we are moving into the evening here, and because of time constraints -- we have other matters, a couple of the counsel have other matters on -- so we are going to have to leave it now until tomorrow. I'm very sorry about that. I hope you were anticipating the prospect of having to come back tomorrow.

WITNESS: I was indeed. Thank you.

I know that I am subject to the good offices of the people sitting around the table with me, but I am perfectly happy to start earlier tomorrow, if the building here was open earlier, and I can see somebody nodding their head. So if you want me to be available earlier tomorrow, that's fine by me.

CHAIRMAN: What time? You tell us and get some more nods from those around you and then we can agree that, I'm sure.

WITNESS: 6.30? Would that help the Commission if we were to start at 6.30 local, UK time?

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CHAIRMAN: 6.30? Wow. That's very good. For us, it's easy, but for you -- will you be reasonably nearby?
WITNESS: I'm staying in a hotel just around the corner. They don't serve breakfast until 7, so I will have to make arrangements to get sandwiches stocked in tonight, but I'm at your disposal.
CHAIRMAN: If he is prepared to start at 6.30, we can start at 1.30. That sounds excellent.
WITNESS: Okay. If that's all right? Yes.
CHAIRMAN: Thank you very much indeed, Dr Wells. Thank you. That would be of great assistance to us.
We will start 6.30 tomorrow morning, make the linkup, UK time. Okay?
WITNESS: Okay. Thank you.
CHAIRMAN: Thank you very much indeed.
I would just mention to you, as a witness, whatever kind of witness you are, including in this instance an expert witness, you are obviously not entitled to discuss your evidence with anybody, without the permission of myself, between now and tomorrow.
WITNESS: Okay. Understood.
CHAIRMAN: Yes, of course. Thank you very much indeed.
WITNESS: Thank you.
Colin, we just wanted to start at 6.30 tomorrow; is that okay?

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(Discussion off the record)
CHAIRMAN: I think what's actually being said off stage is, "Are you mad?" But they are committed now, so there we are.
MR PENNICOTT: Let's go!
CHAIRMAN: Let's go. All right.
MR KHAW: Perhaps, Mr Chairman, I just want to make one point. While we may need to continue to revisit the status of Prof Yin's response, I shall be very brief, since I anticipate the probability that I will be able to score one point today here may be very low, whether you adopt Prof Yin's analysis or Dr Wells' analysis.
The point is this. I fully appreciate Mr Shieh's concern that if we put in Prof Yin's report as evidence now, it runs the risk that, at the end of the day, in our closing submissions, we may run a point that since Dr Wells has not been able to comment on a particular point raised in Prof Yin's report, he will be deemed to have accepted that point. But upon reflection there's really an air of unreality in this argument because, as counsel, we have to be responsible for what we say in our closing submissions. If the point is not put to Dr Wells during cross-examination, we can't really rely on that point to say that since the point exists in Prof Yin's report, but Dr Wells has not been able to

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give a response to that, he is deemed to --
CHAIRMAN: I'm with you there. I didn't mention this fact in the brief ruling I gave, because in my view, statements can go in for all sorts of purposes and in all sorts of contexts.
MR KHAW: Yes.
CHAIRMAN: And one can tidy that up to make sure that those statements are not misused at some later stage.
MR KHAW: So it would be rather inappropriate for us to really put things into Dr Wells' mouth, if the point has not been tested or has not been actually put to him during cross-examination.
So Mr Shieh's concern is not really a genuine one because our analysis, at the end of the day, in our closing submissions, will be confined to the points that we have put to Dr Wells.
So his concern that some points will actually be deemed to have been accepted will not exist.
But what I'm trying to say here is that I don't want to have a situation where Leighton will come back and say, "Well, since the response of Prof Yin has not been admitted in evidence, then we are under no obligation to ask Dr Wells to comment on those points while this issue of admissibility is still not decided", because time is really pressing. On that basis, I would venture to

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suggest that in fact Prof Yin's response could equally be treated on a de bene esse basis. I believe there is no reason why that could not be done.
So that's my suggestion which I just raise for the Commission's consideration, given the fact that we may need to continue to revisit this point tomorrow. But I don't want this issue of admissibility of Prof Yin's report to be hanging in the air, because it is a useful report and I do wish Dr Wells to have the opportunity to actually comment on the report, and in fact that is why we have chosen to put forward his response now, rather than wait until Prof Yin comes to give his synopsis. The main reason is to give Dr Wells a chance to reply.
CHAIRMAN: Mr Shieh, if we were to say, "Okay, but you can have an opportunity to discuss this report" -- or response, rather -- "as much as you like with Dr Wells overnight"?
MR SHIEH: Two points. One is, looking at what my learned friend has said -- he said he did not want us to go back and say, "Well, since the response of Prof Yin has not been admitted in evidence, then we [as in Leighton] are under no obligation to ask Dr Wells to comment on those points while this issue of admissibility is still not decided."
The answer is they could very well put whatever

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points they regard to be germane to Dr Wells in cross-examination rather than for us to ask Dr Wells to comment on that as part of our own evidence.

Secondly, I take on board Mr Chairman's suggestion that what if we are allowed to speak to or to deal with Dr Wells overnight and ask him to come up with a responsive document. But, Mr Chairman, it would be unsatisfactory because, if I can put it bluntly, in terms of producing a document, the government has had about a week and we would be working under extreme time constraints --

CHAIRMAN: I'm not thinking of you producing a document so much. I'm thinking more of that if you had an opportunity to look at that and discuss it with him, then Dr Wells may be in a position to make some oral response tomorrow of a more cogent and focused kind. That's all.

MR SHIEH: Well, he can look at it so as to be prepared for what may be put to him, but what puzzles us is what is -- in this day and age, when one talks about distrust of the government or whatever, one tends to think why is it so important for the document to be in as a document? If they want Dr Wells to be able to give a coherent response because of his ability to read it overnight, fine, he's got it actually. So if Mr Khaw's bona fide

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wish is for Dr Wells to be able to give a more considered response when he is asked a question, I would say thank you very much; I would ask Dr Wells to read the document and wait for the questions to come his way.

CHAIRMAN: That's what seems to me to be what Mr Khaw is asking.

MR SHIEH: Without actually having to attach a special status to admitting a document, because one might ask why admit the document to put it on file?

CHAIRMAN: All right. Fine. Whether one wants to admit the document on that basis, that this is just an aide-memoire so that we can move on tomorrow with coherent questions, of which Dr Wells will have some notice, because he will have read the document, and it's not to be taken as part of an expert report countering anything or expanding upon other matters.

MR SHIEH: Mr Chairman, you have heard our concern as to why the government may wish to rely on it as a file document, but if that point is put to one side, if the invitation is for Dr Wells to consider the points made in the document so that he can perhaps respond more coherently tomorrow, having had one extra night to consider it, then that is something that we obviously would find difficult to resist. Obviously, subject to Dr Wells saying, "Even with that one extra night's

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consideration, I may still not be able to consider it", but that would be a matter for Dr Wells.

CHAIRMAN: We appreciate that.

MR SHIEH: So it's really a matter of whether my learned friend is somehow insisting on filing the document as a document, and if so why is he so insistent?

CHAIRMAN: All right.

MR KHAW: Mr Chairman, my suggestion is in fact simply to address Mr Shieh's concern because his concern is that Dr Wells has not been given a chance to study the document.

We say that if Dr Wells has any further observation or comments, after he has had the benefit of looking at that document, then of course he will feel free to say so. This will be helpful to us, and this would also address the point of any kind of unfairness that Mr Shieh has been complaining about.

And also the purpose of having this document is that when Prof Yin comes forward to give his presentation, no doubt he will focus on his report, and he will also comment on certain salient points raised in Dr Wells' report. In fact, the earlier Dr Wells makes comments on Prof Yin's response, the better, so that we could all know the positions taken by all the parties regarding the differences in the opinion between them.

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CHAIRMAN: All right.

Dr Wells, can you ...

COMMISSIONER HANSFORD: I think he's been muted.

CHAIRMAN: Is there any way we can unmute Dr Wells? Oh, you are unmuted. Dr Wells --

DR WELLS: Hello. I can hear you.

CHAIRMAN: Dr Wells, there is what may best be termed a responsive document that has been prepared by the professor, and there has been some argument -- you probably heard it earlier -- about the value of that document at this moment in time in respect of your evidence. It's a responsive document and, to a very large extent, it is my understanding that counsel for the government feel that if you were able to have a look at it, it may assist you by giving you some earlier notice of various issues, to answer their questions tomorrow more comprehensively and with greater confidence.

That seems to me to be a sensible way forward. There are, of course, concerns expressed by the counsel who represent Leightons and therefore who are your counsel for purposes of the evidence given here. I think their concerns are proper but can be answered. Firstly, this document is going in at this moment in time as an aide-memoire, simply to let matters move with

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greater efficiency tomorrow; okay?
WITNESS: (Nodded head).
CHAIRMAN: It's not going in as an expert report as such. If at a later stage the professor wishes that to go in as an expert report, separate submissions can be made and we can consider it separately, ensuring that you are not in some technical or legal way undercut. Do you see what I mean?
WITNESS: Okay.
CHAIRMAN: So if you get the opportunity today we will make sure the documentation is available. It will be no more than an aide-memoire for you to have a look at, so you can say, "Okay, I can see what is being said by the professor, the other expert in this matter. Yes, to some extent I agree or I don't agree, or at least I know how I can answer this more efficiently."
Anything I have said to you now is not to be taken in any way whatsoever as suggesting that you haven't already dealt with matters efficiently and comprehensively. It's just that obviously if you've already got some written document explaining positions and you've got some foresight of that, you are in a better position. Okay?
WITNESS: Thank you.
CHAIRMAN: Nobody is going to suggest to you -- and if they

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do, they will be shot down by me -- at any later stage that you haven't answered all the matters contained in that document, because you are receiving it as nothing more than an aide-memoire to assist you with tomorrow's oral examination. Okay?
WITNESS: Thank you.
CHAIRMAN: Any objections to having a look at the document on that basis?
WITNESS: None at all. Thank you.
CHAIRMAN: Good.
Any problems there, Mr Shieh?
MR SHIEH: No, Mr Chairman. Indeed, it is actually what was going to happen because, as I acknowledge frankly, we have actually given the document to him.
CHAIRMAN: Okay.
MR SHIEH: And obviously, if he has time, he will be considering it.
CHAIRMAN: Good.
MR SHIEH: As long as, as Mr Chairman very fairly pointed out, no one can later on say, "You have been given a chance to comment and therefore the ball is in your court. If you don't single out a particular paragraph by saying 'I can't comment on it', therefore you are stuck." Nothing of that sort is going to happen.
CHAIRMAN: All right. Dr Wells, thank you very much.

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Just before we go, gentlemen, I'm sure all of this is very fascinating and I will do my best to stay up so that I am at least somewhere in the back pack of the race, but with the greatest of respect, what we have to be careful of I think is getting into great technicalities. There may be such a thing as a quantum computer, I think Google just announced it, but I don't pretend to have any ability to understand the interplay of quarks. What I'm more concerned with is what can a quantum computer do, so what I'm interested in here is more of the fundamentals of why you say some particular statistics don't assist us and others do, and one of the areas, for example, is what I tried to bring out in my long rambling way with the engineer, Mr Ng I think it was, yesterday when I was talking about the fact that taking this, how could it be that essentially 86 per cent of these could have been put in wrong, when you've got a workman who's been briefed and you've got two engineers who both inspect in different teams. Either it means that their work is entirely negligent, which is perhaps questionable, or it means maybe the statistics that it's 86 per cent, that needs to be looked at.
So those kind of issues will really assist. Okay? I appreciate you have to go through the more complex

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stuff, and I have Prof Hansford to assist me there, but I'm just saying that I would be greatly assisted by that sort of direction more.
Good. Anything further? Thank you very much indeed.
Tomorrow afternoon, 1.30. Thank you.
(5.22 pm)
(The hearing adjourned until 1.30 pm the following day)

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