BRITISH COLUMBIA UTILITIES COMMISSION

IN THE MATTER OF THE UTILITIES COMMISSION ACT
R.S.B.C. 1996, CHAPTER 473

And

Re: FortisBC Energy Inc.
Application for a Certificate of Public Convenience and Necessity for the Advanced Metering Infrastructure Project

Kelowna, B.C.
March 6, 2013

PROCEEDINGS

BEFORE:

L. Kelsey,	**Commission Chair / Panel Chair**
N. MacMurchy,	**Panel Member**
D. Morton,	**Panel Member**

VOLUME 4

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C. BENNETT	West Kootenay Concerned Citizens
A. ATAMENENKO	Riding of B.C. Southern Interior
A. SHADRACK	Electoral Area D, Regional District, Central Kootenay
J. FLYNN	On his own Behalf
K. MILES	On his own Behalf

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CAARS

KELOWNA, B.C.

MARCH 6, 2013

(PROCEEDINGS RESUMED AT 8:59 A.M.)

THE CHAIRPERSON: Please be seated.

FORTIS PANEL 2 - HEALTH AND ENVIRONMENT

TOM LOSKI, Resumed:

MARK RICHARD WARREN, Resumed:

WILLIAM HAYES BAILEY, Resumed:

YAKOV SHKOLNIKOV, Resumed:

THE CHAIRPERSON: Mr. Fulton, do you have some business items this morning?

MR. FULTON: I do, Mr. Chairman. Thank you.

First of all, I have a filing. This is an e-mail that was received by the Commission Secretary yesterday from Ms. Postnikoff. Ms. Postnikoff is an interested party in the proceedings. She has designated -- or she is designated as interested party D1, and if the filing that she made with the Commission yesterday could be marked Exhibit D1-20, please.

THE HEARING OFFICER: D1-20.

(E-MAIL FROM MS. CHRISTINA POSTNIKOFF DATED MARCH 5, 2013 MARKED EXHIBIT D1-20)

THE CHAIRPERSON: Thank you.

MR. FULTON: The Commission also received on March the 1st

a letter from Buryl Slack, who is intervener C16, and she had indicated that she cannot attend in person. The copy of the letter that Mrs. Slack sent in isn't completely legible, so I have asked to see if we can get another copy from the Commission Secretary's office, and I won't mark this document until I have a more legible copy.

THE CHAIRPERSON: Thank you. It's disappointing that Ms. Slack is not able to attend. She has been a very active intervener in electricity matters in the Interior for many years, and has, I think, made a useful contribution.

MR. FULTON: Looking forward to the conclusion of this panel's cross-examination, Mr. Chairman, which I do not think will take before mid-day tomorrow, based on present estimates, I have spoken with the Hearing Officer and we will have a practice session for people to see how the video conferencing system will work. And my proposal now is to do that at the end of the hearing tomorrow.

THE CHAIRPERSON: Just a comment I'd like to make on the video conference. I think it would be useful at the very beginning of the video conference if I spent just a few minutes with the individual that is appearing in video conference to introduce the panel, introduce Mr. Fulton, and just give the individual a very brief sort

of context for the hearing. Again, the panel, the hearing room that they're being cross-examined in. So I intend to do that.

MR. FULTON: Yes. And you may, as I understand it, Mr. Chairman, have to do it from the mike. You won't have to do it from the mike here.

THE COURT REPORTER: We can bring it up to him.

MR. FULTON: All right. There's the answer.

THE CHAIRPERSON: Yes. Thank you.

MR. FULTON: The TV can be brought to you.

And in terms of the scheduling of the intervener witnesses, I know there have been discussions -- or I should say I understand there have been some discussions amongst the parties about who those witnesses might be. For each of the intervener experts, though, I think it's going to be most efficient to establish a timetable in half-day increments, so that if we go beyond the half-day, then the person who was to immediately follow will just be backed up. But to set those times at 9:00 in the morning next week and 1:00 in the afternoon.

THE CHAIRPERSON: Okay, thank you.

Proceeding Time 8:59 a.m. T2

MR. FULTON: And I hope to hear from Mr. Aaron later today on his witnesses in terms of which days work best for them.

THE CHAIRPERSON: Thank you.

MR. FULTON: The last item that I have is to turn the mike over to Ms. Herbst to address some undertakings.

MS. HERBST: Thank you, Mr. Fulton. Thank you, Mr. Chair, Commissioners. I have two undertakings to address, one of them posed by or left by Mr. Fulton and one by Mr. Andrews, and I have a written copy of each undertaking to pass up and back, and the passing out at the back is going to be taken care of for me but --

The first undertaking, and I'm doing them individually just for ease of reference, is an undertaking left by Mr. Fulton and the witness at the time was Mr. Stuber in particular, and the transcript references are at the top of the page, and this was a question with respect to the Canadian version of Itron's firmware and whether it has time of use buckets programmed into the meter and whether an unauthorized user might update the time of use schedule and thereby impact the bill.

And the response, and I'll just slightly expand on it, Itron meters comply with Measurement Canada regulations. Measurement Canada tests meters to ensure that the multi-rate register functionality -- that's the ability to keep information, consumption information in buckets -- works correctly where the

meters incorporate such functionality. And the Itron meters, for clarity, that would be supplied as part of the AMI project do incorporate such functionality. It's the utility ultimately, as the end of the first paragraph says, that has the supervision of the definition of and changes to time of use schedules.

Turning to the second paragraph, an unauthorized user could potentially update a multi-rate TOU schedule, time of use, that had been programmed into the meter, if they were to gain a particular level of unauthorized access to the meter, but there are two things to point out in that respect. The meter itself will provide event or alarm data to indicate to FortisBC that the configuration has been changed, if that were to occur.

More fundamentally though, turning to the last paragraph, FortisBC does not intend to use the time of use registers or schedules that are within the meter and accessible potentially to unauthorized users for billing purposes. Instead, what FortisBC intends to use is the hourly interval data received from the meter in the meter data management system to calculate consumption in the time of use period identified in any approved tariff, and the interval data that would be coming back in that respect to the Fortis office to be used for billing can't be modified through the

unauthorized access described above.

And so that's the first of the undertakings that we address. And perhaps if it could be marked as an exhibit.

MR. FULTON: Exhibit B-39.

THE HEARING OFFICER: Marked Exhibit B-39.

(FORTISBC UNDERTAKING NO. 1, VOLUME 3, PAGE 365, LINE 5 TO PAGE 366, LINE 5; AND VOLUME 3, PAGE 418, LINE 25 TO PAGE 420, LINE 15 MARKED EXHIBIT B-39)

MS. HERBST: And the second of the undertakings arose yesterday afternoon, and again I've got a written document to pass up and out. Thank you and I heard Mr. Bemister, if this could be marked as Exhibit B-40, it's Undertaking No. 2. It arose in the cross-examination of Mr. -- by Mr. Andrews and it was in particular directed to Dr. Shkolnikov, and Mr. Andrews had requested a revision or expansion of two tables in the appendix to the E^{x}ponent Report to add additional units of measurement. So microwatts per centimetre squared and milliwatts per metre squared, and the columns that have been requested have been added at the bottom of the page. So with that, thank you very much and that's the close of the undertakings.

THE CHAIRPERSON: Thank you.

THE HEARING OFFICER: B-40.

(FORTISBC UNDERTAKING NO. 2, VOLUME 3, PAGE 540, LINE

14 TO PAGE 541, LINE 20 MARKED EXHIBIT B-40)

MR. FULTON: That then takes us back to the cross-examination by Mr. Andrews.

THE CHAIRPERSON: Thank you, Mr. Fulton. Good morning, Mr. Andrews.

MR. ANDREWS: Good morning, Mr. Chairman, members of the Panel.

Proceeding Time 9:09 a.m. T03

CROSS-EXAMINATION BY MR. ANDREWS (Continued):

MR. ANDREWS: Q: I have one -- well, I'll begin with some follow-ups based on the transcript from yesterday, which is Transcript Volume 3. Dr. Bailey, at page 529, lines 20 to 26, there is a sentence at the bottom of the page that you give in response to questions to do with the agencies and bodies that have provided reviews. And in the course of that, the second sentence says:

> "These other agencies, Health Canada, Netherlands National Radiological Protection Board, Scientific Committee on Emerging and Identified Health Risks, the Swedish agency, are not in business of setting standards."

Can you explain what you meant there specifically regarding Health Canada and the business of setting standards?

DR. BAILEY: A: Obviously this statement does not

reflect the fact that Health Canada does set standards, as we discussed, in Safety Code 6. I have to be going back -- I may have been making a reference to the Health Council of the Netherlands, and let me just -- yes, if you go to page 13 in my original testimony, I think the discussion was there, and it lists these different organizations and the reference there is the Health Council of the Netherlands, 2009. I think that was -- I just didn't complete the statement. So that should have been Health Council of the Netherlands instead of Health Canada.

MR. ANDREWS: Q: Thank you. I think we've cleared that up.

On page 535 of the transcript, and the wording here is not -- these are not the issue, but we're talking about the IARC classification of low-level radio frequency exposure as a possible carcinogen. And just to follow up on that topic --

THE CHAIRPERSON: Mr. Andrews, can I just interrupt for moment? We were interrupted yesterday a couple of times with cell phones ringing, and we've just been interrupted again. And so I would ask everyone to please either mute or turn off their cell phones. Thank you.

MR. ANDREWS: Q: So, we are on the topic of IARC and the classification of a possible carcinogen. On page

29 of the E[x]Ponent report, which is Exhibit B-1, Appendix C-5, and at 29 of 47 --

DR. BAILEY: A: Just one moment. I'm going to make sure that I abide by your request, sir. Silence my cell phone.

MR. ANDREWS: Q: Oh.

THE CHAIRPERSON: I'd better make sure I do the same. Yes.

DR. BAILEY: A: Okay. Okay, so we were at page 535 of the transcript?

MR. ANDREWS: Q: Your page 25, and page 29 of 47. Oh, sorry, of the transcript. No, I don't think you need to go to the transcript. It's just for reference. It was there that we first discussed this IARC possible carcinogen topic, and now I'm going to follow that topic with a question. And the reference is in particular to -- and there is a version of the statement that is provided on page 25 in your numbering.

DR. BAILEY: A: Okay, thank you.

MR. ANDREWS: Q: Of your report. And the statement is that this category that is possible carcinogen is used when studies report an association but when chance, bias, or confounding cannot be ruled out with confidence.

DR. BAILEY: A: That's correct.

MR. ANDREWS: Q: So, the Health Canada threshold for taking action is -- they use the phrase "scientifically established" quite frequently. And is that a fair sort of high-level summary?

DR. BAILEY: A: That descriptor is used frequently.

Proceeding Time 9:13 a.m. T04

MR. ANDREWS: Q: And so, my question is why is it not sufficient to take action when an agent, like in this case RF, meets the category of possible carcinogen? That is, studies report an association but chance, bias, or confounding cannot be ruled out with confidence. Why is that not enough to take action? Why does Health Canada, or in your view, ought Health Canada, not take action on the basis of this possible carcinogen category, and instead await scientifically established evidence?

DR. BAILEY: A: I think it's clear from the IR documents, and our discussion of the IARC report, that all that the panel identified was limited evidence. That is, in the IRAC classification scheme, essentially all it takes to be entered into the 2B category is reports of statistical association of an exposure with cancer. And that alone, a correlation, as it were, is sufficient to make that exposure placed into the 2B category. And as we discussed, the chance, bias, and confounding could explain partially

or all of that association between radio frequency fields and in this case primarily brain cancer.

So that is not sufficient to justify a established causal relationship.

MR. ANDREWS: Q: My question isn't not whether it's sufficient to establish a causal -- or scientifically establish a causal relationship, but why is it insufficient to take action to -- in the form of promulgating a guideline or a standard?

DR. BAILEY: A: Because we don't want to be setting standards that in fact result in no protection of the public health. And if you haven't determined that there is a causal relationship, then an action taken to address that exposure may have no public health benefit at all.

MR. ANDREWS: Q: Why not err on the side of caution? I don't mean that as a rhetorical question.

DR. BAILEY: A: I understand, sir. I think scientific agencies, particularly dealing with health, are extraordinarily cautious, and exercise prudency in their assessments. And have at various times set into place in their deliberations ways that would err on the side of caution. And the fact that we have safety factors in these guidelines and Safety Code 6 and the FCC guideline and the ICNIRP guideline, is part of that precautionary basis.

The other thing that is done is where there is a possibility raised about a potential association with something like cancer, then the precautionary approach would be to be very vigilant in monitoring the research and communicating that, the results of that research, to the public, and also in terms of making recommendations for scientific research.

MR. ANDREWS: Q: Thank you. New topic. Yesterday you had an exchange with Mr. Miles regarding cumulative -- well, the word "cumulative" and cumulative effects. I don't really think we need to go there, but just for the transcript, it's transcript Volume 3 at page 499. And you explained that the EMF is not like some other chemicals which can accumulate in the body. Yes, by all means go to that section if that would help.

Proceeding Time 9:18 a.m. T5

DR. BAILEY: A: Okay, I'm there.

MR. ANDREWS: Q: So the discussion had go to where you had said that EMF is not like those types of chemicals that can accumulate in the body, so we separate that type of cumulative effect.

My question would be that if radio frequency exposure did do some damage to the cell or sub-cellular level such as damaging DNA, but not in such a way as to cause a whole body effect, would it not be reasonable to suppose that the damage at the

cellular level could accumulate in the body over time, over the lifetime of the body?

DR. BAILEY: A: Certainly if any source of DNA damage of the sufficient type and if not repaired could then, you know, in theory develop in a cumulative fashion. I think it's important to place this in context, that our cells on a daily basis are damaged and that just by the very metabolic processes of the cell which produce toxic products which can damage DNA and chromosomes, and we have evolved a very efficient enzyme repair system to correct those -- that damage that occurs naturally.

And so just because, and this has been, I think, noted in the literature, that just because you might have an increase from a particular exposure in DNA damage doesn't necessarily mean that that would result in a, say, permanent damage to the DNA. That there could be repair processes which would very quickly take care of that. But nevertheless, one could be concerned in a long-term basis about accumulation of DNA damage if that were to be established.

MR. ANDREWS: Q: Thank you. Next topic. On page 20 of 47 in the E[x]ponent Report the -- oh, page 16, sorry.

DR. BAILEY: A: Yes, if you give me --

MR. ANDREWS: Q: I will, yes. I didn't realize --

DR. BAILEY: A: My copy does not have those document numbers on them.

MR. ANDREWS: Q: So while we're at it, this is -- the E[x]ponent Report is Exhibit C-5 of -- Appendix C-5 of Exhibit B-1. So this is a page in a section that is discussing at a high level some of the results from major studies, and the heading here is "The International Commission on Non-Ionizing Radiation Protection" which I'll refer to as ICNIRP.

DR. BAILEY: A: Yes.

MR. ANDREWS: Q: So I guess the first -- I have a number of places that I'm going to go to from this page, but first let's just identify that this ICNIRP 2009 A study is the one that is filed by Fortis at Exhibit B-15-1, BCH IR 2 2.13.

DR. BAILEY: A: I'm sorry, could you give that to me again? B-15?

MR. ANDREWS: Q: Exhibit B-15-1. BCH space IR 2, a little space in there and then a space for those searching, 2.13.

DR. BAILEY: A: Okay.

MR. ANDREWS: Q: And it begins at PDF page 895, or the reference there is at PDF page 895. I'm just trying to be abundantly sure that we're talking about the same documents.

Proceeding Time 9:23 a.m. T06

MR. WARREN: A: 2.13, for the attachment or the --
DR. BAILEY: A: Are you looking for the attachment, or the --
MR. WARREN: A: Just looking for the document itself. You're looking for the ICNIRP report, which is --
MR. ANDREWS: Q: The actual ICNIRP -- 2009 report. Thank you.

So can we just confirm that we have the right report?

DR. BAILEY: A: Yes.
MR. ANDREWS: Q: Okay. So, back to the page of your E^{x}Ponent report. First of all, in this -- in the document as it proceeds, this is the first time at which subjective symptoms are mentioned. I can loosely characterize it as the EHS topic. And so my first question is, why did you associate the subjective symptoms topic with ICNIRP alone, and not the other aspects of the ICNIRP review? Was that just for presentation?
DR. BAILEY: A: This was one of the reviews that had covered this topic in some depth. And it hadn't -- I mean, without reproducing pages and pages of the conclusion from each one of these reports, it seemed that because this is an issue that we were going to address later, that there ought to be some summary as to what the current scientific thinking was on this

topic. And so that was why this appears here. But that doesn't mean that there aren't other conclusions from the ICNIRP report that are relevant to the assessment of this, you know, whole area of research.

MR. ANDREWS: Q: My very next question, thank you. Now, on the topic of the ICNIRP 2009 report as a whole, the preface says that it, that report, and another similar review done in 2003 for static and low-frequency fields will form the basis for a thorough re-evaluation of ICNIRP's science-based guidance on limiting exposure to EMFs. My question is, has that thorough re-evaluation of ICNIRP's guidance been published? And if not, when is it expected?

DR. BAILEY: A: I don't know when it's expected. I have not seen an announcement about an upcoming ICNIRP assessment.

MR. ANDREWS: Q: Has it been published now, to your knowledge?

DR. BAILEY: A: Not to my knowledge.

MR. ANDREWS: Q: You would know, if it had been?

DR. BAILEY: A: I would hope so.

MR. ANDREWS: Q: Yes, thank you.

DR. BAILEY: A: Just for clarification, Dr. Shkolnikov mentioned that at another frequency range, in the ELF range, ICNIRP did update their ELF guidance for

frequencies up to 10 megahertz, in 2010.

MR. ANDREWS: Q: And those are below the frequencies at which the --

DR. BAILEY: A: That's right. But I'm not aware of any other ICNIRP update to this 2009.

MR. ANDREWS: Q: In the ICNIRP 2009 report, just for reference, starting at page 240, or PDF page 894, there is a section entitled II.5.1.5, subjective symptoms. And I'm not going to go through the whole discussion there, but they discuss various studies and the results of them.

My question is, whether -- just not the content of the studies but the selection of the studies, have you been able to compare the selection of the studies that were referred to in the Bioinitiative report with the selection of studies that were referred to in ICNIRP 2009?

DR. BAILEY: A: I have not made such a comparison.

Proceeding Time 9:28 a.m. T07

MR. ANDREWS: Q: Are you -- well, I'll leave it at that. Now, in the same ICNIRP 2009 report, there is discussion of something called "microwave auditory phenomenon".

DR. BAILEY: A: What's the page reference for this?

MR. ANDREWS: Q: Page 5 of ICNIRP 2009, which is PDF page 659. I'm going to read the full sentence, but my

focus will be on the microwave auditory phenomenon. It says:

> "The established biophysical mechanisms underlying the interaction of radio frequency radiation with cells, tissues, and entire bodies include ionizing potential, induced charge and dipole relaxation, enhanced attraction between cells for pearl chains formation and RF-inducing force effects, microwave auditory phenomenon, and thermal effects as manifested in tissue temperature elevations."

And then later in the -- on the next page, there is a discussion of the microwave auditory effect.

And perhaps you can explain briefly what that effect is, to start off with.

DR. BAILEY: A: It was reported -- and Dr. Shkolnikov can answer this -- it was reported that exposure to high-intensity pulsed radar fields could lead to the perception of sound - a clicking sound - through stimulation of the auditory sensory system. And that effect occurs at very high exposures that do not cause bulk heating of the tissue *per se*.

Yakov?

DR. SHKOLNIKOV: A: So, this is a physics effect where if you have an exposure to very high intensity short

duration RF signal -- this is much, much higher intensities that we're talking about here. This would be going to radar, pulsed radar installations. That if a worker or a operator is in close vicinity, they can report that they hear the sound.

There was a lot of work into the origin of what causes it, and it was concluded it was purely a physics effect of tissue locally expanding due to the heating, and then contracting the moment it cools down, and that sound wave propagating. And I would note that Safety Code 6 for such exposures does have a separate section addressing pulsed signals that could exceed fields of 100 kilovolts per metre. But that's many, many orders of magnitude beyond the peak exposure from smart meters.

MR. ANDREWS: Q: Thank you. You answered my next question.

Back to -- or maybe continuing with the subjective symptoms topic, on page 32 of 47, which is page 28 of your report, you reference a study by Heinrich and others in which participants were asked to report symptoms and carry dosimeters for radio frequencies at the same time. Do you have that?

DR. BAILEY: A: I do.

MR. ANDREWS: Q: Yes. Now, my question here applies both sort of to the Heinrich study but also to the

whole body of the studies that are referenced in ICNIRP and the other review publications, to do with this cluster of EHS and subject of symptoms or acute, immediate symptoms and so on.

Proceeding Time 9:33 a.m. T8

And the question is, what if the nature of the causal relationship between the RF low-level non-thermal exposure and these symptoms was such that some people respond but others simply do not? And in a sense, and I don't want to say this is an allergy, but analogous to an allergy.

DR. BAILEY: A: To --

MR. ANDREWS: Q: To allergy.

DR. BAILEY: A: Allergy.

MR. ANDREWS: Q: A-L-L-E-R-G-Y. Such that if you were to do a study of 10,000 people, you'd find that on average peanuts have no effect, just hypothetically speaking, but we apparently know that there are some individuals within that overall population who are especially sensitive.

What if the relationship between the EMF exposure level non-thermal and some kind of symptom was of a similar kind? In other words, for most people there's no impact at all, but for some people there is an impact. Would the studies, like the ones that Heinrich and the whole battery of studies, pick

that phenomenon up?

DR. BAILEY: A: It would depend upon the nature of the study. This is a question that obviously scientists were concerned about trying to understand. And so in a number of these studies the subjects that were recruited were persons who had reported to the investigators that they had these so-called symptoms that they attributed to electrical exposures, things like nervousness, dizziness, concentration problems, and fatigue.

And so the studies have been done on those persons who described themselves with this condition, and the double-blind studies of those subjects also show that their responses do not -- could not be discriminated under conditions of exposure to radio frequency fields or a sham exposure.

MR. ANDREWS: Q: What if there are a number of different factors going on and there are people who report an association between RF exposure and symptoms who are not subject to the hypothetical reaction that I'm talking about? There are a lot of people who say they're allergic to milk but aren't necessarily, and yet we know that there are people that are confirmed to be allergic to milk. If you did a study of everybody that these days says they're allergic to milk, you might find that many of them are inaccurate

in that belief. That doesn't mean that there aren't individuals who are very much allergic to milk. Does the same apply to RF?

DR. BAILEY: A: I think the way that scientists address this issue is by repeated study, and at some point you will be able to identify if there is a causal relationship in replicated experiments, that there are reactions. You gave the example of peanut allergies, and I think this is a kind of thing that an immunologist could, even on an individual patient, be able to test pretty reasonably whether someone had a peanut allergy and there are laboratory test designed to determine whether or not a particular individual has a peanut allergy irrespective of whether they know or believe that they do.

Proceeding Time 9:38 a.m. T9

MR. ANDREWS: Q: The question, though, is whether given that we're not saying -- the topic is not whether EMF causes an allergic reaction. Setting that aside. If it was similar only to the extent that some people respond and others don't and that that is confounded by the fact that people for various other reasons, which may or may not be valid either to them or to scientific conclusion, some people do respond with immediate negative symptoms to exposure, would the studies that have been done disclose that phenomenon?

DR. BAILEY: A: You know, it's hard to answer in a general way because the design of studies is not always the same. But one way to do this would be to increase the amount of exposure in the studies, so that instead of using a very very low exposure to radio frequency fields, that much higher exposures could be used. The idea that if someone had an underlying sensitivity to radio frequency fields that it would be more likely to be apparent if they were challenged with an exposure to a field of higher intensity. And so that would enable you to be able to better distinguish between those people that believed that they had a sensitivity to radio frequency fields and those people that may have.

MR. ANDREWS: Q: Thank you. And you're not referring to a study that has been done. You're describing one that could be done.

DR. BAILEY: A: Well, I think if you look through the literature, that the exposures in these provocation studies have been done over a range of studies. At the moment I can't recall the upper limit to what those exposures were in the literature.

MR. ANDREWS: Q: Thank you. A new topic. Over to Russia, Dr. Shkolnikov. I would refer you to, and I didn't mention this to your counsel and I appreciate I ought to have, but I would refer you to Dr. Margaret

Sears's response to BCSEA IR 20.6. This is Exhibit C9-12.

DR. SHKOLNIKOV: A: So what is it, C9-12?

MR. ANDREWS: Q: C9-12.

DR. SHKOLNIKOV: A: Page 26 you're saying?

MR. ANDREWS: Q: It's on page 3.

DR. SHKOLNIKOV: A: Oh, page 3, I'm sorry.

MR. ANDREWS: Q: Halfway down the page, and the question is numbered "20.2 (renumbered 20.6)". It begins, "Dr. Sears says that in Russia," et cetera.

DR. SHKOLNIKOV: A: Yes.

MR. ANDREWS: Q: Perhaps you could just take a minute to read it.

DR. SHKOLNIKOV: A: Yes.

MR. ANDREWS: Q: My question is, for those who haven't read it, can you confirm that Dr. Sears provides information that would appear to indicate that radio frequency exposure from wireless communications in Russia is lower than it is in Canada. And my question is, do you have a different understanding of what is said here, and in any event do you agree with that conclusion that I indicated may have been intended?

Proceeding Time 9:42 a.m. T10

DR. SHKOLNIKOV: A: Well, I tend not to rely on Wikipedia as a source. If you look at World Health Organization summary of the Russian standard, as well

as the Russian standards themselves, they give a range of values depending on the technology used. And it is correct that for some technologies the limit is substantially lower than Health Canada. For some technologies, it is not nearly as low.

So, for example, for cellular frequency signals, which includes 900 megahertz, Russian equivalent of Safety Code 6 says that for durations of exposure of a typic -- if the duration exposure is not expected to be 24 hours, and it would be typically one to two hours, for example, like cellular phone calls, the exposure limit is less than Health Canada Safety Code 6, but nowhere near the values that Dr. Sears refers to.

So this is what -- when I was describing yesterday, Russian standard is structured different -- in a different fashion than Health Canada's Safety Code 6, in that they consider different technologies and different use conditions for setting the safety limits. So they don't have -- like, this is -- like, Table 6 of Safety Code 6 tells you regardless of what technology you're using, this is the level you have to comply with. Russian standards will include exceptions -- depends on technology.

So for example if you have an antenna -- if you have a transmitter that has a duty cycle of 5

percent or less, the Russian exposure limit is different from the transmitter that is operated continuously.

MR. ANDREWS: Q: If I may. Thank you for the response. I should maybe back up a bit with the -- to this question. The question that was put to Dr. Sears was focused not on the actual standards but the reality. Whether there is any difference in reality in Russia as a result of the assertion that Russia has a more stringent standard. And in that regard, she says that she doesn't have complete information and doesn't normally rely on Wikipedia, but does provide some information to do with long-distance telephone exchanges in Russia, which I think could be understood as an assertion that exposure from wireless communications in Russia is lower than it is in Canada, because of the nature of the long-distance telephone exchanges and so on. This last kilometre circuits point that she makes.

DR. SHKOLNIKOV: A: As I said, I'm not sure what this refers to. This could actually -- as I said, this is Wikipedia, and all of us have found errors in it. If I were provided with original document describing whether this was even wireless versus wired technology, and what it refers to, I would be able to do an analysis. But this summary of a Wikipedia

article is just not enough to draw the conclusion.

MR. ANDREWS: Q: Thank you. Fair enough. A narrow question here. On page 29 of 47, which is 25 of your report, Dr. Bailey, there is a reference to -- and a food and -- Federal Drug Administration, FDA, National Toxicology Program, initiating a lab study about long-term exposure to radio frequencies on mice and rats. My question is, what is the status of that research?

DR. BAILEY: A: There are a number of different studies that have been initiated by the National Toxicology Program. There are some short- and medium-term studies that I understand have been completed, but the reports have not been released yet. They're probably still analyzing the data.

Proceeding Time 9:47 a.m. T11

And of course, the results of the longer-term experiments have not been released. And I don't think that the FDA has announced when the National Toxicology Program will be issuing these reports.

MR. ANDREWS: Q: Thank you. Now, in the conclusion paragraph of your report at page 30 of the report itself, page 34 of 37, the last sentence states:

> "The reviews and the recently published research that improved exposure information do not provide a reliable scientific basis to conclude that the operation of the

advanced meters will cause or contribute to adverse health effects or physical symptoms in the population."

Do you see that?

DR. BAILEY: A: Yes.

MR. ANDREWS: Q: Would you agree with me that this is expressed in the negative? That it is -- it doesn't say that the scientific published research et cetera does provide a reliable basis to conclude that the operation of the meters will not cause adverse health effects, that that wording is presumably carefully chosen.

DR. BAILEY: A: I think we got a little bit into this issue a little bit yesterday is that scientists are necessarily cautious, and since science cannot prove the negative, that we have to be careful in not extrapolating beyond the point where the research takes us.

MR. ANDREWS: Thank you. I have no further questions.

THE CHAIRPERSON: Thank you, Mr. Andrews.

CROSS-EXAMINATION BY MR. KUNG:

MR. KUNG: Q: Good morning, panel. My name is Eugene Kung. I represent the BCPSO, Pensioners' and Seniors' Organization *et al.*

DR. BAILEY: A: Excuse me, sir. I have a little bit of difficulty hearing. Could you speak up, please?

MR. KUNG: Q: Sure. I'll move the mike here. My name is Eugene Kung. I represent BCPSO *et al.*, FortisBC's low and fixed income residential ratepayer group.

I don't intend to take a long time this morning, and you'll be happy to hear that I will not be addressing issues of health. I'll leave that for my friends. I do want to ask a couple of questions about the other subject of this panel, which is environment.

So I'll just start by confirming that the environmental benefits that FortisBC is purporting result primarily from the GHG reductions from vehicle emissions that will be reduced through the elimination of manual meter reads. Is that correct?

MR. WARREN: A: That's certainly one of the benefits of the advanced metering project is that, yeah, that there'll be about 234 tonnes of greenhouse gas emissions eliminated from -- primarily by removing the manual meter reading process.

In addition, the benefits of reduced energy use that we expect to see from the improved information that customers will have, either through the information portal that will be available to them over the internet, or through in-home displays or some such device if they choose to install one of those in their home or business, will also accord environmental

benefits.

In addition we talk in the application about the advanced metering system enabling us to support electrical vehicle stations in the future, and such technologies as widespread distributed generation.

Proceeding Time 9:52 a.m. T12

MR. KUNG: Q: I just want to come back a bit to the beginning of your response there where you mentioned 234 tonnes. I may have missed an update. My understanding from Exhibit B-1 was that it was -- the original estimate, at least, was 191. Was that amended at some point in the -- or updated in an IR that I may have overlooked?

MR. WARREN: A: Yeah. I took the liberty of using the figure we provided in our response to BCSEA Information Request 1, question 48.1, which was -- we recalculated that figure using GHGenius, version 4.

MR. KUNG: Q: Thank you.

MR. WARREN: A: Yeah.

MR. KUNG: Q: You spoke a bit about the anticipated reduced energy use that will come from increased information available to customers. And you mentioned both the information portal and the IHD. IHD as being in-home displays, not devices, as Mr. Andrews clarified a couple of days ago.

Those IHDs are optional, is that correct?

MR. WARREN: A: That's correct.

MR. KUNG: Q: They're not part of this application.

MR. WARREN: A: No. The application enables the use of those devices, but we are not proposing to supply them as part of this application.

MR. KUNG: Q: And so that would be entirely at the cost and option of a customer who chose to have that extra level of information.

MR. WARREN: A: That's correct. Although we do intend to provide some sort of incentive, through our PowerSense program, for these devices. We haven't formalized that program yet, but I expect to see one in our upcoming application for our PowerSense program.

MR. KUNG: Q: And the information portal would be accessible from FortisBC's website?

MR. WARREN: A: That's correct.

MR. KUNG: Q: And I apologize for being perhaps overly simplistic, but that would require that the customer had internet access, and the ability to access FortisBC's website?

MR. WARREN: A: That's right. And so, if they don't have it at their home, of course, they could use that at a library or some other public place like that.

As well, and I think we mentioned this in

one of the Information Requests, we had talked about -- if the customer simply doesn't have access to that sort of source, that they can always call our contact centre and request a copy of their consumption for any period they wish, so.

MR. KUNG: Q: Thank you. And likewise part of this kind of anticipation of future savings, if I can put it that way, comes from the information, the IHD and there has been some discussion already with the last panel about smart appliances.

MR. WARREN: A: Yes. We haven't factored in any -- or even estimated any savings from smart appliances at this point, but that certainly is a potential future application that may further reduce energy use, yes.

MR. KUNG: Sure. I mean, I don't mean to suggest that that's part of this application, but you would agree that that's inferred as a future benefit that this infrastructure may allow in the future.

MR. WARREN: A: Yes. If customers chose to use those sort of devices, that's potentially a benefit in the future.

MR. KUNG: Q: And similar to a discussion with IHDs, that would be at the choice and cost of customers who choose to participate.

MR. WARREN: A: That's correct.

MR. KUNG: Q: You don't need to turn there, but I want

to talk about -- if you don't wish to, but if you'd like to, you're welcome to, of course. I want to talk about your response to BCUC 1.8.2, where you rated customer demand for IHD and portal features. Do you recall that IR response?

MR. WARREN: A: I do, but I think I will turn to it.

Proceeding Time 9:58 a.m. T13

MR. KUNG: Q: Sure.

Perhaps while you're turning to that, I'll just read into the record the information that I'm hoping to rely on, and you can confirm it when you have a copy of it before you. It talks about forecast adoption rates of various IHG and portal features, in various categories. So, in pre-pay, 8 percent in-home displays, the IHGs that we've talking about. Through the PowerSense incentive that you just referred to at 30 percent. And the use of customer portal to monitor consumption at 15 percent.

Does that sound about right? And subject to check of those numbers, which you're welcome to do.

MR. WARREN: A: That sounds correct, subject to check.

MR. KUNG: Q: Would you agree that -- with me that those numbers are relatively low? Eight percent, 30 percent and 15 percent?

MR. WARREN: A: I would not agree with "relatively low", no.

MR. KUNG: Q: In terms of adoption rate of programs compared to -- sorry, I see you have that document. You can confirm those numbers.

MR. WARREN: A: Yes.

MR. KUNG: Q: Okay, I can leave that, the characterization, to argument, I suppose.

In CEC 1.15.4, you refer to a Brattle Group study that talks about customer behaviour in terms of responding to information. And that study says that consumers who actively use an IHG can reduce their consumption of electricity on average by about 7 percent, when pre-payment of electricity is not involved. When consumers use both IHG and are on an electricity pre-payment system, their use can be reduced by about twice that amount. Do you recall that IR response? And again, you're welcome to refer to that reference, 1.15.4, CEC.

MR. WARREN: A: We're working on it.

Yes, I have that.

MR. KUNG: Q: So, again, the quote that I just pulled out talks about the use of IHGs and the impact of IHGs -- IHDs and pre-payment systems combined.

MR. WARREN: A: Yes.

MR. KUNG: Q: In terms of the reduction -- the potential reduction of use.

MR. WARREN: A: Yes.

MR. KUNG: Q: Does FortisBC intend on introducing a pre-payment system?

MR. WARREN: A: Well, as discussed in the application, we are considering putting forward an application. We have not decided whether or not to, at this point.

MR. KUNG: Q: So again -- so, as with the IHDs and the use of smart appliances, this application, if you will, provides the infrastructure to allow future functionality. Is that a fair characterization?

MR. WARREN: A: Yes, although the IHDs will -- the use of the IHDs will really be at the discretion of the customer. A pre-payment system, of course, is an application that would have to go in front of the Commission for a new tariff that would support that type of a rate. So, I wouldn't characterize them as exactly the same in that respect.

MR. KUNG: Q: But without this system, IHGs would not -- IHDs would not be possible and likewise pre-pay would not -- or, in the way that you're imagining it?

MR. WARREN: A: I think in both instances it's possible to do both things without an advanced metering infrastructure. This is certainly -- the advanced metering infrastructure is certainly an efficient way to do it, but as we heard yesterday, a little bit about Blueline monitors is one way to get an in-home display in your home. Also, pre-pay systems have been

implemented by utilities elsewhere without an advanced metering infrastructure. However, as I stated, those things can be implemented at virtually no cost once you have one. An advanced metering infrastructure, that is.

Proceeding Time 10:02 a.m. T14

MR. KUNG: Q: Thank you. In terms of the 8 percent, 30 percent, and 15 percent of adoption that we were speaking about earlier, do you have a sense of the demographics of ratepayers who will be able to participate in those or who comprise those 8, 30 and 15 percent respectively?

MR. WARREN: A: No, Mr. Kung, honestly I don't. It would be very speculative of me.

MR. KUNG: Q: Would you agree that it would likely be ratepayers who can prioritize and absorb the costs of IHGs and smart appliances and those types of things?

MR. WARREN: A: As we talked about, I think that the -- there are ways that customers can access this information very inexpensively. The in-home displays themselves I think are -- the price points of those are already in the $100 range and less, and in combination with the power incentive I'm not sure that it'll be a significant price barrier for most people. There will certainly be people for which that is a price barrier, and for those there certainly is the

option of going to the library and accessing their consumption information through the internet. And for those that don't want or can't do that, there's also, as we discussed, the ability to get that information directly from Fortis through our contact centre.

MR. KUNG: Q: So I just want to make sure I understand that option. If this application is approved and I'm at home as a FortisBC customer and I don't have internet at home, I'm not able for whatever reason to go to the library to check my consumption, I can call FortisBC and say, "How much power am I using right now?"

MR. WARREN: A: Yeah, you will be able to do that, and once this is implemented they could certainly tell you how much you've used in, you know, yesterday or the day before and if you'd like a printout of what that consumption has been on an hourly basis, they'd be able to provide you with that for any period that you chose. And so, yes, the Contact Centre will be able to support all customers with a great deal more information than they can today about their consumption.

MR. KUNG: Q: So in that scenario where I'm calling and talking to a customer service representative, the smart meter would be communicating with the customer service rep in real time. Is that --

MR. WARREN: A: It's not quite real time. The information that is coming in goes into the meter data management system every few hours, so there's a lag there that the readings aren't transmitted continuously. So there'd be a lag of a few hours there. And also there is some validation routines that occur on the data as well. So there's a short delay, but it is very near real time information that the customer service reps have.

In addition, if the customer wants to know what their reading is at that exact moment, the system allows what's called an on-demand read, which will actually send a signal out to the meter and retrieve that information within a few seconds.

THE CHAIRPERSON: Mr. Kung, this section of cross-examination is intended to be on the environment. I'm not so sure that the questions that you're asking at the moment relate that directly to the environment. I appreciate your concerns, but I'd ask you to move back to the appropriate topic.

MR. KUNG: Thank you, Mr. Chair. The purpose of this discussion is to establish the relative behavioural change, of course, that comes from the potential installation of these smart meters and the information that the utility has suggested can enable that, and that's the nexus to the environment that I'm going

after here. I have one last question on that and then I'll move on.

Proceeding Time 10:07 a.m. T15

MR. KUNG: Q: Would you agree with me that of the adopters of IHD and smart appliances, those will skew largely towards people who are already comfortable with technology -- with the technology of networking, for example?

MR. WARREN: A: Well, I think that the majority of people in society today are pretty comfortable with technology and, as we discussed, for those that aren't, as long as they're comfortable with the telephone they'll certainly be able to use that methodology. Or they can come in person to one of our offices as well.

MR. KUNG: Panel, thank you very much. Those are my questions.

THE CHAIRPERSON: Thank you, Mr. Kung.

MR. FULTON: Citizens for Safe Technology.

THE CHAIRPERSON: I note that it's ten after ten, and I suspect that Mr. Aaron will have a fairly lengthy cross-examination. And so I am suggesting we have a short break now and then commence his cross-examination immediately following.

So it's ten after ten. Let's reconvene at 10:25.

(PROCEEDINGS ADJOURNED AT 10:09 A.M.)

(PROCEEDINGS RESUMED AT 10:23 A.M.) **T16/17**

THE CHAIRPERSON: Please be seated.

Good morning, Mr. Aaron.

MR. AARON: Good morning. How's that for sound?

THE CHAIRPERSON: I'll ask you to begin.

CROSS-EXAMINATION BY MR. AARON:

MR. AARON: Q: Just a polite reminder to the witnesses that you're still under oath from the --

THE CHAIRPERSON: I don't think that's necessary, Mr. Aaron.

MR. AARON: Q: I'll start by asking you, Dr. Bailey, about the E^{x}ponent Report. You didn't author that independently.

DR. BAILEY: A: As I testified earlier, I also had input from Dr. Shkolnikov and Dr. Erdreich.

MR. AARON: Q: Did Dr. Erdreich collaborate with you on the whole of the report or did you each author certain sections?

DR. BAILEY: A: I don't recall how certain sections were divided up, but she would have, as was Dr. Shkolnikov, would have been involved in the overview of the entire report.

MR. AARON: Q: She would have been involved in an overview of the entire report, and the same would go for you?

DR. BAILEY: A: Yes.
MR. AARON: Q: All right. At the E[x]ponent Report at page 12 -- and when I use page numbers I refer to the -- not the exhibit page numbers, I refer to your page numbers.
DR. BAILEY: A: Thank you.
MR. AARON: Q: There is a reference to the second sentence:

> "These guidelines first developed in 1979 are the…"

and you're referring to Safety Code 6,

> "…are the product of ongoing review of published scientific studies, reviews and research conducted by Health Canada."

Your reference to reviews, would that include the Royal Society reviews?
DR. BAILEY: A: Yes.
MR. AARON: Q: Who is the Royal Society? Can you help us with that?
DR. BAILEY: A: It's a society that is often called upon by agencies to perform reviews of scientific issues. I'm not as familiar with it as I am with the National Academy of Sciences in the U.S., but it appears to me a similar type organization.
MR. AARON: Q: If I told you that the Royal Society was created under federal legislation, that's not

something that you would disagree with.

DR. BAILEY: A: No.

MR. AARON: Q: And did you consider those reviews in the preparation of the E^{x}ponent Report?

DR. BAILEY: A: I would have, yes.

MR. AARON: Q: Yes. Can you tell us the dates of the reviews, how many such Royal Society reviews there are and what dates there are?

DR. BAILEY: A: I haven't gone back through the whole history of them. There was a 1999 report and then there was a smaller update in 2003.

MR. AARON: Q: I have the 1999 report. I don't have the 2003 report. Would you be able to provide a copy to me of the 2003 report?

DR. BAILEY: A: Sure.

MR. AARON: Q: By way of an undertaking?

DR. BAILEY: A: Mm-hmm.

Information Request

MR. AARON: For the purposes of cross-examination I propose to distribute a copy of the 1999 report. For reference purposes, Mr. Chair, I propose that we assign an exhibit number to the 1999 version of the Royal Society report. I'm told that will be Exhibit C9-17.

THE HEARING OFFICER: Marked Exhibit C9-17.

(DOCUMENT HEADED "A REVIEW OF THE POTENTIAL HEALTH

RISKS OF RADIOFREQUENCY FIELDS FROM WIRELESS TELECOMMUNICATION DEVICES", DATED MARCH 1999, MARKED EXHIBIT C9-17)

MR. AARON: And I'll come back to that report.

Proceeding Time 10:29 a.m. T18

MR. AARON: Q: Turning now to page 11 of the E[x]Ponent Report. Under the heading, "Basis for the standard of radio frequency exposure", the third paragraph under that heading states:

"Known adverse health effects can be caused by high exposures to RF."

DR. BAILEY: A: Oh.

MR. AARON: Q: Are you with me, doctor?

DR. BAILEY: A: Yeah, that's what I'm -- page 11?

MR. AARON: Q: Yes.

DR. BAILEY: A: And the third full paragraph down? Yes, okay, there we go. I've got it.

MR. AARON: Q: "Known adverse health effects can be caused by high exposures to RF."

The effect that would occur first, given sufficient exposure, is that of raising the body temperature. The basis of the applicable public -- that's the basis for the applicable exposure limits.

DR. BAILEY: A: Yes.

MR. AARON: Q: It goes on to say:

"Small changes in whole body temperature are

actually not an adverse effect if they represent a change similar to daily changes to which our bodies routinely adapt."

Is that to suggest that under these low-level RF emissions, there still may be small changes, or that those emissions still might cause small changes in body temperature?

DR. BAILEY: A: The question is how small is small.

MR. AARON: Q: Well --

DR. BAILEY: A: And I think that the description here refers to the fact that if there are changes in body temperature occurring, they would be very small and within the range of variability that would occur on a daily basis.

MR. AARON: Q: I'm not asking about quantitive [*sic*]. I'm asking whether it is so, or whether it is not so. That -- and I put it to you that it's a yes or no question. That small -- or low doses of RF cause changes in body temperature. And that is something you would acknowledge. They either do cause them or they don't. They may be very small. As you've said. But I put it to you that it's a yes or no question.

DR. BAILEY: A: Yes, but it would depend upon the level of exposure to the RF field. Obviously, if the field was so weak, then you could not be able to measure any temperature response.

MR. AARON: Q: But within the spectrum of what you would call low. I mean, let's talk about the 900 megahertz, because that's what we're talking about. You would agree that it's possible that -- or that scientifically established, to use your lingo, that at that frequency there can be a causal relationship to changes in body temperature.

DR. BAILEY: A: At sufficient exposure levels, yes.

MR. AARON: Q: The report goes on to say,

> "Health Canada's safety code and those of other organizations set exposure limits to ensure that warming of tissues is restricted."

Can I take from this that Health Canada doesn't set exposure limits to ensure that warming of tissues does not occur? You didn't say in your report, Doctor, that Health Canada sets exposure limits to ensure that warming of tissues does not occur. You used the word "restricted".

DR. BAILEY: A: Correct.

MR. AARON: Q: So can you --

Proceeding Time 10:34 a.m. T19

DR. BAILEY: A: I used the term "restricted" because if ordinary changes in body temperature are biological responses, but they are not adverse effects. And the --

MR. AARON: Q: Oh, I'm not saying they're adverse.
DR. BAILEY: A: -- purpose of the guideline is to protect against adverse effects.
MR. AARON: Q: Okay. So then we're -- I think we're in agreement, because I'm not asking you to affirm that those warming of tissues are adverse at this point. I'm just asking you to affirm that at the levels set by Safety Code 6, warming of tissue by low-level RF such as 900 megahertz is not eliminated. The possibility is not precluded. It's -- and I am asking Dr. Bailey.
DR. BAILEY: A: Well, that's fine, but we can consult.
MR. AARON: Q: Well, I'm asking you, sir.
DR. BAILEY: A: I understand that.
MR. AARON: Q: Independently.
MR. MACINTOSH: With respect, the witness, Dr. Bailey, is entitled to confer as he was with Dr. Shkolnikov in helping to provide the correct response to the question.
MR. AARON: Q: Well, the question goes to -- the question is, in your opinion, Dr. Bailey, and I don't know if Dr. Shkolnikov is in a position to advise you on your opinion.
DR. BAILEY: A: He's not advising me on my opinion.
MR. AARON: Q: Okay.
DR. BAILEY: A: But there may be other information

which he may bring forth that would be helpful in this response.

MR. AARON: Q: The question is, in your opinion, having authored this paper and having written that Health Canada safety code and those of other organizations set exposure limits to ensure that the warming of tissues is restricted, the goal of the standard is to limit such warming of tissues. Since even modest warming of the body can be distracted -- distracting and should be limited. In a working environment.

DR. BAILEY: A: You read that correctly.

MR. AARON: Q: Yes. And I emphasize the words "restricted" and "limited" with respect to the prospect of warming from 900 megahertz, low-level RF emissions. And I put it to you that as you've already acknowledged RF emissions can -- at that frequency can cause warming. And I put it to you that Health Canada Safety Code 6 guidelines allow for limited warming and restrict warming. But don't completely preclude warming. Of body tissues by RF emissions at the 900 megahertz frequency.

DR. BAILEY: A: Yes.

MR. AARON: Q: And then on page 13 of the E^{x}Ponent Report --

DR. SHKOLNIKOV: A: I would like to add a response in terms of heating, because it is a physics effect, that

the heating of the body is a physics effect --

MR. AARON: Q: Sorry. I'm -- this isn't an opportunity to expand on the contents of your testimony. I've got the answer to the question that I'm wanting, and I'm moving on.

MR. MACINTOSH: With respect, Mr. Chair, I mean, Mr. Aaron is entitled to move on, recognizing that there may have been further information the panel could have provided is Mr. Aaron's decision. And the object here is to put all the relevant evidence on the table. This is not a Perry Mason sort of a moment where you, in my respectful submission, ought to segregate the witnesses quite as distinctly as my friend seeks to. But nonetheless, if my friend wants to adopt the practice throughout the day of excluding additional supplementary responses, I just note that that's his decision and I don't want him to be inferring that there is not the body of evidence available from the panel to properly respond.

Proceeding Time 10:39 a.m. T20

THE CHAIRPERSON: Thank you, Mr. Macintosh. I think it's important to remind everyone that the purpose of this hearing is to provide information to the Panel that will be useful and helpful in arriving at a decision on this matter. And so, we are interested in hearing full responses to questions that have been asked.

And so, at least directionally, I would agree with Mr. Macintosh, that if there is additional information around the question that would be useful, I think it would be interesting to hear that. The Panel can subsequently decide whether it wants to put any weight on it or --

MR. AARON: I'm persuaded. I'm persuaded.

MR. AARON: Q: Mr. Shkolnikov.

DR. SHKOLNIKOV: A: Okay. So, just to put in context what Safety Code 6 says, it says that you're allowed to be exposed to 6 watts of energy on your body from radio frequency, and that is derived from a knowledge that applying about 50 times the exposure of that amount -- so 50 times 6 is 300 watts per metre squared, you would observe one degree temperature rise in the body.

So, once you realize that there are devices -- once exposure reduces, the analogy is the same as, for example, if you're trying to cook something in an oven, and instead of turning on the temperature continuously and heating it, in the case of a smart meter, 0.05 percent duty cycle means that the smart meter is on only about a fifth of a second in a six-minute period. So it's a very inefficient way to heat the body.

So we start with the -- even if we exclude

human mechanisms and efficiencies, you start with a one-degree temperature rise, you go factor 50, and if you ignore all the cooling, you could assume that it's probably one-fiftieth of one degree, although it's not precise. And that's at Safety Code 6 limit. So one-fiftieth of one degree. And then once you start going ten thousand below, then your heating is ten thousand times below that.

So it is important to know that the temperatures we're talking about are well below -- for this scenario, the temperature fluctuations affected are not only comparable but are substantially much lower than the normal fluctuation of temperature both in the environment and your human body, to a point of basically being immeasurable using even advanced instruments. So it is important to keep in mind that, you know, there is a limit -- the value in which the limit is set, and also the exposure in this case.

MR. AARON: Q: And I appreciate how incremental it is. But you would appreciate that the answer to my question is, are there some heating effects at low-level RF under the safety code limits? And the answer would be yes, correct?

DR. SHKOLNIKOV: A: Whether -- the question is whether there is heating or temperature rise are separate questions. I would concur with you that there is

heating.

MR. AARON: Q: Okay.

DR. SHKOLNIKOV: A: But I don't think it's appropriate to just say there is going to be a temperature rise, because it depends on the cooling ability of the body.

MR. AARON: Q: Okay. So, what we have from you is that at low-level RF there is a heating effect, but we don't have from you that that heating effect will cause a temperature rise.

DR. SHKOLNIKOV: A: That is correct.

MR. AARON: Q: Thank you. At page 13, Dr. Bailey, of your E^{x}Ponent report, the paragraph I'm looking at is the second paragraph. It says "Some studies …".

DR. BAILEY: A: Yes.

MR. AARON: Q: And second sentence, "These studies have been reviewed by scientific and regulatory agencies which have not accepted this data as reliable, because the observed biological effects attributed to non-thermal levels were consistent -- were not consistent or reproducible and not supported by any plausible biological explanation as to how they could occur. And in some studies, the biological effects are not known to be linked to adverse effects of health." And I emphasize the phrase, "the biological effects are not known to be linked to adverse effects on health".

And the point which I seek your affirmation

on is that the studies that you refer to show biological effects. Correct? As a result of RF frequency, albeit not linked to adverse effects. You would admit that the studies show biological effects.

DR. BAILEY: A: Yes, or biological responses that were reported in the study and the question is, whether they represent a reliable established phenomenon.

MR. AARON: Q: So Fortis is going to implement a metering technology that's going to cause biological effects on its customers, although we don't know whether those --

DR. BAILEY: A: I would disagree with that characterization, sir.

MR. AARON: Q: Well, you have said that the studies show biological effects at these low RF levels. Correct?

Proceeding Time 10:45 a.m. T21

DR. BAILEY: A: There are studies in the scientific literature that report all kinds of things. And the purpose of having these scientific reviews and doing the work and setting standards is to determine whether those reports or observations represent valid, established effects that can be replicated by other people. Just because someone reports in a paper a particular claim, we as scientists do not accept that until it has been replicated and verified that in that

that is a reliable observation. So the --

MR. AARON: Q: Well, let me stop --

DR. BAILEY: A: The claim that there are going to be biological effects in FortisBC's customers as a result of the smart meters is an unwarranted extrapolation.

MR. AARON: Q: Well, let me put it this way. You've referred to studies at the second paragraph of your report at page 13 and you've described those studies as showing that the biological effects, which you acknowledge to have been shown in those studies, don't have a link to adverse effects. But you acknowledge, and you just did in cross-examination, that those studies showed biological effects, correct?

DR. BAILEY: A: Right, but we're not talking about those biological effects could occur at -- could have been reported at exposure levels that are 1,000 times higher than what are associated with the smart meter.

MR. AARON: Q: But they were reported at the low level range, correct? The same frequency range as the proposed AMI meter.

DR. BAILEY: A: Has nothing to do with the frequency range *per se*.

MR. AARON: Q: Well, it might not.

DR. BAILEY: A: I'm talking about the levels of exposure.

MR. AARON: Q: I'm not asking about the level of

exposure. I'm asking about the frequency range.

MR. MACINTOSH: I do want to endeavour to blow the whistle here just for a moment. I want Mr. Aaron to try to allow the witness to fully answer before the next question comes.

THE CHAIRPERSON: I think that's reasonable. Again, I think that if you'll recall that in my opening comments, I expressly indicated that cross-examination didn't provide an opportunity to argue with a witness. So I would ask that you ask a question and let the witness answer it. If you then have another question to probe further or to probe in another direction, I'd ask you to ask that one. Thank you.

MR. AARON: Q: You were saying, sir.

DR. BAILEY: A: I believe that I answered as best I could the question that was before me. If you want to restate it or give me a new question.

MR. AARON: Q: My question is: Was the exposure at the studies that you describe in this paragraph beginning with the words "Some studies" on page 13 of your report, was the exposure at -- in the range of low-level non-thermal RF emission in those studies?

DR. BAILEY: A: Those studies were reported at a variety of frequencies, some of which would be similar to those of -- in the 900 megahertz range, and encompass a variety of intensities. Some of them are

in the range of 1,000 times higher than what is reported by -- as the exposure from a smart meter in our report.

MR. AARON: Q: So is that a yes?

DR. BAILEY: A: Yes, with the information I provided.

MR. AARON: Q: Thank you. And existing bio-effects from low-level RF emissions aren't denied by Safety Code 6 review, which I've just handed up to you. Would you agree, at page 110 of that document?

THE CHAIRPERSON: Would you direct us to a place on that page, Mr. Aaron, please?

MR. AARON: Yes, sorry. I was just going to find my place. Sorry for the delay. Where it says:

> "It is clear to the panel that there are a number of observed biological effects…"

Yeah, second to last paragraph.

Proceeding Time 10:51 a.m. T23

MR. AARON: Q: It says, "It is clear to the panel that there are a number of observed biological effects of exposure of cells or animals to non-thermal levels of exposure to RF fields. These observed biological effects meet the common standards for scientific observation in that the experiments are well-designed, had appropriate positive and/or negative controls, contained valid RF exposure parameters, included appropriate statistical evaluation of the significance

of the data, and have been observed to occur by more than one investigator."

So, Dr. Bailey, you would agree with me, then, that the existing bioeffects from non-thermal levels of exposure are not denied but are affirmed by the authors of this document.

DR. BAILEY: A: That's what they state. And if you go on to the next page, 1-11, they give an example of -- actually, starting at the bottom of 1-10 and continuing on, it says:

"For example, when a phone rings, a person can hear the sound and is capable of responding to the sound by picking up the phone or in some cases may be startled in response. Clearly this is a biological effect that does not have any overt adverse health effects on this organism. For this reason, the panel was particularly sensitive as to whether the biological effects which may have -- or which have been observed in cells and animals following RF exposure have been documented by additional studies to show adverse health effects in the exposed organism. The panel found no evidence of documented health effects in animals or humans exposed to non-thermal levels of

radio frequency fields. The panel therefore does not recommend that Safety Code 6 be altered to include regulation at the non-thermal levels of RF which have been shown to produce these biological effects."

MR. AARON: Q: And I'm not asking you to affirm the existence or non-existence of adverse health effects right now. The point that I'm on is that these levels of RF emissions as proposed by the applicant in these proceedings has been shown to have biological effects. Do you --

DR. BAILEY: A: That's what the review states.

MR. AARON: Q: All right. And those biological effects are a physical effect on the body. Correct?

DR. BAILEY: A: I'm not quite sure what you mean by "physical effect". They're referring to studies in which organisms or cells have been exposed to radio frequency fields and a change in some parameter that has been measured has been reported. And it would vary with the experiment what the exposure was, what was measured and so on. And if that's what you mean by physical change, then I agree.

MR. AARON: Q: In fact, the Safety Code 6 review identifies effects at that low level on the central nervous system, doesn't it?

DR. BAILEY: A: There are reports of changes in, for

instance, the electrical activity of the brain following exposure to radio frequency fields. Whether that is a direct response to the field or in some studies is reflecting signals that are picked up by the recording electrodes themselves and not something coming directly from the brain, for example. These studies have been undertaken and such reports have been observed in the literature over many years. And have been reviewed by agencies and have not been determined that they are adverse. And further investigation would be required to determine what in fact was responsible for that. Was it an artifact? Was it a factor of the design of the experiment? And so on.

MR. AARON: Q: Well, let's see what this report says about that. At page 96. The third paragraph starting with "Thus".

Proceeding Time 10:56 a.m. T24

DR. BAILEY: A: I'm sorry. Yes.

MR. AARON: Q: "Thus, although the data are conflicting, there is a suggestion of MW induced…"

Is that microwave induced?

DR. BAILEY: A: Yes.

MR. AARON: Q: "…microwave induced biological effects on the CNS."

Is that central nervous system?

DR. BAILEY: A: Yes.

MR. AARON: Q: "More importantly, however, do these effects translate into any clinically relevant neurobiological effects?"

And there's a discussion and it ends with the conclusion at the end of the next paragraph, the final sentence:

"Accordingly, there is a justification for evaluating whether the biological effects of microwave radio frequency fields on the central nervous system are isolated laboratory findings or whether they translate into clinically relevant human effects."

Can you affirm --

DR. BAILEY: A: That's correct.

MR. AARON: Q: -- that's what it says? And so from the perspective of these authors, you would agree to me -- you would agree that they take the view that the jury is out as to whether these low-level microwave effects on the central nervous system translate into clinically relevant human results.

DR. BAILEY: A: That's your paraphrasing of their conclusion.

MR. AARON: Q: Well, and I'm asking if you would agree that that's their conclusion.

DR. BAILEY: A: I would agree with the conclusion that's stated in the report.

MR. AARON: Q: Okay, that's all I need. Thank you.

DR. BAILEY: A: And I would point out that this report was prepared in 1999.

MR. AARON: Q: Yes.

DR. BAILEY: A: And I will give you the current status on this.

MR. AARON: Q: What document are you referring to, doctor --

DR. BAILEY: A: I'll come to that in a moment, if you don't mind.

MR. AARON: Q: Well, what document are you referring to right now, because --

DR. BAILEY: A: I have before me a report of the Independent Advisory Group on Non-Ionizing Radiation. This was an independent review of the scientific literature at the request of the Health Protection Agency of the United Kingdom, and it's titled "Health Effects from Radio Frequency Electromagnetic Fields" and --

MR. AARON: Q: Could hold on, please, because I object to this manner in which cross-examination is occurring. This isn't an opportunity for the witness

to refer to a document that -- is this document in evidence?

DR. BAILEY: A: You asked me about a report from 1999--

MR. AARON: Q: Yes.

DR. BAILEY: A: -- which is not current.

MR. AARON: Q: Okay, but --

DR. BAILEY: A: And I have a report here in front of me which was in 2012 which represents a very thorough and comprehensive review of the evidence, and I think their updated assessment on this topic is relevant.

MR. AARON: Q: Okay, well, that doesn't entitle you to refer to it --

MR. MACINTOSH: With great respect, Mr. Chair, it does. The way cross-examination works, in my respectful submission, is that you ask the question as a cross-examiner to some extent at your peril. In other words, you ask the question and the witness is entitled to respond with the truth and the whole truth and nothing but the truth. And sometimes in this occupation the witness doesn't give exactly the answer we hope for, but that's part of the process. And if you ask a witness to draw conclusions regarding a 1999 document, I'm afraid he is entitled to draw upon his own expertise to say, well, the 1999 document is qualified by X, Y and Z.

Mr. Aaron does not have the right to

preclude a witness from referencing material which amplifies the answer to the question that Mr. Aaron has chosen to ask, in my submission.

Proceeding Time 11:01 a.m. T25

MR. AARON: Mr. Chair, the question that I asked was to affirm what has been stated in the 1999 document. That was the question. The answer that he provided completely answered that question, is yes, that is what they said. He said, "I agree that they said what they said."

MR. MACINTOSH: And then --

MR. AARON: Sorry, my friend. And he now seeks to proceed beyond the scope of the question along the lines of rebuttal by way of a document that I've never seen, that's not in evidence, and that's absolutely inappropriate.

MR. MACINTOSH: Mister --

MR. AARON: If the question was "What's your opinion as to the validity of that conclusion," then I've opened it up for him to say, "I don't think that's valid, because there is a subsequent finding, a scientific finding, that undermines it." That wasn't my question.

THE CHAIRPERSON: I can appreciate your point, Mr. Aaron, but again I think it's important that the Commission Panel have all the relevant information before it to

make an informed decision. And again, the Panel is required to attribute weight to evidence, and so crafting a question to get a limited answer is a style that you have used here, but I'm not so sure that that answer is going to be as helpful to the Panel as an answer that would say, "Yes, that was the case then, however, there is additional research that is more current," and you know, I think that information is useful. Later you can dispute that evidence.

MR. AARON: But there was no question as to the validity. All I'm doing is canvassing the contents of a document.

MR. MACINTOSH: Now, when my friend is finished, I want to make a submission.

MR. AARON: And it's highly inappropriate to -- in cross-examination to bring out material that's not in evidence that hasn't been disclosed.

THE CHAIRPERSON: I'm going to ask Mr. Fulton if he would rise and perhaps give us some guidance here.

MR. FULTON: Yes, thank you, Mr. Chairman. My friend Mr. Macintosh is right. And I think this was touched on in part in Mr. Aaron's submission, that when one's cross-examining, the risk that the cross-examiner always runs is that if one asks a question that one doesn't know the answer to, or if they know the answer to it but there is an explanation that the witness

wants to give, that clarifies the evidence, then the witness is ordinarily allowed to do that. It's sometimes referred to as "opening the door". And once you open the door, it becomes almost impossible to close it.

And so that in this scenario, Mr. Chairman, my view is that you need to decide whether the door has been opened by the cross, and that the witness should be given the opportunity to fully explain the answer to the question that he was asked.

MR. AARON: And I further submit it's inappropriate for a witness in cross-examination to be referring to a document that's not in evidence. And I would request that Dr. Bailey be directed not to answer the question by reference to documents that aren't in evidence. It's also a disclosure issue.

THE CHAIRPERSON: Mr. Macintosh?

MR. MACINTOSH: Mr. Chair, my evidence professor at law school at Dalhousie, he was a very practical man. And he called this, with regard to cross-examination, he called this "the fly in the ointment" rule. What he meant by that was, you put whatever question you like, but the fly in the ointment is, you may not be in love with the answer you get. And a witness is entitled to draw on anything he or she wishes in answering the question that the lawyer chooses to put. And when my

friend, by a question, puts in issue some subsequent publication, there is no rule of unilateral lawyer censorship which precludes that information from finding its way into the answer. That's just the law of evidence and the law of lawyer life.

Proceeding Time 11:06 a.m. T26

And my friend Ms. Aaron was not exactly correct, I respectfully submit. If the transcript is looked at, Dr. Bailey was asked a question, in essence, is this what the report says? And Dr. Bailey said yes, in essence, that's what the report says. That's not where it stopped. My friend then asked a follow-up question, I would need to get the wording of the transcript to see what it was, which called entirely for Dr. Bailey to amplify by saying essentially but what you have to know is that since this report was done something else important has been written on it. That's all he did.

And I know when I cross-examine my friend's experts, they will give answers I don't like and I'll cope with them at the time as I can, but it won't be open to me to say, "Ooh no, you can't answer that by referring me to something else that's been written." I'm afraid that the rules of evidence are not that unilateral in the questioner's favour.

MR. AARON: I don't mind him referring me to the

evidence.

Q: Is there anything in the evidence, Dr. Bailey, that could assist you in answering the question as to does this report say what it says?

THE CHAIRPERSON: I think --

MR. MACINTOSH: I'm sorry to -- did you speak, Mr. Chair? I'm sorry.

THE CHAIRPERSON: I did, but I'll let you speak.

MR. MACINTOSH: Thank you. My friend is implying that a witness in responding to a question is precluded from referring to some data just because it hasn't been prefiled. Evidence is not prefiled when there is no cause for it. There was no cause for it until this question is asked. The question puts the evidence in issue, puts this other data in issue. The witness is perfectly entitled to resort to it. There's no rule which says that just because the question calls for the responder to refer to something that it somehow has to have been in evidence first. Not at all.

MR. AARON: I haven't had an opportunity to make information requests on this document, to review this document. I contend that it's irregular.

THE CHAIRPERSON: I hear what you're saying, Mr. Aaron, but it strikes me that it wouldn't be unusual for an expert because they are experts, they do have a vast body of knowledge which they can call on just as your

experts can call on a vast body of knowledge. Some of that knowledge is grounded in specific studies which haven't been entered in evidence, and some of the knowledge will be drawn from experience. And so we ask the experts to appear before us to inform the Panel.

In this particular case I can see where Mr. Bailey might have said, "However, there was a further study," and just make reference to it and give us the details of that study. In this particular case he wanted to be more precise and has gone to the study. And in this case I'm going to allow reference to that study. I think it would be useful if that study was entered as a formal document, and you're in a position to deal with that in argument.

MR. AARON: I think it would also be fair if it was entered as a formal document --

THE CHAIRPERSON: Well, that's why I'm suggesting that.

MR. AARON: -- and disclosed prior to it being --

THE CHAIRPERSON: Well, he didn't know the question was going to be asked, sir. And just as your witnesses may want to draw on other reference material in answering their questions when Mr. Macintosh and others have an opportunity to cross-examine them, they'll be treated in exactly the same way. Please proceed.

DR. BAILEY: A: I believe I've identified the document, and there is a section in the document, if I could get the title of the section, it's Chapter 5 Neuro Cognitive Effects in Humans.

MR. AARON: Q: Sorry, what is the document?

DR. BAILEY: A: It's the document that I'll -- would you like me to give the reference again?

MR. AARON: Q: Well, you're starting to refer to the section but --

DR. BAILEY: A: Okay, this is from the Independent Advisory Group on Non-Ionized and Radiation Protection Report, the one that was prepared for the Health Protection Agency. The report is entitled Health Effects from Radio Frequency Electromagnetic Fields, and this --

MR. AARON: Q: Who authored it and what date was it?

DR. BAILEY: A: It was 2012 authored by the Health Protection Agency of the United Kingdom.

MR. AARON: Q: But what individuals authored it?

Proceeding Time 11:11 a.m. T27

DR. BAILEY: A: Let me go to -- the chairman of the group was Professor Anthony Swerdlow of the Institute of Cancer Research, University of London. The members of the advisory group include Dr. L.A. Colton from the Department of Human Metabolism, the University of Sheffield; Professor F.A. Duck from the Royal United

Hospital Bath and University of Bath; Professor M. Fechting, the Institute of Environmental Medicine, Karolin Institute, Stockholm, Sweden; Professor P. Haggard, Institute of Cognitive Neural Science, University College London; Professor D.J. Lomas, Edinbrooks Hospital Cambridge; Professor D. Nobel, University of Oxford; Dr. G.J. Rubin, Department of Psychological Medicine, King's College London; and there was an observer, S.W. Kani from the Department of Health, and other representatives from the Health Protection Agency.

MR. AARON: Q: And I'd like to go to your reference point, but just on the authorship, is that the same Anthony Swerdlow, S-W-E-R-D-L-O-W, that is referred to at page 6 of the statement of Maish when he says:

> "Then Anthony Swerdlow, who is also in the main commission at ICNIRP, and in this position is supposed to be free of industry connections, he holds shares in the telecoms companies, cable and wireless worldwide and cable and wireless communications. Swerdlow's wife holds shares in BG Group at Global Telecommunications Services Company."

Is that the same gentleman referred to in Dr. Maish's report?

DR. BAILEY: A: I believe it is.

MR. AARON: Q: Okay. Proceed.

DR. BAILEY: A: So this report covers many different topics, and the chapter that I'm going to bring your attention to is Neuro-Cognitive Effects in Humans, and they discuss a variety of studies. And I was giving an example, some responses to radio frequency fields involving neuro-physiological responses. That is, for example, putting electrodes on the skull and recording potentials from the brain and the scalp under conditions of exposure.

So in the summary chapter and there's -- I mean I could go on for quite a while reading, but just relevant to the particular topic that I was discussing and I was asked about, it says neuro-physiological -- this is on page 226, the third full paragraph:

> "Neuro-physiological studies of brain function are inconsistent. Many of these studies are of higher quality than those considered in earlier AGNIR reviews. This panel has reviewed the research before."

And they give the listings in 2001 and 2003.

> "Some recent studies are large and methodologically rigorous, while others still suffer from small sample sizes, poor exposure control, or poor blinding."

I just point out that blinding refers to the fact that

when studies are done, ideally the investigator when they're analyzing the data does not know the condition of exposure, so they can't inadvertently bias their results by knowing what group was exposed and what was controlling. It says:

> "Four of the six recent studies using vascular metabolic measures suggest possible effects of RF fields on brain function. However, of the four studies that found an effect of RF fields, only one involved a large sample size, and the exposure system used in that study means that the actual RF field exposures are unclear."

So, I think that this paragraph that I read gives an example of how science advances over time, and conclusions that may be appropriate at the time they were made, based upon the evidence that was examined may be relevant, but a larger examination of more current evidence may give you a different picture.

MR. AARON: Q: This study doesn't deny that the low-level R effects have an effect on the central nervous system.

DR. BAILEY: A: It didn't, it didn't establish that they are, and let's -- since you've asked that question, let's go to look and see --

MR. AARON: Q: While you're referring to it, can I have an undertaking that that study be produced? Thank you.

Information Request

DR. BAILEY: A: Yes. Here are --

MR. AARON: Q: I'm going to propose that the witness have an opportunity in re-examination to --

DR. BAILEY: A: Here, I've found a section. This is from the executive summary, the first page of the executive summary, and it says:

> "The evidence suggests that RF field exposure below guideline levels does not cause acute symptoms in humans, and that people, including those who report being sensitive to RF fields, cannot detect the presence of RF fields. Similarly, well conducted studies do not suggest that exposure to RF fields give rise to acute cognitive effects. There is, however, some evidence that RF field exposure may affect the EEG and other markets of brain function. However, these effects have not been consistent across studies. In addition, the size of these reported effects is often small relative to normal physiological changes, and it is unclear whether they have

any implications for health."

That's on page 3 of the executive summary.

MR. AARON: Q: Page what?

DR. BAILEY: A: Page 3.

Proceeding Time 11:18 a.m. T28

MR. AARON: Q: Okay, thank you. Going back to the 1999 Royal Society report, at page 44, it's talking about the effects of radio frequency microwave -- with microwave fields on cell membranes. And the section starts at the bottom of 43 and on 44 there is a sentence in the middle of the first paragraph that says "Effects of RF microwave fields on transport of cations such as Na and K."

DR. BAILEY: A: Okay.

MR. AARON: Q: Sorry?

DR. BAILEY: A: I'm sorry, I'm just getting to the same place in the text.

MR. AARON: Q: Across cell membranes have also been documented. And Cleary, 19 --

THE CHAIRPERSON: Mr. Aaron, I'm having a problem locating the material. It's in 6.6, presumably? Oh, it's above that. Up towards the top of page 44?

MR. AARON: Yes. And I'm reading from the middle of the paragraph.

THE CHAIRPERSON: Okay. Thank you very much. I have it.

MR. AARON: Q: The effects of transport of these things

across cell membranes have also been documented and Cleary, 1995, has suggested that these effects may occur without measured changes in temperature. Is that a reference to effects from radiation in the non-thermal category?

DR. BAILEY: A: Well, this statement says that it was suggested that these effects might have occurred without there being a change in temperature. The difficulty, however, is that trying to distinguish thermal from non-thermal effects is very difficult, and that's why I cautioned earlier in testimony that when we try and set guidelines, we want to search for evidence of effects and not mechanisms. And the difficulty is that when you have these *in vitro* exposures, even though the average level of the radio frequency field exposure may be one that, if it were totally uniform, would not be expected to produce any change in the temperature of the medium, that in practice, that theoretical condition, is not always achieved, even close, and there can be spots in the cell medium where the values are two, four, or higher in exposure to the radio frequency fields than they are at the average level.

So you could have an exposure that an investigator believes is not likely to have a thermal effect, but in fact there are parts of the cell medium

in which there could be thermal effects.

MR. AARON: Q: Okay, thank you. The authors go on to say, although it -- you would agree to me that -- with me that the authors are of the perception that RF fields affect membrane channels at the non-thermal level.

DR. BAILEY: A: That's what they wrote. That's what they suggested from their study, yes.

MR. AARON: Q: Yes. And they -- in the next section on page 45, the second whole paragraph, they say:

> "In summary, the work of Salford…provides evidence that at SAR levels below Safety Code 6 limits, changes in blood-brain barrier permeability occur."

Are you aware of that Salford study?

DR. BAILEY: A: Yes, I am.

MR. AARON: Q: Okay. Was it referenced in the E^{x}Ponent Report?

DR. BAILEY: A: I don't believe so.

MR. AARON: Q: Okay.

DR. BAILEY: A: Again, I don't want to get back into controversy, but my report was based upon the current state of the evidence, and if you consult the same review from which I quoted a moment ago, they have a much more extensive and updated assessment of the Salford studies and studies that have been published

since.

MR. AARON: Q: Is that the one authored by Swerdlow?

DR. BAILEY: A: It's the report authored by the AGNIR.

MR. AARON: Q: Including Swerdlow and others?

DR. BAILEY: A: Yes.

MR. AARON: Q: Yeah. And then I'd like to refer to Exhibit C9-8, which is -- includes all the expert reports of the CSTS witnesses.

Proceeding Time 11:24 a.m. T29

I'd like to start with the report of Martin Blank. Now, there is a clerical problem with this document, if you could find it, is that it's not numbered. So what I've done is just written in page numbers, starting with the first page.

DR. BAILEY: A: Yes.

MR. AARON: Q: And then on the second page, you see the heading "Biological effects of radio frequency radiation".

DR. BAILEY: A: Yes.

MR. AARON: Q: "Many biological effects with health implications have been ascribed to low level radiofrequency radiation. As early as 1995, Allen Frey -- sorry, 1975, Allen Frey described leakage of the blood-brain barrier that causes contamination of the fluid that protects the brain and results in the death of nerve cells." And he quotes another study,

Nittby.

Does the E[x]Ponent report contain any material that contradicts that assertion, that biological effects with health implications have been ascribed to low-level radio frequency radiation? Or, rather, is there anything that contradicts the observation of leakage of the blood/brain barrier as a result of exposure to RF? Anything in the E[x]Ponent report that contradicts that?

DR. BAILEY: A: Our report did not focus on this particular topic, but we included references to reviews of health agencies that have included this topic, and that there is no conclusion that in fact exposure to radio frequency fields produces a confirmed effect on the leakage of the blood/brain barrier.

MR. AARON: Q: And where is that in the material?

DR. BAILEY: A: I just told you what the conclusion -- the current status of research on this issue is.

MR. AARON: Q: Okay. And where is that in the material? Is it in the material? In the E[x]Ponent report?

DR. BAILEY: A: I answered that question already. I said that the topic of the blood/brain barrier was not --

MR. AARON: Q: Ah, okay.

DR. BAILEY: A: -- specifically identified in our report, and then I went on -- when you asked for an opinion about this statement here, that we had cited, however, these numerous agency reviews that have covered this topic and the current scientific consensus is -- of these reviews, is that effects of radio frequency fields on the blood/brain barrier have not been established.

MR. AARON: Q: Could you take me to that in the E[x]Ponent report, where you refer to that?

DR. BAILEY: A: I will. If you go to -- for example, you go to page 16, my page 16, it's reference to the ICNIRP Commission. Their 2009 review which we -- you had me discuss earlier this morning. I believe if we go to that 2009 review, we'll find a discussion of the blood/brain barrier topic.

MR. AARON: Q: Can you take me there, please?

DR. BAILEY: A: Sure. I'll take this.

MR. AARON: Q: What exhibit are you looking at?

Proceeding Time 11:29 a.m. T30

DR. BAILEY: A: This is Exhibit B-15-1, response to B.C. Hydro IR 2, and it's appendix BCH IR 2 2.13.

MR. AARON: Q: Sorry, response to BCH IR 1, is that what you said?

DR. BAILEY: A: Response to B.C. Hydro --

MR. AARON: Q: Oh, okay.

DR. BAILEY: A: -- IR 2.
MR. AARON: Q: Oh, IR 2.
DR. BAILEY: A: And it's Appendix BCH IR 2 2.13, and if you give me a moment I'll -- okay, I'm turning to page 259, which is Section II.6, "Summary and conclusions". It says,

> "In animals, despite there being sporadic reports of positive effects on brain physiology, most studies have not reported any field-dependent responses in either gene expression or in increased permeability of the blood brain barrier. Several studies indicate that changes may be induced by relatively intense RF exposure in cholinergic activity of the brain, but the evidence of any functional consequence for the performance of some behavioural tasks is equivocal."

MR. AARON: Q: Okay. So the last sentence, I'm not a technical person.
DR. BAILEY: A: The last sentence doesn't really -- sorry, I just wanted to --
MR. AARON: Q: No, I'm just asking you to re-read it, because I need to hear it again to follow it.
DR. BAILEY: A: The last sentence?
MR. AARON: Q: Yes.

DR. BAILEY: A: Okay.

"Several studies indicate that changes may be induced by relatively intense RF exposure in cholinergic activity of the brain, but the evidence of any functional consequence for the performance of some behavioural tasks is equivocal."

MR. AARON: Q: So it doesn't speak -- when it refers to relatively intense, what's your understanding of that? Does that -- is there any elaboration as to what intensity means? Does it refer to duration --

DR. BAILEY: A: I'd have to go back to --

MR. AARON: Q: I'll just ask the question.

DR. BAILEY: A: -- the details of this.

MR. AARON: Q: Just ask the question. Does it refer to duration or does it refer to frequency? It doesn't specify, does it?

DR. BAILEY: A: Frequency is not a measure of intensity.

MR. AARON: Q: Okay.

DR. BAILEY: A: Directly, sir. Frequency is describing a characteristic of the field.

MR. AARON: Q: Okay.

DR. BAILEY: A: But when we talk about intensity we're usually talking about something that's either measured as power density or a specific absorption rate.

MR. AARON: Q: Okay. Could duration of exposure also effect intensity of exposure?

DR. BAILEY: A: It would effect the duration of exposure, but the intensity of what that exposure was would not be effected.

MR. AARON: Q: Okay, so you're saying duration is not a factor in intensity of exposure.

DR. BAILEY: A: Only in the colloquial sense.

MR. AARON: Q: Okay.

DR. BAILEY: A: Not in a strict scientific sense. Intensity is something that we would express in units of power density or specific absorption rate, and not in minutes.

MR. AARON: Q: So what this last sentence is saying is at a certain intensity there are effects but no conclusions with respect to -- with respect to adverse health issues?

Proceeding Time 11:35 a.m. T31

DR. BAILEY: A: Correct.

MR. AARON: Q: Okay. All right. I'm going to move on to a different topic now.

DR. BAILEY: A: Okay.

MR. AARON: Q: Modulation, and I'd refer you to the Safety Code 6 review of 1999 at page 30. Sorry, Royal Society 1999. Top of the page of page 30, and I'll just wait for you to tell me that you're there. Page

30.

DR. BAILEY: A: Okay.

MR. AARON: Q: It says

"There is one additional factor to be considered in evaluating the potential biological effect of RF exposure from wireless telecommunication sources. This factor is the modulation, or variation, of the RF signals that occurs as a result of certain digital pulsing characteristics of some system, where the modulation frequency has particular characteristics at extremely low frequencies below 300 Hertz…"

And then I'm going to skip to the sentence,

"Some research suggests that the ELF characteristics of the signal may be important in altering biological systems."

And I put it to you, Doctor, that there's nothing in the E[x]ponent Report that addresses these modulations, that are cited by these authors as being an additional factor to be considered in evaluating the potential biological effects of RF exposure.

DR. BAILEY: A: Where this comes into view, if you are comparing different --

MR. AARON: Q: I'm just asking you --

DR. BAILEY: A: -- exposure systems --

MR. AARON: Q: -- if there's anything in your report that refers to it. That's the question.

DR. BAILEY: A: I did not -- I did not discuss this modulation aspect. It is frequently treated, in my mind and in the scientific reviews, as part and parcel of the discussion of low level RF effects. So it's one of the hypotheses about low intensity effects. A-thermal, non-thermal effects would be related to modulation. So I discuss the general topic of non-thermal effects and this is one of the hypotheses to -- that has been looked at for many years, actually, to look at that non-thermal issue.

MR. AARON: Q: All right. And it's not a hypothesis that you discussed in your report, and that's all I'm asking you to affirm.

DR. BAILEY: A: That's the hypothesis -- this detail that I did not discuss, correct.

MR. AARON: Q: At page 12 of the same document, the Safety Code 6 review of 1999, the authors say, second to last paragraph,

> "Further research will be required as new technologies emerge, which use frequencies and modulations that have been inadequately studied previously."

Can you confirm that is the view of the authors of the report?

Proceeding Time 11:40 a.m. T32

DR. BAILEY: A: You've read it correctly.

MR. AARON: Q: And then at page 27 of the same document -- sorry, I'm just going to have to find my reference. It says at the last five lines, "Since power density" --

DR. BAILEY: A: Excuse me, we're on page 27?

MR. AARON: Q: Yes, last five lines.

DR. BAILEY: A: Right.

MR. AARON: Q: "Since power density is a measure of the RF intensity at a given point in time, it…"

Power density,

"…cannot be used to define cumulative exposure to RF fields, other than in a [time-weighted average]. As noted later in this report, there is reason to reconsider this approach toward RF exposure assessment. Possible areas of reconsideration include the modulation characteristics of the RF signal and the duration of exposure beyond the 6 minute average now used in Safety Code 6."

Again, there's nothing in the E^{x}ponent Report that addresses the possibility of areas of reconsideration with respect to modulation

characteristics of the RF signal, is there?

DR. BAILEY: A: That's correct, but I think you misstate the purpose of the E^{x}ponent Report. The E^{x}ponent Report was not to provide a review such as we have from Royal Society of Canada or from the ICNIRP report or from the Health Protection Agency. We were not striving to duplicate a 400-page tome, or shorter tome in this case. It was to provide a broad overview and current summary of the current status of knowledge and refer people to a reference sources that did contain these far more detailed issues.

DR. SHKOLNIKOV: A: I'd like to add one -- I'd like to add one more thing. The -- going back to the previous comment about heat frequencies and modulation, the smart meter, the AM -- used for Fortis -- or proposed for Fortis AMI infrastructure uses the frequency range which has been around for many decades, pre-dating this report. And the modulation that it uses dates back -- it was invented around World War II and has been in use since 1970. So, from a point of view of new frequencies and new modulation, the Fortis AMI smart meter does not introduce either of those.

MR. AARON: Q: Oh, so it's a well established modulation?

DR. SHKOLNIKOV: A: Yes, frequency hopping spread spectrum was invented by an entertainment performer

during World Ward II as a way to hide the information from the Nazi Germany and has been implemented by navy in 19 -- late 1960, if I recall.

MR. AARON: Q: So then there would be an opportunity to have conducted some long-term studies on long-term chronic exposure to this specific modulation, correct?

Proceeding Time 11:44 a.m. T33

DR. SHKOLNIKOV: A: I can't speak to the exposure, but I can state that the sources of exposure have existed in the environment for -- well before the 1999 report has been issued and -- I can't say for certain, but I would suspect were part of the -- were considered as part of -- some of the exposure assessment, but Bill Bailey would be able to address that.

MR. AARON: Q: So my question is, have there been any long-term chronic, so to speak, studies of the health effects of this specific modulation to which Dr. Shkolnikov refers? And can you point me to those studies.

DR. BAILEY: A: If -- it would be quite an exercise. We would be here for quite a while for me to go through and identify each and every study that has been reviewed or examined exposures similar to that produced by the smart meters. But there are similar modulations used in certain mobile phones that have been used as exposures sources in laboratory studies

and cellular studies.

MR. AARON: Q: You knew of the specific modulation of the AMI meter upon preparing the E[x]ponent Report, correct?

DR. BAILEY: A: Yes.

MR. AARON: Q: And so have able to point to any study that has considered the long-term impact of exposure to that modulation?

DR. BAILEY: A: I did not isolate, out of the studies that I reviewed, studies only on that type of modulation. I looked at the entire body of evidence.

MR. AARON: Q: And within that body of evidence can you point me to any study that considers the long-term effects of exposure to that particular modulation?

DR. BAILEY: A: Excuse me.

MR. AARON: Q: So modulation that, according to Dr. Shkolnikov has been around since 1947 --

THE CHAIRPERSON: Mr. Aaron, please let me them answer your question.

DR. BAILEY: A: If you want to do a search you can look on CDMA or UTM -- UMTS Technologies, and in the literature you'll find where that is referenced, that those would be examples of studies using this modulation.

DR. SHKOLNIKOV: A: Or a similar type of modulation. There is a definitional change when you talk to

juniors, but it is a similar type of modulation.

MR. AARON: Q: Did those studies specifically deal with long-term, so to speak, chronic exposure to that modulation?

DR. BAILEY: A: I would have to check for each individual study, as to exactly what modulation was used, but certainly in epidemiology studies there would be -- although it's not described exactly what cell phone and what modulation is used, but cell phones with this type of modulation are used in various parts of the world.

MR. AARON: Q: I understand that they're used, and I understand, Doctor, you've just referred to a particular study.

DR. BAILEY: A: I didn't --

MR. AARON: Q: CDMS --

DR. SHKOLNIKOV: A: CDMA, Code Division Multiple Access, which is an alternative to GSM phones.

MR. AARON: Q: Right, and have you not just referred to a study of that? Because I'm asking --

DR. BAILEY: A: No, I did not refer to a study.

Proceeding Time 11:49 a.m. T34

MR. AARON: Q: Oh, you said if you look or if you search. My question is simply this, and I suggest it can be dealt with very easily, is given that you wrote the E^{x}ponent Report, knowing of the specific modulation

of the AMI meter, and given that, according to Dr. Shkolnikov, that modulation is very old, it's been around since 1947, have you been able to write your report in reference to any study that's considered long-term chronic effects of exposure to that modulation, given that what is proposed is exposure of Fortis customers to that modulation for 20 years, and that modulation has been around since 1947? Is there a study in that regard?

DR. SHKOLNIKOV: A: I can address a little bit of understanding of --

MR. AARON: Q: I'm just asking the question to William Bailey.

THE CHAIRPERSON: I think it would be useful if at a starting point if you could answer the question. If there's additional elaboration that's helpful to the Panel, then we'd be interested to hear that, but let's answer the question.

DR. BAILEY: A: Sure. Sure. I'm not -- as I understand your question, did, in preparing this report, did I consider studies that included exposures with modulation characteristics like that of the smart meter system?

MR. AARON: Q: Chronic exposures is my question, yeah. Does such a study exist, is my question, and did you refer to it?

DR. BAILEY: A: I did not make a reference to a specific study like that. Again, what --

MR. AARON: Q: Does it exist?

DR. BAILEY: A: Can I continue?

MR. AARON: Q: I mean I've asked the same question three times. Does such a study exist? It either exists to your knowledge or it doesn't.

DR. BAILEY: A: I would have to go and search the literature to identify and pull out those studies that deal with specific modulation characteristics.

MR. AARON: Q: Like the EMF meter?

DR. BAILEY: A: Yes. The reason that I --

MR. AARON: Q: Well, why didn't you do that in preparing the Exponent report?

DR. BAILEY: A: May I complete my answer? The reason that I did not was because the scientific consensus is that the modulation does not produce a replicable difference in the response of organisms to radio frequency fields. And because of that, it would be limiting our assessment of the knowledge to confine ourselves just to one type of RF exposure, when what is relevant are studies at similar frequencies and exposures, exposure intensities. So I did not separate out and just cherry-pick studies from the literature based upon this one modulation type.

MR. AARON: Q: Well, this is the modulation type to --

I see my friend is rising.

MR. FULTON: Yes. All I wanted to ask, Mr. Chairman, is that parties wait until the question is asked or the answer is given before interjecting. The court reporters have a difficult enough job as it is, and it's very difficult to pick up people crossing over and talking at the same time.

THE CHAIRPERSON: Thank you, Mr. Fulton, and you're also echoing a request that I made earlier. So I certainly agree with that.

MR. AARON: Q: So you didn't cherry-pick just to included studies that dealt with that particular modulation, but it's not clear to me what your answer is to the question is -- as to the existence of a study of chronic exposure to the RF emissions at this specific modulation that's been around since '47. Does such a study exist, whether you refer to it or not, to your knowledge?

DR. BAILEY: A: I would have to go back and check a number of studies to confirm whether that modulation characteristic was included in those studies. I would be happy to do that as an undertaking.

MR. AARON: Q: Yes, a chronic study that includes long-term exposure.

DR. BAILEY: A: Mm-hmm.

Information Request

MR. AARON: Q: Thank you for that undertaking.

Proceeding Time 11:54 a.m. T35

THE CHAIRPERSON: Is that a lengthy review, Dr. Bailey? Or something that you can come back to us with in a reasonably short time frame? Not today, necessarily.

DR. BAILEY: A: I think I could have my -- the studies that I propose to review on this are those that have involved exposure over most of the animal's lifetime, and I will check them. The modulation that was used in those, and there's a limited number of those studies. There is not hundreds, so I think I could have this tomorrow morning for you.

MR. AARON: Q: Thank you.

THE CHAIRPERSON: Thank you.

Information Request

MR. AARON: Q: At page 3 of the E^{x}Ponent report --

THE CHAIRPERSON: Mr. Aaron, are you moving to a new topic at this stage?

MR. AARON: No.

THE CHAIRPERSON: No? Okay.

MR. AARON: No, I'm still in --

THE CHAIRPERSON: That's fine. Because we are going to break for lunch shortly, and I'm just trying to map out a convenient time. I'm mindful of not taking you off track.

MR. AARON: I can finish this modulation concern, I

think, very quickly.
THE CHAIRPERSON: Okay.
MR. AARON: With a few questions. It all depends upon the extent of elaboration provided by the witness.
THE CHAIRPERSON: Thank you.
MR. AARON: Q: Page 3 of the E^{x}Ponent report. Second paragraph, starting with "In the first step". Second sentence, starting with "The next step". "

> "Dose response assessment is an evaluation of the data from the hazard identification to determine what intensity and duration of exposure causes adverse effects."

And I notice you talk about the intensity and duration.
DR. BAILEY: A: Mm-hmm.
MR. AARON: Q: But you don't talk about modulation. Is that because you think modulation doesn't matter?
DR. BAILEY: A: If you look at this paragraph, this is a very general description of the health risk assessment approach.
MR. AARON: Q: Mm-hmm.
DR. BAILEY: A: And hazard -- I think the issue of modulation would really go back to an earlier stage of hazard identification. Then --
MR. AARON: Q: Oh, so then you say it does -- would it -- would modulation -- would be considered in hazard

identification?

DR. BAILEY: A: All of the research on a particular topic would be considered and to the extent that the modulation -- the issue has arisen, and it's been bandied about for, you know, since the 1980s, anyway, as to modulation might be important. Then that would be part of the review that would assess what potential adverse effects were -- or resulted from exposures.

So, the modulation study, or investigation, I believe, is really probably part of what is included in the hazard identification stage. So, the review by scientific and health agencies of the literature, if they determined that there was a difference between one type of modulation and another, that would have been developed in part of the hazard identification stage.

MR. AARON: Q: Mm-hmm. On page 18 of the E^{x}Ponent report, the last five lines, you state:

> "Given the dose response nature of effects on human health, mobile phone exposures represent the highest dose scenario for people in the general population and therefore the greatest potential for detecting adverse response to RF exposure."

So you're saying because the reason that phones have the greatest potential for adverse response is because

of the high dose associated with them. Is that correct?

DR. BAILEY: A: The -- yes, and the strategy -- if you want to try and detect an effect of an exposure, then you want to look at the highest possible exposures, with the idea that it might be easier to detect an effect in populations with higher intensity and higher duration experience.

Proceeding Time 11:59 a.m. T36

MR. AARON: Q: But there's an assumption there, isn't there? And the assumption is that the higher the dose, the more you have adverse biological effects, correct? You're operating on that assumption?

DR. BAILEY: A: In a general sense that is the fundamental principle of toxicology, that the dose makes the poison. And so obviously if you do not see an effect at a very high dose and you do not see an effect at a very low dose, then you can titrate to determine at what point in between there is some kind of threshold or --

MR. AARON: Q: Right. I don't see that's what you've done in your analysis. You haven't looked at the threshold. You've just looked at a causal relationship between more dose and more adverse effects. You've said "Given the dose response nature of the effects on human health, mobile phone exposures

represent the highest dose scenario for people in the general population, and therefore, because they're high, they are the greatest potential for detecting adverse response." So what I'm putting to you is that within that statement, you are depending on the assumption that the higher the dose the more the response. In that statement.

DR. BAILEY: A: In this statement I'm pointing out that a particular reason for looking at the exposures of people in the population or in laboratory exposures to mobile phones is because that presents a much greater exposure in intensity than do the sources, other sources including smart meters.

MR. AARON: Q: Well, you've said "the reason for the phones having the greatest potential for adverse response is the highest dose response". That's what you've said, haven't you?

DR. BAILEY: A: This --

MR. AARON: Q: You haven't said a -- a reason to look at phones is the high dose. You've said because it's got a high dose it's got the highest adverse effect.

DR. BAILEY: A: I didn't say -- the sentence, I think, reads for itself, sir.

MR. AARON: Q: Okay.

DR. BAILEY: A: And I stand by the sentence.

MR. AARON: Q: Okay.

DR. BAILEY: A: And the implication of the sentence is that if one wants to try and identify potential adverse effects on the exposure, looking at a population or a type of exposure that is far higher than what is encountered from other sources on environment would be a good place to look.

MR. AARON: Q: All right. I'm going to move within this topic to the notion of a power density window. Are you familiar with that concept?

DR. BAILEY: A: Yes.

MR. AARON: Q: Right, and I think the best -- rather than me try to describe what a power density window is, I'll refer to the Safety Code 6 review at page 34. 1999. Sorry. Right, the Royal Society Review of Safety Code 6.

DR. BAILEY: A: Okay. And the page number again, sir.

MR. AARON: Q: 34.

DR. BAILEY: A: 34.

MR. AARON: Q: And I'm just going to read in some excerpts from page 34 to 36 and ask you to confirm that this what is meant by a power density window.

Starting at the top of page 34, first paragraph:

> "One of the key…priorities for *in vitro* studies, identified by the World Health Organization program…is to 'determine RF

field thresholds for altering the cell-cycle kinetics and proliferation of normal and transformed cells'."

Proceeding Time 12:03 p.m. T37

Skipping to the next paragraph they talk about reports of increased proliferation in glioma cells after a single two-hour RF exposure to either of these frequencies. And they talk about statistically significant differences having been observed at the lowest SAR level. And at the end of that paragraph, alterations in cell-cycle kinetics under similar conditions with another cell culture.

Over to the paragraph starting with "Stagg" in the middle of the paragraph.

"In these experiments, increases in radiolabeled nucleic acid uptake in DNA synthesis were observed in one subset of log-phase C6 glioma experiments at SAR of 5.9 mW/mg…"

And then over onto the next page.

DR. BAILEY: A: Page 35?

MR. AARON: Q: Yes. They go on to consider the effects of Ca^2. And in the middle of the paragraph, they say:

"This effect is not directly dependent on power density."

And this is the topic of the discussion, is that

certain effects have been seen to have occurred that aren't about the power being more, they're about something else. This effect is not direct at power density.

Next paragraphs starting with -- sorry, is everyone following me? It says, "In 1975," and in the middle of that paragraph. It says "This effect is not directly dependent on power density."

Next paragraph, second sentence.

> "Therefore, the results just described above are referred to in the literature as a power density window…"

And then they talk about this modulation frequency dependence, that is the reaction they found was dependent on particular modulation frequency, having been replicated in Blackman, 79, studies that showed power density window effects at 7.5 watts per metre squared but not at 5 watts per metre squared, or at 10.

So, I'm not a scientist, but to summarize, there were no effects at 5, there were no effects at 10, but there were effects at 7.

A further study by Blackman found an effect dependent on frequency modulation. And then at the bottom of the page,

> "In summary, power density windows have been

observed for extremely low frequency modulation of RF microwave carriers. Evidence that this does not occur at frequencies above 1000 megahertz is inconclusive, since low SAR…"

We don't have to worry about that, because we're not above 1,000.

"Therefore, this is a body of data that suggests that ELF-modulated RF radiation may affect Ca^2 efflux from brain tissue."

So I read all this so that you know what I mean by power density window. If I use the term "power density window", is it clear to you what I mean?

DR. BAILEY: A: Yes.

MR. AARON: Q: All right. And I know we're looking for a break. I mean, my question is, there is no discussion in the E^{x}Ponent Report, is there, of possible -- this possible phenomenon being applicable to health effects, that is, the health effects occurring not at a higher level, not at a lower level, but at some intermediary level characterized as a power density window. And if there is such a reference in the E^{x}Ponent Report, please take me to it.

DR. BAILEY: A: There -- if you're -- I'm sure from your reading of the E^{x}Ponent Report, we specifically

did not include a discussion of *in vitro* cellular studies because of their -- for two reasons.

Proceeding Time 12:08 p.m. T38

One is that these studies have been viewed elsewhere by the agencies that we cited, and also in health risk assessment *in vitro* studies have a limited relevance, in the sense that one can observe effects in isolated cells and tissues that may not be observed in an animal or a human --

MR. AARON: Sorry, Mr. Chair, the question --

DR. BAILEY: A: -- or *vice versa*.

MR. AARON: The question was -- he's not answering the question. The question is, does the study -- does the E[x]Ponent Report deal with power density window, that phenomenon. It doesn't deal with different kind of studies, whether *in vitro* or epidemiological.

DR. BAILEY: A: These are *in vitro* studies. What you are discussing here, the phenomena of --

MR. AARON: Q: Okay.

DR. BAILEY: A: -- of power density windows --

MR. AARON: Q: Okay.

DR. BAILEY: A: -- is something that has arisen in *in vitro* studies and all of the studies, sir, that you have put to me here on the pages --

MR. AARON: Q: Okay.

DR. BAILEY: A: -- are *in vitro* studies.

MR. AARON: Q: So then would the answer to my question as to whether the E[x]Ponent Report discusses the power density window phenomenon be no, because that phenomenon is based on *in vitro* studies? Is that the answer to my question?
MR. MACINTOSH: That was the answer that was being given when the witness was cut off. That was --
MR. AARON: I just prefer to have the answer before the long explanation.
DR. BAILEY: A: That was the purpose of my explanation, to explain that.
MR. AARON: Q: Okay.
DR. BAILEY: A: And I also want to -- since you've drawn my attention to it, on page 35, in that first paragraph --
MR. AARON: Q: So, just to clarify the answer, and I'll let you go there --
DR. BAILEY: A: Yes.
MR. AARON: Q: -- the answer to my question is no, the E[x]Ponent Report does not refer to the power density window phenomenon, correct?
DR. BAILEY: A: Because it did not --
MR. AARON: Q: Okay.
DR. BAILEY: A: -- discuss *in vitro* studies.
MR. AARON: Q: Thank you.
DR. BAILEY: A: Okay? On page 35, in the first full

paragraph, is a --

MR. AARON: Q: Of which document?

DR. BAILEY: A: Again, this is the Royal Society, 1999 document, that you were just --

MR. AARON: Q: Okay.

DR. BAILEY: A: -- referencing. And in the first full paragraph down they're describing a study by Bawin *et al.* in 1975. And the incident power density used was 10 to 20 watts per metre squared. Very high -- which is higher than the safety code limit of 2 watts per metre squared.

MR. AARON: Q: I'm not following you. Under which heading are we?

DR. BAILEY: A: It's under 6.2, "Radio frequency effects on calcium".

MR. AARON: Q: Oh. Does this have to do with power window density?

DR. BAILEY: A: Yes, it does.

MR. AARON: Q: Okay.

DR. BAILEY: A: This study was one of the pioneer studies that led to the concept of power density windows.

MR. AARON: Q: Okay.

DR. BAILEY: A: And so, in their discussion, it's very appropriate that they cite this study. But if you -- I'm just pointing out what the field levels are here,

of 10 to 20 watts per metre squared, which is higher than Safety Code limit 6 of 2 watts per metre squared.

MR. AARON: Q: Mm-hmm.

DR. BAILEY: A: So, these exposures are far higher than what we're talking about with regard to smart meters. But the sentence that I want to call your attention to is that the sentence goes on and says:

> "This effect is not directly dependent on power density."

And although it's not quoted here, this group of studies includes a study in which the tissue was poisoned by cyanide, and exactly the same effect was observed.

These are very crude studies. What was done in these studies is to take out a piece of a whole brain, put it in a test tube and expose it to radio frequency fields, and that brain had been -- the solution surrounding it had been -- contained radioactive calcium. And so that radioactive calcium then attached itself to the surface of the brain. And then when they exposed it to these radio frequency fields above the safety code limit, more of this radioactive calcium disassociated itself from the outside of the tissue and came back into the medium.

And so it was not really looking at the way that calcium is used by tissues. It's more of a

surface effect.

Proceeding Time 12:13 p.m. T39

So you could do the same thing with putting radioactive calcium on my hand, leaving it there for a period of time, then washing it off. It wasn't looking at the function of calcium within the cells, and the experiment was done later to find out the biological relevance of this, and so they poisoned the brain with cyanide so that it could not function and they got exactly the same results, indicating that this calcium response was not something that was associated with a living biological activity. Rather it was a reflection of a disturbance of the medium around the surface of the brain, and so therefore more of the radioactive calcium washed off.

But I just point that out as an example of how you have to be very careful, Mr. Aaron, in trying to pull out individual studies and draw conclusions about them. And this power density phenomena has not been confirmed as a reliable fact, either in *in vitro* studies or where it's been looked at --

MR. AARON: Q: It hasn't been confirmed and it also hasn't been discussed in your paper.

DR. BAILEY: A: It was not discussed, as I pointed out.

MR. AARON: I don't think I can impose further on the panel and the staff, although I'm not finished with

power density window. I ought to canvass the panel for the need to break.

THE CHAIRPERSON: Thank you, Mr. Aaron. We will break now then and we'll reconvene at 1:15.

(PROCEEDINGS ADJOURNED AT 12:15 P.M.)

(PROCEEDINGS RESUMED AT 1:14 P.M.) **T40/41**

THE CHAIRPERSON: Please be seated.

Please continue, Mr. Aaron.

MR. AARON: Mr. Chair, just to give the Panel an idea of the progress that I'm making, I'm perhaps one-fifth and not one-quarter of the way through my cross-examination. It's taking longer than I anticipated because of the elaborate answers and explanations that we're getting. So I just provide that information to put the timeline in context.

THE CHAIRPERSON: Thank you.

MR. AARON: Q: Dr. Bailey, you already alluded to this in your testimony, but what is the reason why your E^{x}ponent Report didn't consider the role of modulations in terms of the role of the factor in the bioeffects of non-thermal RF emissions?

DR. BAILEY: A: The reason, as I explained earlier this morning, from my perspective it was included under the discussion of non-thermal effects, and also that the modulation issues have not been shown in the literature to be robust enough to have influenced a

risk assessment. That is, that the effects that are reported to radio frequency fields are not judged to be particularly sensitive to the modulation of the exposure.

MR. AARON: Q: So to address the first part of your answer that it was discussed under non-thermal effects --

DR. BAILEY: A: I said in my assessment I considered it in mind to be discussed, but I did not discuss the specific -- it falls within the topic of non-thermal effects --

MR. AARON: Q: I understand --

DR. BAILEY: A: -- and that I did not discuss that level of detail under the non-thermal effects discussion.

MR. AARON: Q: Right.

DR. BAILEY: A: But it is found in the discussion of other reports such as we discussed in the Royal Society and other reports that I have referenced in the E^{x}ponent Report.

MR. AARON: Q: Okay, so you can confirm that it's not discussed in your paper.

DR. BAILEY: A: Yes, as I spoke earlier this morning, yes.

MR. AARON: Q: All right. Now, on the question of whether the science on whether modulation has a

significant or robust effect, or robust role in the bioeffects of RF emissions, I'm going to challenge you on that by reference to the report of Karl Maret which is at Exhibit C9-8. This is Karl, who on page 4 of his report, just to contextualize this, says that his formal education includes a Bachelor of Science in electrical engineering from Queen's University, a Master's a engineering in biomedical engineering from U of T, and Doctor of Medicine degree from -- also from U of T.

Proceeding Time 1:19 p.m. T42

So, talking about someone who has a unique combination of a medical degree and a bachelor of science in electrical engineering and a master of electrical -- has a degree in biomedical engineering. Master of engineering, sorry.

So at the preamble of his report, on page 2, the last sentence, he says:

> "It's in the nature of the non-thermal RF pulsations and not the power density levels that constitute the adverse biological effects of the meters."

And I put it to you that that is a challenge to your assertion that the role of modulations is -- has not been found in the science to be robust. His opinion is in contradiction with that. Correct?

DR. BAILEY: A: I don't think that that sentence is specific enough to constitute the challenge that you believe it is.

MR. AARON: Q: Okay.

DR. BAILEY: A: If you could point me somewhere else --

MR. AARON: Q: Sure.

DR. BAILEY: A: -- to something that's more relevant.

MR. AARON: Q: Okay, let's try page 6. I'll point you to a few passages, and then re-put the question to you, if I may.

Page 6, middle of the page, paragraph starting:

> "By averaging the power density over…the day, by multiplying the peak power density by the duty cycle, a much lower average value is obtained which looks quite low when compared to the current RF exposure guidelines."

Skipping a sentence.

> "Averaging in this way, which is a commonly accepted practice, tends to obscure the potentially significant biological impact of short-term burst RF transmissions at peak power density levels which these meters generate. The pulsed nature …"

I emphasize.

"The pulsed nature of the 900 megahertz transmission at irregular intervals is quite different than other existing wireless type transmissions. Current wireless devices tend to be more continuous types of transmission."

The next sentence:

"No human, animal, cell studies or environmental impact studies involving these types of transmission patterns from smart meters have been carried out prior to the deployment of these new technologies."

And I put it to you that the last sentence there is a direct challenge in the terms that I put to you earlier in cross-examination, as to whether there exist studies that have dealt with chronic exposure to this specific modulation. And you've taken an undertaking as to produce such a study.

DR. BAILEY: A: I do have an undertaking that I will be working on, yes.

MR. AARON: Q: Then it -- would it seem -- am I correct in interpreting Maret as saying that there have been no such studies? So I put it to you that there have been no such studies.

DR. BAILEY: A: There is -- the answer to that is, there have been studies that have looked at the 900

megahertz transmission as it is incorporated in mobile phone technologies, and similar in nature to that of the Fortis smart meters, and there are studies in the literature on that point, and I'll ask Dr. Shkolnikov to comment on the burst transmission patterns.

MR. AARON: Q: Yeah. I'm not asking about whether there have been studies in the 900 megahertz frequency. I'm asking whether there have been studies involving, to quote Maret, "these type of burst transmission patterns" from smart meters. It's the particular modulation --

DR. BAILEY: A: And I -- yes.

MR. AARON: Q: That's my concern.

DR. BAILEY: A: And I want to get the exact answer from Dr. Shkolnikov --

MR. AARON: Q: As to whether --

DR. BAILEY: A: -- from the engineering perspective in terms of the technology and, if necessary, I'll come back and address the biology.

MR. AARON: Q: Okay. So the question for you, sir, Doctor, is have there been studies involving that kind of burst modulation?

DR. SHKOLNIKOV: A: GSM phones, which have been studied, are a type of a phone which is called "time division multiple access", which means that they share the same frequency when they communicate.

Proceeding Time 1:24 p.m. T43

Eight phones can share the same communication frequency. They achieve that by rapidly turning on and off only for a short duration. So a GSM phone which dominates, still dominates the communication in the world and was part of the studies, part of the phones considered by Interphone studies, do switch very rapidly on and off, and when they are on, during the conversation as you have a phone call, they turn on and off about 217 times a second. So they turn on for a short duration of time and then they shut down, and they repeat this burst transmission about 217 times a second.

MR. AARON: Q: And the Interphone study was a long-term study of chronic exposure to that?

DR. BAILEY: A: That was an epidemiology study in terms of asking people about their use of mobile phones, but that dominant technology in Europe is the GSM mobile phone.

MR. AARON: Q: Okay, I'll just repeat my question. Was that a study of long-term chronic exposure to those emissions?

DR. BAILEY: A: Yes. As a human -- let's put it this way. The study involved the comparisons of people's exposure of use of mobile phones, which would have included for the most part GSM mobile phones, and

asked people about the length of time and frequency that they used those mobile phones.

So these mobile phones, presumably to the length of time that people use them, are a source of chronic exposure, but those are not the same as the type of studies in which there is a controlled exposure over -- of to known levels and types of frequencies over long periods of time.

MR. AARON: Q: So you're saying that Karl Maret is incorrect that when he says there's been no human, animal, cell studies or environmental impact studies involving these types of burst transmission patterns from smart meters? He says those studies haven't been carried out prior to this technology, you say they have been carried out with respect to these type of bursts and you cite the Interphone study as such.

DR. BAILEY: A: And many other laboratory studies. So what we're saying here is that just because something is called a smart meter doesn't necessarily mean that the type of modulation that is used has never appeared anywhere in the world before. And as Dr. Shkolnikov testified, that it is a component of the GSM signal during communications.

MR. AARON: Q: So then you're saying Dr. Maret is incorrect in his statement in the last sentence of that paragraph?

DR. BAILEY: A: Yes.
MR. AARON: Q: All right. And in the Interphone study, that's the study where the group -- there was a significant correlation between exposure and brain cancer in the group of heaviest use, usage time, correct?
DR. BAILEY: A: Only among the heaviest usage of time, yes.
MR. AARON: Q: Okay, thank you. All right then, on to page -- oh, I should just ask you. In the results reported in the Interphone study, is there a distinction made in the reporting as between one kind of specific modulation and another kind of specific modulation? I'm hearing that the Interphone study included the kind of pulse modulations that we'd see in this proposed AMI meter. But in the reporting, does it distinguish between these kind of modulations?
DR. BAILEY: A: No, it does not.
MR. AARON: Q: Okay. Then going on to page 9 of Maret, just with respect to the challenge to your assertion that modulations is not a factor, under the heading "Dr. Maret's Response" he says:

> "The principal characteristic of these transmission is their intermittent brief nature with each transmission burst estimated to last a fraction of a second

(…less than 20 milliseconds). During active transmissions, the 902 to 928 megahertz carrier will be rapidly switched on and off as part of an assumed type of pulse code modulated (PCM) digital data stream being transmitted to the data collector located in the neighbourhood. If each meter's electrical transmission were to be compared to sound, it might be characterized as analogous to a sudden gunshot or a similar burst of sound followed by quiet until the next burst or transmission."

Proceeding Time 1:29 p.m. T44

So I put it to you Dr. Maret's view is contradictory to yours. You -- he thinks that the principal characteristic for the purpose of analysis of risk assessment is the intermittent brief nature -- in colloquial terms, the "burst" -- he says this is the most important thing. And you disagree with him, correct?

DR. BAILEY: A: What I have disagreed with is something different than what you just stated, but what I think is important to recognize is that -- I mean, he has stated before that this technology, the exposures of the type associated with the smart meter technology, have not been studied on biological systems. I take

that to be the essence of his response. And my position is that that is not correct, that we have lots of studies in which the modulation characteristics of the Fortis smart meters have been part of the exposure to animals and -- in studies. And --

MR. AARON: Q: I'm actually on to a different point, and I'm sorry to interrupt you. The point is, you said that modulation is not a robust enough characteristic according to the established science in relation to its impact on adverse effects, or bioeffects. Maret, I put it to you, challenges that. He says that the prime -- he looks at the pulses as being, in his language, the prime -- the principal characteristic.

DR. BAILEY: A: Okay.

MR. AARON: Q: And so the question isn't about the research.

DR. BAILEY: A: Now, I think I have a little clearer understanding of the question you're asking.

MR. AARON: Q: Okay.

DR. BAILEY: A: My comment, response to that, is that the exposure to the -- to a mobile phone includes what he has characterized as pulses, we described as bursts. And this carrier field. And so any response that is reported by cells, or animals, or people, to

that exposure, will include all of these components.

It seems to me that he is saying "I have some kind of special insight into the literature, and I know that the only component which is important is this pulse modulation." In my assessment of the evidence, and the assessments that's done by the agencies, we look at the response to the whole signal, whatever it contains. However -- how many -- however many bursts or how many pulses it has, we're looking at the response to that whole exposure and are not picking out in advance a component and say, "This is the only thing we should look at."

MR. AARON: Q: Now, you're looking from primarily at power level. And I'm challenging that.

DR. BAILEY: A: No, I am not. This has nothing to do with power level.

MR. AARON: Q: Well --

DR. BAILEY: A: It has to do with the characteristic of the exposure -- not -- has nothing to do with the power levels, sir.

MR. AARON: Q: Right. And one such characteristic is the pulse modulation. And I'm just going to point you to a couple of other things Maret says about it, and by that I am challenging your assertion that it's not a robust factor, and further I'm also challenging your failure to discuss it in the report. And so I will

take you to --

DR. SHKOLNIKOV: A: Excuse me. I'd like to point out that Dr. Maret is incorrect in terms of types of modulation that has been used. PCM is not a modulation utilized in Fortis AMI smart meters.

DR. BAILEY: A: That's on page 9 in the first paragraph of his response.

MR. AARON: Q: Okay. All right, thank you.

At -- so, you're saying he's incorrect in the type of modulation. But you wouldn't dispute that there is a particular modulation -- there is a particular pattern of bursts associated with the proposed AMI meter.

DR. SHKOLNIKOV: A: I think this is where it would be appropriate to mention that modulation has a very specific definition. These devices use something called "frequency shift keying modulation" where they change the frequency of the signal and not the amplitude. The pulse code modulation which is the type that is used in CD players is a very different type of modulation.

Proceeding Time 1:34 p.m. T45

MR. AARON: Q: Okay.

DR. SHKOLNIKOV: A: Those devices do turn on and off. That's not a modulation of the signal for purposes of transmission of the signal. It's really for purposes

of conserving power when they're not transmitting. But it is incorrect to say that they're pulse code modulated signals.

MR. AARON: Q: So what kind of modulation is this again? You said it but I forgot.

DR. SHKOLNIKOV: A: Yes. So the full term for this after discussion with Itron and it's in agreement with what's in SEC is frequency hopping spread spectrum, frequency shift keen. So that's the terminology and acronyms is FHSS-FSK.

MR. AARON: Q: Okay, so that's the particular modulation of the AMI meters.

DR. SHKOLNIKOV: A: Yes.

MR. AARON: Q: And so in the future if I refer to the AMI meters modulation, I'll be referring just to that, all right?

DR. SHKOLNIKOV: A: Okay.

MR. AARON: Q: And you're saying Dr. Shkolnikov, that the AMI modulation, that particular one, was studied in the Interphone study and that there was a study with respect to long-term chronic exposure of that specific AMI modulation, correct?

DR. SKOLNIKOV: A: No. What I was saying is that in addition to modulation, there is a concept of how much you're on air, and that's a -- it's sometimes referred to as multiple access. So cell phones, like GSM

phones, because they need -- they're constrained by their available spectrum, will communicate only a fraction of the time -- fraction of the time. So this gives their burst nature.

So GSM phones use a related technique for modulation. It's also FSK or frequency shift key base technique. And the phones do turn on and off in a similar fashion, as smart meters do also turn on and off. It's not a type of a modulation. It's just a characteristic of burstness, I would say, of their transmissions, that they don't continue to transmit. And that's a part that I will say is similar. Both the GSM phones and AMI smart meters don't transmit all the time.

MR. AARON: Q: Oh, I misinterpreted. I thought you were saying that the Interphone studies studied emissions of the same modulation as the AMI meters, but that's not what you were saying.

DR. BAILEY: A: If I could clarify, what Dr. Shkolnikov mentioned is that in many countries, particularly in Europe where the Interphone study was conducted, the main type of phone is the GSM phone, and so although--

MR. AARON: Q: Yes, does the GSM phone have the --

VOICE: Let him answer.

DR. BAILEY: A: Although the study itself did not focus on a particular type of phone or particular modulation

characteristic, if you ask people in Europe about how long you've used a cell phone or what's -- most of those people, my guess would be, would be saying that they used a GSM phone. But there's nothing in the study about GSM phones because they were just asking people, "How long have -- when did you start using a cell phone? How long have you used it for? How many minutes for?" But we don't have any data in that study about what was the exact mobile phone they used? Was it a GSM mobile phone?

And all Dr. Shkolnikov was saying is that the most prevalent type of mobile phone in Europe, for example, is the GSM, which incorporates these modulation characteristics like the Itron meter.

MR. AARON: Q: But it doesn't incorporate the same modulation characteristic which Dr. Shkolnikov referred to by some complicated acronym which I refer to as the AMI meters, specific modulation. You cannot tell me that the GSM phone incorporates that same modulation pattern.

DR. SHKOLNIKOV: A: We will come back to it tomorrow with direct comparison. But going directly to Maret's point where he's talking about the fact that it's not a continuous source but it has a burst nature to it, where it's on for some duration time --

MR. AARON: Q: Okay --

DR. SHKOLNIKOV: A: -- and off, that characteristic is shared between GSM phones --

MR. AARON: Q: Okay --

DR. SHKOLNIKOV: A: -- AMI meters, DECT phones, and a lot of other technology that is currently utilized.

MR. AARON: Q: So I think we're in agreement that there's been studies of phones that modulate and pulse, but we can say that there have been studies of phones which have the same particular AMI modulation as the proposed AMI meter. Correct?

Proceeding Time 1:39 p.m. T46

DR. SHKOLNIKOV: A: We will come back with that answer tomorrow.

MR. AARON: Q: Okay.

Information Request

DR. SHKOLNIKOV: A: All I was saying is that the nature of my understanding of Maret's response, he's specifically referring to the fact that it's not continuous transmission but is intermittent transmission and from that perspective, GSM phones, as well as actually a lot of other technologies, share that characteristic with AMI smart meters.

MR. AARON: Q: Okay. He says further at the bottom of page 11,

"To summarize, the current exposure guidelines adopted by Health Canada as

Safety Code 6 are closely aligned with ICNIRP and do not consider long-term exposure…"

And he also says it doesn't consider modulation patterns of the RF carrier.

So he is saying that Safety Code 6 doesn't consider modulation patterns. And then he --

DR. BAILEY: A: I'm having trouble just -- on page 11?

MR. AARON: Q: Sorry. Bottom of page 11.

DR. BAILEY: A: And it's the last full paragraph?

MR. AARON: Q: Yeah. "To summarize".

DR. BAILEY: A: Okay, okay. I was trying to find it over there.

MR. AARON: Q: So, he says a couple of things which I'll ask you to -- I'll put to you. He says Safety Code 6 and ICNIRP don't consider modulation patterns. Or low thermal effects, next page. He says

"The standard is solely concerned with short-term exposures leading to tissue heating effects. Thus these standards do not protect the public from low-level chronic exposure which includes emissions from the RF network…"

So, I challenge you. I say, Safety Code 6 doesn't consider modulation patterns. Correct?

DR. BAILEY: A: The standard does not -- the review of

the standard considered -- of research leading to the standard considered modulation patterns, but the standard itself does not carve out a different exposure limit for radio frequency sources with different types of modulation.

MR. AARON: Q: Okay, let's pause there. The review of the research -- sorry. Safety Code 6, it reviewed research and you're saying it reviewed research that considered modulation patterns. Are you saying that?

DR. BAILEY: A: I am saying that in the research literature we have studies that, whenever a particular source is described, it will typically also identify the type of modulation, if there was modulation, in the exposure assessment. And so those modulations are described in the studies and so if you review the literature, then you're reviewing studies with different -- all different types of modulations.

MR. AARON: Q: Well, you're saying two different things, Doctor. First you're saying Safety Code 6 reviewed studies that deal with modulations, and then in your second answer you said what we have in the literature. So, the first answer goes to what Safety Code 6 considered and the second goes to what we have in the literature.

I'm suggesting to you that Safety Code 6 did not consider modulation patterns. And you're

saying that Safety Code 6 did. Correct? That in the review of the material the reviewers considered modulation patterns.

DR. BAILEY: A: I can't speculate about how they interpreted the data, because that's not described. But I can tell you that in the literature we have biological and cellular studies with exposures that are described with a variety of modulations, and any review of that literature by Safety Code 6 or any other agency would have looked at this, given that modulation has been a topic since the 1980s.

MR. AARON: Q: I appreciate that if the Safety Code 6 authors had reviewed this, they would have seen that. But I'm saying they didn't. Karl Maret says they didn't review it, and you say they did review it. Am I correct in interpreting your testimony as saying that the Safety Code 6 authors reviewed literature that dealt with modulations. Yes or no?

I'll repeat the question.

Proceeding Time 1:44 p.m. T47

DR. BAILEY: A: I understand the question.

MR. AARON: Q: Yeah. Am I correct in interpreting your testimony as saying that the Safety Code 6 authors reviewed literature that dealt with modulations? Is that what you're saying?

DR. BAILEY: A: My statement is that this literature

was -- if literature was reviewed by a body, Safety Code 6 or anyone else, it included studies of different types of modulations. I don't know, I can't go into the minds of the reviewers to further intuit how they dealt with that information. But it did not result in a standard that was different for fields of different modulation.

MR. AARON: Q: You're not answering my question, sir. You said -- your answer was "If they reviewed it they would have considered it." I'm not -- and I'm asking you whether they reviewed it and whether you know they reviewed it, and so you're not answering my question by saying, "Well, if they reviewed it, something would have followed," okay? The suggestion that's put to you, the challenge that's put to you is that the Safety Code 6 reviewers did not review, did not consider modulation patterns. And earlier on your evidence you said, "Well, that they did consider it," or -- then you said, "Well, if they considered it they would have seen it." So which is it?

DR. BAILEY: A: Okay, I'm sorry if I have been in any way unclear in my answers, but let's just go to Safety Code 6 and turn to the reference list. These are documents that are cited by the reviewers of materials in their formulation of Safety Code 6 and they make reference to these documents as an indication of

things that are relevant to the issues that are discussed.

MR. AARON: Q: What page are you on?

DR. BAILEY: A: It's on page 24. If you go to, for instance, reference number 9, the IEEE standard.

MR. AARON: Q: Yes.

DR. BAILEY: A: There is a long and lengthy discussion about modulation in there. If you go to --

MR. AARON: Q: Okay, well, let's -- let's pause there.

MR. MACINTOSH: No, no, excuse me. I'm interrupting my friend, who has been interrupting the witness. Now, he has put the question and had the answer in ways that in my respectful submission were satisfactory. He has refused to accept the answers. He has pushed the point further and he has caused Dr. Bailey to have to go to Safety Code 6 to verify that the people who prepared Safety Code 6 accessed data which took modulations into account. My friend refuses to receive that because it's not consistent with his view of life.

But my friend must listen to the answer where the answer is just getting at what he keeps asking and keeps refusing to hear. With great respect, he has to let the witness answer.

THE CHAIRPERSON: I would agree with that.

Dr. Bailey, do you have some additional

studies to cite in responding to this?

DR. BAILEY: A: Yes, I do, sir. We would have to go to another document on page 25. Yeah, there's a number of -- reference number 21, "Exposure to ELF Magnetic and ELF Modulated Radio Frequency Fields, the Time Course of Physiological and Cognitive Effects". It's a review of the literature and studies between 2001 and 2005.

Proceeding Time 1:49 p.m. T48

I would have to check, but perhaps reference 25 might also have a discussion of this. Reference 30 will have a discussion of this topic. Reference 31 will have a discussion of this topic, and reference 32. So, there may be others, but I would have to actually look at them to make sure in that particular document that that topic was covered.

So there are -- my testimony is that the -- any review of the radio frequency literature on exposures relating to health would have -- if it was at all comprehensive and not selective -- would have included studies with different types of modulations, and that those studies were -- and those reviews that discuss this topic were referenced by Safety Code 6.

So my -- the implication is that the reviewers, the people who developed Safety Code 6 had read and reviewed studies that considered different

types of modulation and when they set up the standard they did not set up or carve out a specific exemption or specification that related to modulation.

MR. AARON: Q: I appreciate that they're studying modulated RF. The question is whether the studies look at modulation -- whether they're designed so as to consider whether modulation is a characteristic to be assessed in and of itself as a factor in risk assessment. And the question is, do any of these studies do that?

DR. BAILEY: A: Yes. That's -- that was just my testimony.

MR. AARON: Q: All right. And so let's look at number 9. So this is at which exhibit?

DR. BAILEY: A: Where is it? We'll try and pull that up.

MR. AARON: Q: All right. So, I'm willing to defer that question.

DR. BAILEY: A: Well, it all depends on what -- I mean, if the question is, is this question discussed? It is.

MR. AARON: Q: It's whether the study looks at modulation as a factor in and of itself. Whether different modulations or whether the pulsed nature -- basically, in my layman terms …

DR. BAILEY: A: That's not what I -- that's not the --

MR. AARON: Q: Perhaps you could give us an idea of where we should be looking.

DR. BAILEY: A: Yeah. I just want to go back to try and find something.

MR. AARON: Q: Or what exhibit that document is at. So we can all get ready for you.

DR. SHKOLNIKOV: A: It's -- at least here, you go to the C19 -- oh, so, C9-13.

MR. AARON: Q: Where this ICNIRP study is?

DR. SHKOLNIKOV: A: I just see C9-13-3. I would have to --

MR. AARON: Q: Because we're looking for the study that's referenced as footnote 9 in Safety Code 6, right?

MR. MACINTOSH: I just want to explain, in fairness to the witnesses, Mr. Chair, what is going on. If I may.

So, the panel -- the Commission may be following this, I'm not sure. But what's happened is, the cross-examining has been asking Dr. Bailey whether or not those who created Safety Code 6 took modulation into account in their considerations in any way.

Proceeding Time 1:55 p.m. T49

THE CHAIRPERSON: Yes.

MR. MACINTOSH: Dr. Bailey said he couldn't get into their minds, but then he said it's pretty clear from looking at certain of the publications here that they

addressed modulation, and my inference is therefore they did consider it.

Dr. Bailey then was asked to look at the references at the end of Safety Code 6 and identified five of them, six of the references which addressed modulation. The first one he addressed is the one at footnote 9. It is 237 pages long. It is Appendix B.C. Hydro IR 2 2-12, and my friend is now asking him to find where in this 237-page study modulation is considered. And I say that only because I want there to be fairness to the witness for the task that is now being assigned to him.

MR. AARON: I'm willing to defer and have it an undertaking.

MR. MACINTOSH: Sure.

THE CHAIRPERSON: I would rather that we defer that.

MR. MACINTOSH: I thought --

MR. AARON: An undertaking --

MR. MACINTOSH: -- find a --

THE CHAIRPERSON: -- too many high-priced lawyers in the room to spend a lot of time here, while we sit --

MR. AARON: Q: How about I put it this way. Could you undertake to refer me to the provision, the part of any of those references that you referenced in Safety Code 6 that address my concern and Karl Maret's concern, or that answers Maret's concern that Safety

Code 6 has not considered the effect of modulating patterns as a variable in the risk assessment in relation to RF emissions? And you refer to several Safety Code 6 studies which are referenced in Safety Code 6, and I invite you to show me within any or all of those studies where modulations have been studied as a factor so as to impugn my suggestion that the authors of Safety Code 6 have not --

THE CHAIRPERSON: I think that's clear.

MR. AARON: Q: Yeah.

DR. BAILEY: A: Okay. So my undertaking will be provide -- to identify the documents cited in Safety Code 6 as to where the modulation characteristics were considered.

Information Request

MR. AARON: Q: Yes. And then I would put the same challenge to you with respect to ICNIRP, because Maret has said neither ICNIRP nor Safety Code 6 consider modula- -- long-term exposure, modulation patterns, and low-level non-thermal effects.

DR. BAILEY: A: And you're adding some -- excuse me.

MR. AARON: Q: That's his statement and it includes modulation.

DR. BAILEY: A: Is the undertaking having to do with modulation?

MR. AARON: Q: Yes, it is.

DR. BAILEY: A: Okay.
MR. AARON: Q: Although I'm going to get to long-term effects and I'm not going to be surprised --
THE CHAIRPERSON: Well, let's deal with that as a separate issue, please.
MR. AARON: Yeah. Sure. Just the shot across the bow there. We're forgetting the long-term effects.
THE CHAIRPERSON: Well, okay, let's -- we'll get to that one when we get to it.
DR. BAILEY: A: Fine.
MR. AARON: Q: And at -- the science with respect to the robustness of modulation and the risk analysis is partially set out at page 20 of the Maret report where he says, "The type of…" Oh, sorry, under the heading "Effects of Modulation Patterns" he says:

> "The type of modulation used in wireless signals influences the extent to which RF radiation affects living tissues."

And is that a statement you agree with or you disagree with, that the type of modulation used influences the bioeffect?

Proceeding Time 2:00 p.m. T50

DR. BAILEY: A: There are reports that make those kinds of claims. Whether it's a reliable phenomenon or not, I do not know.
MR. AARON: Q: Okay. And you're saying those reports

haven't been discussed in the E[x]Ponent Report, but they have been discussed by ICNIRP in Safety Code 6, although you can't get in their minds. You are saying they were considered.

DR. BAILEY: A: It's, to the best of my recollection, in both of those documents and the other agency documents that I considered, this issue was evaluated.

MR. AARON: Q: Yes. Okay.

DR. BAILEY: A: Okay?

MR. AARON: Q: "There are windows of both frequency and power density level that cause a biological response in contrast to higher power density levels where there may be no effect."

And then he refers to Bawin, Blackman, and Del Re. With respect to this -- again, this phenomenon of power density window.

DR. BAILEY: A: Mm-hmm.

MR. AARON: Q: Were Bawin, Blackman or Del Re discussed in these E[x]Ponent Report?

DR. BAILEY: A: No, they were not. But they were discussed by the reviews that I did mention.

MR. AARON: Q: All right. And would you please point that out to me, in the context of fulfilling your undertaking? Not now. I mean --

DR. BAILEY: A: No, I'm just --

Information Request

MR. AARON: Q: Oh, yeah. Okay.

DR. BAILEY: A: So this is a new undertaking?

MR. AARON: Q: No, you've undertaken to reference where Safety Code 6 discusses -- you're saying they discuss modulation and you're saying they discuss power density window, in reference to Bawin, Blackman and Del RE.

You didn't consider it --

DR. BAILEY: A: The previous undertaking had to do with modular -- documents cited by Safety Code 6 that discuss the issue of modulation.

MR. AARON: Q: Yes. And then this one extends the undertaking to power density window. Basically it's because you're saying, "Well, I didn't discuss it in my report, but I reference and I rely," is what you're saying, "on Safety Code 6 for their finding that this consideration of modulation is not a robust factor." Correct?

DR. BAILEY: A: Sir, I rely on all of the studies and reviews that I have read. Not -- I'm not relying for any -- you know, saying my only opinion is based upon Safety Code 6. As pointed out before, my opinion is based upon lots of research that I have read and evaluated and it's not just based upon Safety Code 6.

MR. AARON: Q: Okay. But you're saying you didn't

discuss it in your report but you referenced agencies that have considered it.

DR. BAILEY: A: That's correct.

MR. AARON: Q: Okay. He goes on, Maret.

"Each type of modulation of a carrier frequency may convey specific information to the living body…"

Each type, he says. Continuing.

"…and some modulation patterns are more bioactive than others depending on the physical reactivity of specific tissues."

And this is, sir, why I ask you if this specific AMI meter modulation pattern has been studied, and you've got a -- and I asked if such studies exist, and you've got a previous undertaking as to --

DR. BAILEY: A: Correct.

MR. AARON: Q: -- identify whether there have been chronic studies of that specific modulation pattern.

DR. BAILEY: A: Correct.

MR. AARON: Q: And I hope I'm just making sense as to why I'm asking for these things, because Karl Maret says the specific modulation patterns matter. Right? They send specific information to the body.

Going on with Maret, last sentence of that paragraph.

"Current safety standards do not take this issue into account…"

And you would disagree with that, correct?

DR. BAILEY: A: The standards do not specify a different limit for different types of modulation fields. But it's my testimony that the review of research on biological effects of radio frequency fields would have necessarily involved consideration of modulation of different types and in the undertaking we will get back to you to point to you some of that discussion.

MR. AARON: Q: Thank you. Continuing to quote Maret.

"o…current standards do not take this issue into account and are thus inadequate in protecting the public in terms of chronic exposure to some forms of extremely low-frequency…modulated RF carriers.

Since no studies have been carried out with the pulsed modulated patterns of intermittent transitions from RF network meters, it would be erroneous to simply assume that they have no biological or health impact, especially since advanced neurological responses to their emissions have been reported in electrically hypersensitive individuals in self-reporting

surveys.

Low-intensity microwaves with different modulation patterns can have quite different effects even when they are of the same frequency and intensity."

And then he refers to a good overview of the importance of considering modulation patterns in risk assessment. And provides references that have all demonstrated that modulation patterns can have an effect in the living system. And I ask you whether any of those references were considered by you in the preparation of your report.

Proceeding Time 2:06 a.m. T51

DR. BAILEY: A: Yes.

MR. AARON: Q: Which one?

DR. BAILEY: A: The Bawin and Blackman, those studies starting with Bawin through Blackman. The d'Ambrosio, the Hung *et al.* 2007. The Luukkonen, and let's see, and we seem to recall the Sanders study.

MR. AARON: Q: Okay.

DR. BAILEY: A: So these are -- the other studies I may have read in the course of the review. Some of these go back quite a way, 1975.

MR. AARON: Q: Okay.

DR. BAILEY: A: I don't remember recently reviewing that study.

MR. AARON: Q: And would you agree with Maret that these studies, all of which you mention, have demonstrated that modulation patterns can have an effect in living systems?

DR. BAILEY: A: I would agree that these studies, subject to check, are reporting biological responses to different types of modulated fields.

MR. AARON: Q: Okay, I'm not sure if what you would agree with is the same thing what Maret said, so let me just ask it again. Would you agree, and I quote him:

> "…that the following references all have demonstrated that modulation patterns can have an effect in living systems."

So he's saying these references show modulated patterns can have an effect in living systems. Is that something you can agree with?

DR. BAILEY: A: I would agree with that reference. The answer is yes. And to say that those are the responses that are reported in these studies.

MR. AARON: Q: All right. And the last reference I'm going to make to Maret is at 49 on this modulation issue, where under the heading "Maret Response", to the Second Paragraph" he says:

> "It is important to reiterate the importance of considering the non-thermal burst

transmissions from the meter. The transmission characteristics become minimized by looking only at average power density levels which are more important from the thermal or heating perspective. Clearly there are no expected heating effects from the meters unless a person stands 12 centimetres or closer and the meter was operating at 100 percent."

So would you agree with him that it's important to consider the burst transmissions, the burst nature, that the characteristics would be minimized by looking only at average power density levels and not the bursts. Is that something you can agree with?

Proceeding Time 2:10 p.m. T52

DR. BAILEY: A: You can't have an average power density without considering the bursts. The averaging is something that has to do with something that occurs over time, so the intensity of the signal fluctuates over time and so you can describe the average or mean level of intensity over some period of time.

MR. AARON: Q: Mm-hmm.

DR. BAILEY: A: That transmission will have bursts throughout that entire time of averaging. So they are separate concepts. And so the question is that

looking at average power density levels is relevant from -- in terms of averaging, it's in terms of compliance with a standard.

In terms of an exposure to a biological system, it's whatever that exposure is in terms of bursts, and its frequency and intensity is something that will -- the organism, the cell or animal experience from the time that the exposure is started until the time that it's ended. And it has nothing to do with the averaging which is a compliance issue for Safety Code 6.

MR. AARON: Q: And I realize you have to look at those, the bursts, and to measure them in order to calculate what the average is. But what is being suggested to you is that if you only had the figure of the average, and you only considered that figure in assessing adverse bioeffect, you're not looking at the whole picture. What's being put to you is that you also need to look at the nature of the bursts and it's insufficient from a risk assessment perspective just to assess risk assessment in relation to the figure that relates to the average power density. And I'm asking you if that's something you would concur with, that you have to look at the burst pattern as a variable in relation to potential bioeffects.

DR. BAILEY: A: It is a variable that has been looked

at and considered, and I consider it as well in my review of the literature.

MR. AARON: Q: So you would agree with me on that. On my suggestion.

DR. BAILEY: A: Yes, and --

MR. AARON: Q: The answer is yes.

DR. BAILEY: A: -- pulse fields are considered at page 18 of the Safety Code 6, where it discussed peak field strength for pulse fields.

MR. AARON: Q: And in your E^{x}Ponent Report, in assessing the potential bioeffects and potential adverse effects of the proposed AMI meter, did you consider the burst characteristics? Above and beyond mere consideration of the average level. Sorry, the average power density.

DR. BAILEY: A: Let Dr. Shkolnikov comment first.

MR. AARON: Q: And if you did consider it, would you take me to the part of the E^{x}Ponent report where --

DR. BAILEY: A: Well, let me answer. I did -- as I answered to you the question you put to me earlier. I did not consider -- I did not discuss modulation characteristics in the E^{x}Ponent Report. And as I testified before, I considered that was part of the discussion about non-thermal effects, and non-thermal effects I did discuss, and non-thermal effects and the component of that discussion on modulation is

considered in the references that I cited.

Proceeding Time 2:15 p.m. T53

MR. AARON: Q: Okay. So you didn't discuss pulse modulated effects. And I put it to you that that was an oversight because -- and to support my challenge to you in that regard, I refer to this last full paragraph, second last paragraph on page 40 where the second sentence, Maret says:

> "These pulses could potentially initiate a cellular stress response if the person were close enough to the meter."

And then previously he says, "It's important…" The previous paragraph, first sentence, he says:

> "It's important to reiterate the importance of considering the non-thermal burst transmissions from the meter. The transmission characteristics become minimized by looking at the average."

And he says different kind of burst patterns can have different kind of effects. And I put it to you, by not looking at the particular kind of particular burst pattern, that was an oversight in your risk assessment process.

DR. BAILEY: A: I did not make a specific distinction between the different modulation types in terms of assessing the potential impact of radio frequency

field exposure, because there is general agreement in the scientific community, except for Dr. Maret here, that the differences in modulation do not result in any reliable or confirmed biological responses.

MR. AARON: Q: All right. So there's no consensus in the scientific community on that issue.

DR. BAILEY: A: Well, if you define consensus by unanimity, I would agree. But for the reviews that I have referenced by national and international health agencies, I would characterize their position as being that modulation is not an important aspect of the assessment.

MR. AARON: Q: And you're saying on that point, you didn't engage any analysis in that regard in the E[x]ponent Report, but you trust the analysis that you assume Health Canada and ICNIRP to have made on that point.

DR. BAILEY: A: I made no assumptions about what analysis that they had done. I read their reviews.

MR. AARON: Q: Okay. All right.

I'm going to move on to the topic of averaging, and refer us to the report of Dr. Carpenter which is also at Exhibit C9-8. And again we have a problem with page numbering in this document.

DR. BAILEY: A: I have renumbered the pages by hand.

MR. AARON: Q: We've had a limited budget so we

couldn't afford page numbers. So turning to *de facto* page 16 of the Carpenter report, he refers to -- so let's see if we're on the right page. At the bottom of the page is a heading called "Summary and Conclusions".

DR. BAILEY: A: Yes.

MR. AARON: Q: Are you with me? Yeah.

DR. BAILEY: A: Yeah.

MR. AARON: Q: So the top paragraph, top line, end of line he says "However" and he refers to the concept of averaging:

"However, the radio frequency released…"

DR. BAILEY: A: I'm sorry, I thought you were at the Summary and Conclusion. What was the other paragraph you jumped to?

MR. AARON: Q: Okay, let's go to the bottom of page 15, the previous page, so we have his statement in context:

"There is another important concern here. The standard practice is to average the radio frequency exposure over periods of time. It is likely that most of the time, the average exposure levels from smart meters, at distances of one meter, fall below the standard of the FCC and Health Canada. However, the RF released is in the

form of high intensity pulses, not continuous releases. Since the meters transmit in pulses, it is not clear that averaging the power over time is appropriate, since it may be peak power, not average exposure, that is of greater concern. The maximum transmitted power reported by PG&E was 1000 milliwatts. Given the high peak power, this at least raises the possibility that exposures may even exceed FCC standards which are based solely on prevention of heating and do not consider all of the above evidence, that there are serious adverse human effects at much lower exposures. This is a subject urgently in need of additional research."

So this is what I am referring to as of concern with respect to average. Are you understanding?

Proceeding Time 2:21 p.m. T54

DR. BAILEY: A: I understand what Dr. Carpenter has written, and I believe that he is confusing two different concepts. The first concept has to do with averaging. And averaging is important from the standpoint of determining compliance with the standard under certain conditions. So, in order to demonstrate

compliance with a standard, you have to take a measurement averaged over a certain period of time. That is averaging for compliance purposes. As I indicated a few minutes ago, we don't do the definition of exposure in the biological studies based upon that same concept. That is, if you produce an exposure to cells or tissue and you measure a certain power density, there is no averaging involved. At all.

If you say that I have exposed the cells to, you know, 4 watts per metre squared, there is no averaging in that exposure. For whatever period of time that exposure took place, that exposure is assumed by the investigator to have applied. And there is no averaging at all.

The second thing -- aspect, I would like Dr. Shkolnikov to comment on the characterization of the standards.

DR. SHKOLNIKOV: A: Dr. Carpenter is incorrect in his statement, especially as applied to Fortis AMI smart meters. FCC Part 15 and the Industry Canada specifically test for compliance at peak, not average value, and it is this, as Fortis AMI smart meter is at about -- less than 30 -- sorry. Less than 50 percent -- about 40 percent of the limit without any averaging taken into consideration.

MR. AARON: Q: At the high point.
DR. SHKOLNIKOV: A: At the high point, yes.
MR. AARON: Q: In relation to Safety Code 6.
DR. SHKOLNIKOV: A: And Health Canada's Safety Code 6 as well as FCC 1.13(10).
MR. AARON: Q: Well, maybe I can better articulate the concern by reference to -- I think what is being criticized is the standard itself. And that criticism is set out in the Maret report, if you could reference that at page 3. Sorry. I mis-spoke. The Maisch report, Don Maisch.
DR. BAILEY: A: And it says tissue heating may cause adverse biological effects at the top of the page?
MR. AARON: Q: Yes.
DR. BAILEY: A: Okay, we're on the right page.
MR. AARON: Q: And he refers to concerns raised by the working group, RFIAWG. In the context of -- which represented, I think, a Workers' Compensation -- oh, no, there is a Workers' Compensation representative on that working group. And this is at the paragraph that starts in June, 1999.

And he says

> "The working group criticized the biological rationale in the IEEE standard on a number of fronts, one of which is as follows…"

I am looking -- ah. So, let's see. There is not a

lot of paragraphs in here. But there is a sentence that starts about two-thirds of the way down the page:

"There was also a concern expressed…"

Are you following me?

Proceeding Time 2:27 p.m. T55

DR. BAILEY: A: Yes.

MR. AARON: Q: "…about the failure to include consideration of the body of research on the biological effects of exposure to ELF modulated and pulse modulated RF that was relevant to public exposures. In addition, the SAR time averaging calculations, as used in the standard, hid any biological effects resulting from modulated RF exposures."

Do you understand this as being a criticism of the failure to consider the pulse nature of the modulations resulting from the process of time averaging?

DR. BAILEY: A: As I said before, I think they're two separate but related concepts, that this is a criticism that the standard as discussed in 1999 did not consider research on biological effects of exposure to ELF modulated and pulse modulated fields relevant to public exposures. And that is a separate issue than the one discussed in the next sentence.

MR. AARON: Q: Okay. At page 14 he elaborates and

maybe that might help us. Third paragraph where it says: "FortisBC's reply is to refer to Safety Code 6," in the second sentence he says:

"In addition, Safety Code 6's method of using a --"

DR. BAILEY: A: Excuse me. Could you direct me again to that? Page 14?

MR. AARON: Q: Fourteen.

DR. BAILEY: A: Which question number?

MR. AARON: Q: DM response to number 16.

DR. BAILEY: A: Second paragraph? Okay.

MR. AARON: Q: Second paragraph, second sentence.

DR. BAILEY: A: Okay.

MR. AARON: Q: "In addition, Safety Code 6's method of using a six minute time average for exposure is not suitable for smart meter emissions, since the transient radio frequency spikes that are constantly being emitted by an active smart meter are smoothed out by averaging over six minutes, thus eliminating the assessment of maximum peak exposures. If there are unique health effects from smart meter emissions, it might be from those brief but frequent peak exposures."

So the question is, is there consideration

in the E[x]ponent Report of this subject matter that seems to be of concern? That is, an assessment of maximum peak exposures?

DR. SKOLNIKOV: A: I can address that because it falls under the exposure. We have followed Safety Code 6 precisely, and on page 18 of the standard there's a section 2.2.1 which identifies whether assessment of peak exposure versus average should be used. Looking through the requirements for it, and there are two paragraphs, one is to make sure that the field doesn't exceed 100 -- you know, for fields up to -- the fields don't exceed 100 kilowatts per metre, that consideration is easily dismissed for this technology because it will never approach fields anywhere near this amount, both on peak and on average basis.

Proceeding Time 2:31 p.m. T56

And a second one was on consideration of using shorter time averaging instead of six minutes if a certain threshold is exceeded. If you go through the calculation of what that threshold is, it is actually quite high. It is higher than the -- you know, it is much higher than the average value allowed. Therefore, since 2.2.1 did not apply, when we perform the exposure assessment in E[x]Ponent report, we have relied on Table 6, and the associated discussion, rather than look at the pulsed fields

which again are explicitly considered and in a sense prescribed as a consideration as part of Safety Code 6.

MR. AARON: Q: And so am I correct in understanding that under Safety Code 6, you didn't have to consider that?

DR. SHKOLNIKOV: A: What I'm saying is, under Safety Code 6 we have evaluated --

MR. AARON: Q: Yes.

DR. SHKOLNIKOV: A: -- whether separate limits should be applied for this signal.

MR. AARON: Q: Yes.

DR. SHKOLNIKOV: A: And the answer is, since neither of the criteria for separate considerations were triggered --

MR. AARON: Q: Yes.

DR. SHKOLNIKOV: A: -- by the signal from AMI smart meter, it was not required to do the assessment, compared to the peak pulse density and the average value was used.

MR. AARON: Q: So, so, so --

DR. BAILEY: A: And coming back to finish my part of the answer, in that paragraph you directed to, it seems to me that his criticism is directed towards the Safety Code 6 and the method by which they require people to demonstrate compliance, which has to do with

this averaging technique.

MR. AARON: Q: That's what the criticism is.

DR. BAILEY: A: Yes.

MR. AARON: Q: Yeah. Okay.

DR. BAILEY: A: And so that's a criticism of the Safety Code 6 compliance part of the standard, as opposed to the scientific review part.

MR. AARON: Q: Okay. Thank you. That's been -- that you've helped me to understand that now.

And you haven't, in the E^{x}Ponent report, considered the validity of Safety Code 6's standard in that regard. Because -- no, just --

DR. BAILEY: A: I have -- I did not -- you asked me a question. I did -- our report did not concern the methods by which -- that, from my part, the methods by which you would demonstrate compliance with Safety Code 6. It was to the scientific basis underlying Safety Code 6.

MR. AARON: Q: Mm-hmm.

DR. BAILEY: A: And Dr. Shkolnikov was concerned with determining whether the smart meters following the procedures to demonstrate compliance in fact achieved that.

MR. AARON: Q: But you appreciate that the standard set out in Safety Code 6 with respect to the thermal/non-thermal effect issue and with respect to this issue of

whether you need to be held to scrutiny on your spikes or the threshold at which you need to be held to scrutiny on your spike, that standard is impugned. Do you appreciate that?

DR. BAILEY: A: Yes. I understand that Dr. Maret is criticizing the Safety Code 6 standard.

MR. AARON: Q: Not just Dr. Maret. I mean, every contributor to the Bioinitiative report, 2012, criticizes the Safety Code 6 standard. You would appreciate that, correct?

DR. BAILEY: A: I see that in their testimony, yes.

MR. AARON: Q: But you in the E^{x}Ponent report took the Safety Code 6 standard and accepted it.

DR. BAILEY: A: We accepted the Safety Code 6 standard as being that which applied to the permitting of devices in Canada, and as regarding the science, that was much broader than Safety Code 6 that we considered.

MR. AARON: Q: I appreciate that you've said now that you considered Safety Code 6 as the applicable standard.

DR. BAILEY: A: Correct.

MR. AARON: Q: But what you didn't do, you will agree with me, is that you didn't consider, "Well, Safety Code 6 is impugned. There are all these scientists out there that say it's wrong. That it's not doing

its job in protecting Canadians."

Proceeding Time 2:36 p.m. T57

You didn't consider that and go on to do a critical analysis of whether -- of the validity of the Safety Code 6 standard and whether it's adequate. That's just not part of what you've done in the E[x]Ponent Report. Correct?

DR. BAILEY: A: I have reviewed and assessed the scientific literature and my assessment of that literature, and the reviews that I pointed the readers of our report to, do not indicate that the allegations against Safety Code 6 are supported by the scientific evidence.

MR. AARON: Q: Right. You disagree with the allegations, the BWG, the Bioinitiative Working Group. They criticize Safety Code 6. They say the standards are not what's needed. You disagree. And you say that on your review of the science those safety code standards are just -- are properly reflective of the state of science. Correct?

DR. BAILEY: A: In general terms, yes.

MR. AARON: Q: Right. So I'm correct on that. How -- what I'm just saying, and I think it's absolutely clear, is that your E[x]Ponent Report did not engage in an analysis of whether the criticism of Safety Code 6 is correct or not. It didn't weigh the two camps and

say "This is my opinion on it, and I side with Safety Code 6 and ICNIRP, and this is why." I know you side with Safety Code 6 and ICNIRP, it's just not set out in your report.

DR. BAILEY: A: I agree, it is not set out in our report.

DR. SHKOLNIKOV: A: One comment on this specific Maisch comment. It is inaccurate with respect to the sum of both ICNIRP and Safety Code 6. As I mentioned explicitly. Six -- the Safety Code 6 considers short-term high-power exposures as a separate category than continuous exposure, and Dr. Maisch ignores the standard, as I mention on page 18 and 19. And in equation 2.7, it is explicitly evaluating the exposure in increments of one-tenth of a second instead of six minutes.

MR. AARON: Q: You guys will cross-examine him on that, I can't really understand that.

DR. SHKOLNIKOV: A: Okay.

THE CHAIRPERSON: Mr. Aaron, could I ask you to move on, please? I think we've covered this topic.

MR. AARON: Yeah. Would you like to take a break, Mr. Chair?

THE CHAIRPERSON: Not particularly. I'd like to keep moving until about 3:00.

MR. AARON: All right. So that's two hours on and 45

minutes -- oh, all right. The --

Q: You will recall, Dr. Bailey, that we had an issue as to whether you could refer to that report that you referred to this morning.

DR. BAILEY: A: Yes.

MR. AARON: Q: I don't have a copy of it, but I have located a press article that refers to it, which I propose to put to you.

DR. BAILEY: A: Okay.

MR. AARON: Q: The first question is, does this press article refer to the report that you referred to this morning? And the press article starts, "In November, 2000" …

DR. BAILEY: A: Excuse me. Can I just read it? You're reading faster than I am.

MR. AARON: Q: I'm just going to read it into the record, while you're reading it.

DR. BAILEY: A: Oh, okay.

MR. AARON: Q: "In November, 2011" …

MR. FULTON: Mr. Chairman, I think it's -- the witness is reading it.

MR. AARON: Oh, okay.

MR. FULTON: I personally find it difficult to read and concentrate and have somebody reading out loud at the same time, so -- thank you.

Proceeding Time 2:41 p.m. T58

THE CHAIRPERSON: Yes, thank you, Mr. Fulton. I was, frankly, wondering how I was going to deal with that myself, so I appreciate that.

MR. AARON: I am happy to sit down for a moment.

DR. BAILEY: A: Okay, I've reviewed it.

MR. AARON: Q: Is the report you referred to this morning the paper titled "Mobile Phones, Brain Tumours, and the Interphone Studies, Where Are We Now?"

DR. BAILEY: A: No, it was not.

MR. AARON: Q: Okay, so I'm off base, I'm dealing with the wrong report?

DR. BAILEY: A: That's correct. And I was told during the break that the report that I referred to is actually in the record of our proceeding here.

MR. AARON: Q: All right, and I'll ask you to refer me to that in a moment.

And now with respect to the criticisms of Swerdlow, are you a -- and I know you relied on a paper this morning that was coauthored by Swerdlow.

DR. BAILEY: A: He was one of roughly a dozen members of a panel.

MR. AARON: Q: Oh, right, okay. And that report that you referred to this morning, when was it written?

DR. BAILEY: A: In 2012.

MR. AARON: Q: Okay.

DR. BAILEY: A: It was released in 2012.
MR. AARON: Q: And did it refer -- and I haven't seen it so I have to ask. Did it refer to the IARC findings on cancer?
DR. BAILEY: A: Subject to check I believe it did.
MR. AARON: Q: Okay. Will you get back to me on that?
DR. BAILEY: A: Yeah.
MR. AARON: Q: Can we just note an undertaking in that regard?
THE CHAIRPERSON: Yes, thank you.

Information Request

MR. AARON: Q: And are you aware of these allegations with respect to Mr. Swerdlow's independence? On page 2 of this press article it says:

"The Importance of Controlling Conflict of Interest.

As AGNIR supposedly "independent organization'…"

I should just pause. AGNIR, is that the same body that authored the paper you referred to this morning?
DR. BAILEY: A: That's correct.
MR. AARON: Q: Okay. So this is where -- this is the correlation. All right. So they authored a previous paper called "Mobile Phones, Brain Tumours, and the Interphone Study, Where Are We Now?" Am I right?
DR. BAILEY: A: No, that was by a different group.

MR. AARON: Q: Oh.
DR. BAILEY: A: AGNIR did not -- that review panel did not author the report that you cited in November 2011. That was written by member of ICNIRP Standing Committee on Epidemiology.
MR. AARON: Q: Okay.
DR. BAILEY: A: So that was a report from ICNIRP in 2011, and the report that's discussed on the second page of this --
MR. AARON: Q: Oh.
DR. BAILEY: A: Of this sheet that you gave me, two sheets, three sheets, refers to a different report --
MR. AARON: Q: Is this -- oh.
DR. BAILEY: A: -- prepared by a different scientific committee.
MR. AARON: Q: Okay. And the one titled "Health Effects from Radio Frequency Electromatic [sic] Fields", is that the one you referred to this morning?
DR. BAILEY: A: Yes.
MR. AARON: Q: Ah. Okay.
DR. BAILEY: A: So two different reviews --
MR. AARON: Q: All right.
DR. BAILEY: A: -- done at different times by two different groups of scientists.
MR. AARON: Q: Okay. So let's take it this way and thank you for the clarity. The report you referred to

this morning, does it have an exhibit number?

Proceeding Time 2:46 p.m. T59

MR. MACINTOSH: Mr. Chair, I can assist in part here. This morning, as you may recall, my friend Mr. Aaron asked Dr. Bailey a question and he answered in part by referring to a report.

And Dr. Bailey, understandably, had no knowledge of whether that was in evidence or not. And we proceeded in the morning on the assumption that it had not yet entered the domain of evidence here. And we had a bit of a back-and-forth about whether my friend was still having to live with the answer he was obtaining.

What has turned out to be the case is that the report that Dr. Bailey brought in to his reference this morning, "The health effects from radio frequency electromagnetic fields report of the independent advisory group on non-ionizing radiation", was provided to my friend on February 7th, by way of e-mail accompanying CEC's Information Requests. And Fortis provided the link to the same report on February 7 in its Information Requests to CSTS. And CSTS responded to the IRs. That is, my friend opposed both by CEC and Fortis. And then there is more detail about how this report has already been the subject of discussion and responses within this hearing.

But I don't know that it has been marked. Ms. Herbst will answer that when she gives the further response to Undertaking 4. But it's certainly in the domain of my friend.

MR. AARON: All right. Well, then, that's --

DR. BAILEY: A: Excuse me. If I could just answer -- you asked for an undertaking, and my -- I was uncertain of my recollection as to whether the AGNIR 2012 report had cited IARC, and we just did a check, and it seems that it is not cited.

MR. AARON: Q: It's not cited?

DR. BAILEY: A: Right. And I'm not sure why that is the case, but the IARC report has only been released as a few-page summary in 2011 in a journal, and we're still waiting for the full report to appear.

MR. AARON: Q: Yeah. You would agree with me that the IARC report would be relevant to the analysis undertaken under this report titled "Health effects from radio frequency electromagnetic fields".

DR. BAILEY: A: I would say that probably the part of the research literature dealing with the issue of cancer would have been the subject of both reports.

MR. AARON: Q: Okay. So, I want to ask you if you are aware of the allegations of a lack of independence which are set out in the evidence. And I'll take you there, but also in this press article under the

heading on page 2, "The importance of controlling conflict of interest". Where it says:

> "As AGNIR is supposedly 'independent [an independent organization]' it would seem obvious that the chairman [that's Swerdlow] would need to have no ties with the telecommunication industry. After all, look at what happened to Anders Ahlbom when it was found that he had links with the industry."

And I pause to say that Anders Ahlbom is also referenced in the evidence, which I'll take you to. And then it goes on to quote an allegation and from *Microwave News*.

> "The…IARC has removed Anders Ahlbom from its panel of experts which is set to evaluate the cancer risks posed by mobile phones."

Can you confirm, Dr. Bailey, that that removal occurred?

DR. BAILEY: A: It's my understanding that it's referenced on the IARC report that before work began that he was -- his participation was declined, or he did not participate.

MR. AARON: Q: Okay. Did you see that e-mail that he allegedly sent out saying "IARC excluded me from the RF working group because of possible perception of

conflict of interest"?

DR. BAILEY: A: I'm not sure that I've seen it.

MR. AARON: Q: Okay. "IARC moved quickly", it says,

> "brother's consulting firm [in Alberta]. The company, which is based in Brussels, the European capital, a centre for lobbyists, was established to help clients on telecom issues with an emphasis on environment and energy. Ahlbom failed to mention this sideline in his declaration of interest that's required of all those who participate in IARC assessments."

And it goes on to say,

> "With the UK's health protection agency, however, allowing Swerdlow to head AGNIR while having a similar conflict of interest, as set out below, it's apparently not seen as a problem even though numerous peer-reviewed and published research papers have illustrated that industry/research conflicts of interest can bias the ability to objectively evaluate scientific literature. This significant problem is addressed by the Committee in medical journals under their uniform requirements."

And I won't quote that.

Proceeding Time 2:52 p.m. T60

And then it goes on to say in the paragraph starting:

"Perhaps the HPA having a conflict of interest is not considered a problem, perhaps even an unwritten job requirement. As for the elephant that goes unnoticed, Swerdlow…"

and this is what I'm asking if you're aware of that,

"…that Swerdlow holds shares in two telecom companies, one called Cable and Wireless Worldwide, and the other called Cable and Wireless Communications, and that his wife holds shares in the BT Group, a telecommunications services company."

Were you aware of those allegations against Swerdlow?

DR. BAILEY: A: I was not aware of any particular details of this such are described in this posting on a website that opposes devices that produce radio frequency fields.

MR. AARON: Q: Has he to your knowledge answered those allegations?

MR. MACINTOSH: Mr. Chair, I rise --

DR. BAILEY: A: I can't -- I don't know about Dr. Swerdlow's business or his associations and I'm not

the right person to put this question to.

MR. MACINTOSH: I rise to object on the basis of relevance. If time were unlimited it might be another thing, but where we are now is that Dr. Bailey was asked a question which caused him to refer to a voluminous report prepared in the United Kingdom where apparently one of approximately a dozen authors had shares in a phone company, and/or his wife had shares in a phone company or two phone companies. And my friend has now placed before us a printout from a -- maybe it's a website, I'm not sure, which from what Dr. Bailey said is often against radio frequency devices and that's fine, about this person or his wife having shares in a phone company.

And in my submission, it is too far outside the bounds of relevance to permit that to be further explored.

THE CHAIRPERSON: Thank you, Mr. Macintosh. Let me just confer with my colleagues for a moment here.

MR. AARON: Can I make submissions on the objection?

THE CHAIRPERSON: Yes. Yes, you may.

MR. AARON: Thank you. The relevance will become apparent if I'm given an opportunity to proceed. It goes something like this. The Interphone study, which we've already heard much of, is referenced in the E^{x}ponent Report, and at page 23 of the E^{x}ponent Report,

at the second paragraph, the E[x]ponent authors say:

> "Most other epidemiologic studies published prior to the Interphone study had not reported that people with brain cancers had a history of more mobile phone use. There's one exception to this consistency of results across studies."

And then Dr. Bailey, the author, refers to the Hardel study:

> "…where positive associations have been reported in pooled results in case of controlled studies from Sweden."

So these are associations between mobile phones and brain cancer as reported by Hardel. Hardel, he goes on to say:

> "…reports positive associations for mobile phone use and brain cancer, and those associations, as E[x]ponent sets out, tended to be stronger with increased hours of use."

So this is what Hardel stands for. The more you use the more your behaviour is associated with brain cancer.

Proceeding Time 2:57 p.m. T61

"These indications of dose response", Bailey writes, "if consistent across valid studies, would be interpreted as support -- for inferences of

causality. However", Dr. Bailey says, "limitations in the analysis have been raised."

Who have they been raised by? Swerdlow and Ahlbom, the two individuals around whom some serious concerns of conflict of interest arise.

He goes on to refer to -- oh, on the next page. "The limitations of the authors" -- that's of Hardel's -- "analysis in these studies are unclear definition." He goes on to criticize them. And I don't -- and what he does is, he says at the end, "these decisions result in data that's not sufficiently clear to allow the reader to unmistakably understand the analysis and raise concerns on the validity of the results, as has been noted."

So he attributes his statement to two reviewers, Ahlbom and Swerdlow. Therein lies the relevance of this matter, and I'm not raising it by way of ambush. It's set out in detail, these concerns, in both the expert reports of Drs. Carpenter and Maisch, and what I propose to do is identify those allegations and challenge Dr. Bailey's reliance on Ahlbom and Swerdlow.

Now, in my submission, the relevance of the matter is clear. And then it's a question of the weight to be attributed. But, I mean, to suggest that this material is not relevant is just -- I mean,

conflict of interest is one of the key concerns --

THE CHAIRPERSON: Mr. Aaron, I am -- I have heard your comments, and frankly I disagree with you in terms of the -- when you say this wasn't an ambush. The context that we were discussing this, at least my understanding, and I could be wrong, my understanding was, we were talking about this in the context of the report that was referred to earlier today that was authored by some, I think, dozen authors, including the particular individual that you claim to have a conflict of interest.

MR. AARON: It arises in a different context as well, sir, and that's why with respect I show you that it arises in another context that's central, and there has been disclosure of our position in that regard through our expert reports.

THE CHAIRPERSON: Okay. What we'll do at this stage, unless Mr. Macintosh wants to respond, which I'll allow him to do, we should have a -- we'll have our afternoon break and come back.

Mr. Macintosh, do you want to respond?

MR. MACINTOSH: Well, I may be able to facilitate, Mr. Chair. As I hear my friend now, he is saying "Dr. Bailey, you referenced or relied upon a report including an author of Dr. Swerdlow, yes or no. If yes, are you aware of an accusation that Dr. Swerdlow

or his wife have shares in telecom, yes or no? And what do you make of that?" That's fine. I mean, that's fine.

Where we were before, where I thought it was just too tangential, was that Swerdlow was one of 12 people in a British report. So that's fine. In my respectful submission, it's easier to put that to the witness than it is to fight about it.

THE CHAIRPERSON: Exactly. Well, your positioning of the issue was the same as mine, and I think it is relevant, or certainly more relevant related to the E[x]Ponent Report than it is to this other report that was authored by some dozen individuals.

We'll have our afternoon break and return at 3:20.

(PROCEEDINGS ADJOURNED AT 3:02 P.M.)

(PROCEEDINGS RESUMED AT 3:22 P.M.) **T62/63**

THE CHAIRPERSON: Thank you. Please be seated.

MS. HERBST: Thank you, Mr. Chair. You're seeing something from the wrong side of the floor because Mr. Fulton has kindly said that we could file two undertakings.

THE CHAIRPERSON: Okay, thank you.

MS. HERBST: Thank you. So the first undertaking and I will pass up four copies and they're also being distributed. This is what we're calling Undertaking

No. 3. This morning Mr. Aaron asked, when he was cross-examining Dr. Bailey, for a copy of the 2003 update to the 1999 Royal Society of Canada report on the potential health risks of radio frequency fields, and so this response simply attaches that. It's a copy of the 2003 update that we obtained from the Royal Society of Canada website, and so that is the bulk of the filing here. And I think if I recall correctly from the numbering this morning, this would be Exhibit B-41.

THE HEARING OFFICER: Marked Exhibit B-41.

(FORTISBC UNDERTAKING NO. 3, VOLUME 4, MARKED EXHIBIT B-41)

MS. HERBST: And the second and heftier undertaking response is a full copy of the report that Dr. Bailey referenced this morning in responding to cross-examination by Mr. Aaron again. It's the 2012 report from the Independent Advisory Group on Non-Ionizing Radiation, and this written response provides some of the exhibit references. Mr. Macintosh referred to some of the history of this matter, and I'll just run through for reference some of the exhibit references to this report already on the record.

And the written response is lettered, and so under (A) on the first page is the exhibit reference to the initial spot where the report was

referenced by CEC in its Information Request No. 1 on February 7th, 2013, specifically directed to Dr. Blank, one of the CSTS experts, and the IRs were -- the IRs in question 22 requested Dr. Blank to comment on several reports including the same report that Dr. Bailey referenced. And question 22 is reproduced on page 2.

Also attached as part of this IR response is an e-mail where Mr. Craig of CEC submitted a full copy of the report via e-mail as an attachment. It was sent around to the Commission Secretary and participants. It didn't end up being marked as an exhibit. It was distributed but it didn't end up being marked and posted on the Commission website, but was circulated.

Letter (B) on page 2 provides the exhibit reference to FortisBC's link to the same report, the 2012 report that Dr. Bailey referenced, and that was referenced and their link provided in Information Request No. 4.24 in Exhibit B-26 on February 7th, 2013.

And then finally (C) refers to exhibit numbers for the CSTS responses in relation to that report. The response from CSTS in relation to the CEC Information Request was Exhibit C9-14-4, IR 22.1. And the CSTS response to the FortisBC Information Request 4.24 was Exhibit C-13-3. Thank you.

THE CHAIRPERSON: Thank you.

THE HEARING OFFICER: B-42.

(FORTISBC UNDERTAKING NO. 4, VOLUME 4, MARKED EXHIBIT B-42)

THE CHAIRPERSON: Mr. Aaron.

MR. AARON: A little bit of housekeeping. This press article regarding Swerdlow, it's been marked as an exhibit. Oh, it needs to be marked as an exhibit please. C1-18. Sorry, C9-18.

THE HEARING OFFICER: Marked Exhibit C9-18.

(PRESS RELEASED WITH HEADER "THE SWERDLOW REPORTS: DOWNPLAYING THE MOBILE PHONE CANCER RISK/EMFACTS CONSULTANCY", MARKED EXHIBIT C9-18)

Proceeding Time 3:27 p.m. T64

MR. AARON: I'm wondering, this isn't by way of undertaking, if I could please get by way of e-mail, digital copies of these so I can flip them over to my analysts. Thank you very much.

THE CHAIRPERSON: Let me just comment firstly on the matter that was at hand when we broke for our afternoon break period. And the panel has considered this matter, and it will permit Mr. Aaron to question the witness panel on the conflict of interest issues that may be seen as influencing the credibility of the studies relied on in the E^{x}Ponent Report.

With respect to the report co-authored by a

panel of -- and I'm not sure, roughly 12 scientists -- the report that was referred to earlier, the panel considers further questions with regard to this conflict of interest to be unwarranted.

MR. AARON: So I can ask questions pursuant to conflict of interest with respect to the E[x]Ponent report.

THE CHAIRPERSON: That's correct.

MR. AARON: Yeah. They would be the same questions anyways. Thank you.

Q: Dr. Bailey, thank you for fulfilling your undertaking to provide a copy of the 2003 Royal Society review on Safety Code 6. Just one quick question on that. Under the conclusions, on page 33, it says:

> "The widespread use of devices that remit RF fields, notably wireless communication devices such as mobile phones, has resulted in increased potential for RF field exposure. The potential health risks from RF fields were reviewed in detail by the Royal Society, 1999. At that time, the panel conducting this review concluded that existing RF guidelines were largely protective of human health based on the scientific evidence available at that time, but noted several RF fields appeared to be

associated with certain biological effects of no known clinical significance that required clarification."

The panel also made a number of research recommendations, the most important of which was the conduct of large-scale epidemiologic studies of the potential cancer risks from mobile phone use. The results of the ongoing World Health Organization study of mobile phones will provide important new information in this regard.

My question to you, Dr. Bailey, is, is the reference to the ongoing WHO study the IARC results, is that the same thing? That resulted in the IARC identification of RF emissions as a --

DR. BAILEY: A: No.

MR. AARON: Q: -- a possible -- no, is that a different one?

DR. BAILEY: A: It's a different report. I'm just checking the -- it's not clear from the citation here, but my guess would be that this reference is a reference to the -- what we have termed the "Interphone" study.

MR. AARON: Q: All right.

DR. BAILEY: A: It's not referenced to the IARC review.

MR. AARON: Q: All right. Do you know when we can expect the full version of that IARC study?

DR. BAILEY: A: I do not. In past years, it's sometimes taken several years for the publication to be fully available. They haven't given an indication of when it's going to be coming out.

MR. AARON: Q: Are the authors of those -- that study the people who were referred to in a press article I just introduced as having to go through a declaration of interests?

DR. BAILEY: A: For -- typically for IARC and other such bodies, there would be a declaration of interest.

Proceeding Time 3:32 p.m. T65

MR. AARON: Q: Right. Is there one for the IEEE?

DR. BAILEY: A: No, there's not.

MR. AARON: Q: No. Is there one for ICNIRP?

DR. BAILEY: A: I believe there is one for ICNIRP.

MR. AARON: Q: Okay. But you know that there's one -- that there's not one for the IEEE because you sit on an IEEE subcommittee.

DR. BAILEY: A: Right. This is a committee composed of volunteers.

MR. AARON: Q: Right.

DR. BAILEY: A: Anyone can participate in this review process.

MR. AARON: Q: All right. This 2000 -- well, this Royal Society report, we have one in 1999, we have one in 2003. I have information that one is due in fall

of 2013. Can you confirm that?

DR. BAILEY: A: I saw a reference on the website that indicates that, yes.

MR. AARON: Q: Yes. And in the 1999 report which I've put into evidence, on the final page of that document is an excerpt from that website, which indicates that we're due for an update in 2013. Would you expect that that update would include a reference to the IARC findings on the classification of RF as a Class 2B carcinogen?

DR. BAILEY: A: I would expect so. Perhaps you're aware that Dr. McNamay was a member of the IARC panel. And so I certainly would expect a reference to it.

MR. AARON: Q: They talk to each other, yeah. All right.

The concern with respect to conflict of interest, as I said, arises out of page 24 of your E[x]ponent Report. Can you confirm that you rely, in the top paragraph of that page, on Ahlbom and Swerdlow in your -- in questioning the validity of the Hardel studies?

DR. BAILEY: A: Those are two citations that I made where there had been published comments on the Hardel studies. If my recollection serves there may be others as well, but those are the two that were most well-known to me.

MR. AARON: Q: And what you relied on in this Exponent Report.

DR. BAILEY: A: In part in our own assessment of these studies.

MR. AARON: Q: All right. And you're obviously aware of the conflict of interest concern around those two individuals by this point. I'll point you to Martin Blank's articulation of his concern with industry influence, just to contextualize my challenge, and that is at his answers to CEC Information Request, and I think this is Exhibit C9-12. I'm sorry, is it? CST answers to information request? Ah, C9-14, thank you.

And so then the CEC information request answers should be in there and they're not page numbered but I'm looking at question 7, and in answering question 7.1, Dr. Blank confirms that -- his view.

Proceeding Time 3:36 p.m. T66

"Many biases and errors can occur in the conduct of experimental studies conducted in the laboratory. A review of some of the controversial replication reported in *Microwave News* indicates that the biases and errors often stem from investigators who, funded by industry,

appear committed to a non-effects model. For example, Lion Singh, '95, found DNA damage on exposure of cells. Subsequently, Maliapa, in 1997, from the lab of Roti Roti funded by Motorola, published a study purported to be a replication, and they failed to find an effect. However, an examination of what they did showed that it was not a replication. They selected different cells that were less sensitive to DNA fragmentation.

Another example of use of a different cell population was a study by Geoffrey Schaeffer at Battelle, who could not repeat the Goodman Henderson study showing EMF stimulation of DNA. It was subsequently shown by Goodman that Schaeffer had used a different cell population, and that genetic variations in the cell lines used by the different research groups could explain the difference in fragility.

Since the Maliapa study was supported by Motorola, and the Schaeffer study by Battelle, one wonders about the influence of industrial support on bias."

This is his concern. I just -- would you

help me to confirm that Motorola is a telecommunications company?

DR. BAILEY: A: Yes.

MR. AARON: Q: But Battelle --

DR. BAILEY: A: No, it's a research laboratory that does a lot of government-related work, and also for private industry.

MR. AARON: Q: All right. Do you share the concern that -- of industry influence that Martin Blank has in these terms. If a study was funded in this context by Motorola, would you find that to be a concern with respect to the independence of that study? As somebody who has -- who works in the industry, with the industry, setting standards. And who reviews a lot of studies. If you review a study, and you find it's funded by Motorola, does that raise a concern with respect to its validity or independence, in your mind?

DR. BAILEY: A: I have a concern about relying on any individual study, whether it's funded by Motorola or other agencies. I think with regard to the questions that are discussed here, on page 8 of this response, is that one can go to other scientific papers that have no connection, to my knowledge, with Motorola or any industry, which have attempted to replicate the findings that are referred to here on DNA damage of

cells, and they also do not replicate the findings of Lion Singh on DNA damage or the Goodman Henderson or Blank results. So, even if you dismiss -- even if you removed those studies that did not replicate that were funded by Motorola, one would still find other studies that also had been unable to replicate their findings.

MR. AARON: Q: So you're concerned about any individual study, is what your evidence was.

DR. BAILEY: A: Yes. We don't draw conclusions based upon any individual study, and we look at the weight of the evidence as I described, and for these topics here, the weight of the evidence with or without industry study -- funded studies would be similar.

MR. AARON: Q: But my question is, does the fact of industry funding in itself weigh as a consideration in your mind? When evaluating a study as to its weight and validity? And utility. And risk assessment. Or is that not a factor?

Proceeding Time 3:41 p.m. T67

DR. BAILEY: A: It's only a factor if I have some credible reason to believe that it may have improperly influenced the outcome of the study. Typically when -- industry funds a lot of research on all different topics, and typically those are set up in such a way as to maintain the independence of the investigator from the source of funding.

MR. AARON: Q: Okay. So the fact that Motorola funds a study into the health of cell phones doesn't in itself raise a concern in your mind with respect to the validity or partiality of the study, correct? You need something more.

DR. BAILEY: A: Not necessarily. As I said, I said it would depend upon the circumstances. And I think the other thing is that there are many potential sources of bias and influence on the outcome of those studies, not just the influence of the funder. It could be the investigator themselves. Unfortunately there have been all too many instances where investigators have falsified results in order to advance their career, or that they have reviewed studies or designed studies in such a way that they fit their prior hypotheses.

So there are many sources of --

MR. AARON: Q: Bias, mm-hmm.

DR. BAILEY: A: -- potential bias that could affect studies and, you know, reviewers and organizations should be more diligent in looking at these.

MR. AARON: Q: Okay. I asked you a question and your answer was "not necessarily". My sense is that your answer to my question was yes, but it could be a little confusing on the transcript because your answer was "not necessarily". So I'm just going to re-put the question to you.

DR. BAILEY: A: Sure. That would be good.
MR. AARON: Q: And that is, it's your view that the fact that a study is funded by a telecom company, where that study is into the health effects of cell phones, does not, in your mind, in itself raise concerns with respect to the independence and validity of the study.
DR. BAILEY: A: That's correct.
MR. AARON: Q: Now, specifically with respect to Ahlbom and Swerdlow, at the report of Don Maisch at page 6, the concern with respect to impartiality is set out.
DR. BAILEY: A: What page?
MR. AARON: Q: Page 6 of the report of Don Maisch. Second paragraph he says:

> "In my own thesis assessment of the RF standard setting process, primarily looking at the IEEE and ICNIRP risk assessment processes, what is apparent is that the process is very much influenced by the reviewer's affiliations."

Do you disagree or agree with that?
DR. BAILEY: A: I would not agree with this statement.
MR. AARON: Q: Okay. Then he goes on:

> "This is seen, for example, where the Exponent report dismisses the Hardel group's work largely on assessments by Ahlbom and

Swerdlow."

Which is the -- I pause to say that's the provision in the E[x]ponent Report, the section that I just referred to at the top of page 24. He continues:

Proceeding Time 3:46 p.m. T68

"This may seem persuasive until the reviewers' financial conflicts of interest are considered, and which have the potential to influence their expert opinion. For example, Anders Ahlbom is co-founder of Gunnar Ahlbom AB, a Brussels-based lobby firm aiming to assist the telecom industry on EU regulations, public affairs and corporate communications."

And he's put an appendix.

Dr. Bailey, do you disagree that Ahlbom is a co-founder of Gunnar, which is a Brussels lobby firm aiming to assist the telecom industry?

DR. BAILEY: A: I don't know, really, anything about his affiliations apart from scientific work.

MR. AARON: Q: Okay. And then Anthony Swerdlow, he says, is also on the main commission at ICNIRP. And in this position is supposed to be free of industry connections. And he holds shares, as I've already read in other evidence. He holds shares in the telecom's companies Cable and Wireless Worldwide and

Cable and Wireless Communication. And his wife holds shares in the BT Group.

And I take it you cannot confirm or deny these allegations.

DR. BAILEY: A: I have -- until we -- you described some of these details, I had no knowledge of it.

MR. AARON: Q: Is this the first time you've --

DR. BAILEY: A: No, I've heard in general the allegations, but I had no idea in terms of specific companies or about his wife, or --

MR. AARON: Q: Right. If this was true, these allegations, with respect to the shares, would that bring you to a point of questioning the independence of these gentlemen -- these reports by these gentlemen?

DR. BAILEY: A: I don't think that whether someone's wife holds shares in a company is going to necessarily influence the opinion of a scientist who is charged with, you know, trying to ascertain whether there are health risks. I mean, you could even particularly argue that it might make him even more diligent in terms of scrutinizing this. And I suspect there are many people, scientists and all different kinds of opinions on this issue, who might hold opinions and stock of companies that could be put together with their name and say that influences their opinion.

But --

MR. AARON: Q: What about being a founder of a lobby firm that assists the telecom industry on regulations? Is that something that would raise a concern in your mind with respect to the impartiality of an author of one of these reports?

DR. BAILEY: A: Again, I don't know any of the details of this. If those regulations had to do with radio frequency fields of mobile phones, then that's something I would want to look into.

MR. AARON: Q: All right.

DR. BAILEY: A: To my knowledge, that's not the case.

MR. AARON: Q: All right. At Martin -- back to Martin Blank's material. At Dr. Blank's response to CEC Information Request which is C9-14, we've looked at it recently --

DR. BAILEY: A: One moment, please.

MR. AARON: Q: While we're looking for the document, can I just ask you, are you aware of Dr. Martin Blank?

DR. BAILEY: A: Oh, yes, I know him.

MR. AARON: Q: He is in the same field as you, in terms of research?

DR. BAILEY: A: Yes, we've met any number of times at meetings of the Bioelectromagnetic Society and in past hearings.

MR. AARON: Q: Have you had lunch with him, kind of

thing?

DR. BAILEY: A: I don't recall that I have.

Proceeding Time 3:51 p.m. T69

MR. AARON: Q: I just wanted to show you what he says at 22.2 of his answers to the CEC. I mean, he doesn't quite share you view that a corporate affiliation is possibly tolerable. He seems to -- at 21.3 he says:

> "Critiques are an essential and integral part of the scientific progress. It is, of course, essential that those making critiques fully divulge their sources of funding, investments, et cetera. As we have seen, corporate interests have distorted the scientific process, resulting in many of the critiques being invalid."

I know you think, Dr. Bailey, there are many sources of bias, but would you agree that corporate interests have distorted the scientific process as is being asserted by Martin Blank in --

DR. BAILEY: A: I don't have a basis to conclude that that -- that any distortion has occurred.

MR. AARON: Q: And at 22.2 he says:

> "The scientific committee member listed on SCE and HIR…"

Which is what? Sorry? What is that acronym?

DR. BAILEY: A: Scientific Committee on Emerging and

New Health Risks. I can't remember the full acronym.

MR. AARON: Q: Okay. The member on that committee is Anders Ahlbom, he says,

> "…who was recently found to have undisclosed corporate connections and was removed from EMF regulatory committees. This connection of a key committee suggests a similar mindset of other members and probably amounts to yet another report that omits references to molecular and cellular studies and proposed mechanisms already mentioned in earlier comments."

DR. BAILEY: A: I don't believe that this statement is entirely accurate. The only situation that I'm aware of where Anders Ahlbom was excused from one review panel, and this says EMF regulatory committees, and I seem to recall that Anders Ahlbom has been on other review committees. So I think maybe the only one that I'm aware of has to do with the IARC review. And he is a very experienced epidemiologist and I'm not aware that any other -- his participation on any other committees has been affected.

MR. AARON: Q: I've pointed out in the Exponent reference you reference and rely on Swerdlow and Ahlbom at page 23. Do you also rely on them at page 21 of your -- sorry. It's not page 23, it's page 24

of your -- the initial point I made. At page 21 of your report at the end of your section on occupational exposure, do you rely on Ahlbom for the proposition that the studies that report an association with leukemia, that they've been evaluated in scientific reviews which found no consistent or convincing evidence that the RF causes leukemia? Now, are some of those reviews Ahlbom's?

DR. BAILEY: A: There is a reference to Ahlbom *et al.*, 2004, and if you go back and look at that reference in the bibliography, the authors of that report are A. Ahlbom, A. Green, L. Keyfitz, David Savitz, and A. Swerdlow. And the other Ahlbom reference also has, besides -- it's not a sole author study. Besides Ahlbom there's Fechting, Green, Keyfitz, Savitz and Swerdlow in 2009.

MR. AARON: Q: Okay.

DR. BAILEY: A: And one second.

MR. AARON: Q: So they tend to pop up here and there, Ahlbom and Swerdlow.

DR. BAILEY: A: Right.

MR. AARON: Q: All right. You said the IEEE subcommittee that you sit on is a committee that anyone can sit on?

Proceeding Time 3:56 p.m. T70

DR. BAILEY: A: People can apply to join the committee

and if they're willing to participate, and --

MR. AARON: Q: Okay. Well, a layman wouldn't have any chance of getting on the committee. Your application is vetted.

DR. BAILEY: A: There are -- people are vetted to make sure that they're serious, and if they're willing to do the work of the committee, but there are lay people that are on the committee, although it's not a --

MR. AARON: Q: Okay. So it's --

DR. BAILEY: A: -- a very interesting kind of thing for lay people to join.

MR. AARON: Q: I'd be very interested. There is an application process, so it's not true that anyone can sit on the committee. Anyone can apply, and if accepted, can sit on the committee. Correct?

DR. BAILEY: A: I'm not -- I don't know of anybody who's ever been refused membership. It's a process of making an application to the committee, and filling out information about oneself and one's background, and where you work and what your interests are.

MR. AARON: Q: Okay.

DR. BAILEY: A: And I understand that there is no barrier to entry.

MR. AARON: Q: But there is not the kind of declaration of interest that there is on the IARC table.

DR. BAILEY: A: Not to my knowledge.

MR. AARON: Q: And you say that kind of declaration, to your knowledge, applies to ICNIRP.
DR. BAILEY: A: Correct.
MR. AARON: Q: Which you refer to the membership of ICNIRP at page 16 of your E[x]Ponent Report.
DR. BAILEY: A: Mm-hmm.
MR. AARON: Q: And you say that the ICNIRP 2009 report was prepared by 14 scientists, from 10 different countries, who are members of ICNIRP. And do you have any idea how -- is that an open membership, to the same extent that the IEEE is? Like, anyone who wants to kind of -- is it quite selective?
DR. BAILEY: A: It is by invitation only.
MR. AARON: Q: Okay. And do you have any idea of what the criteria are for membership in ICNIRP?
DR. BAILEY: A: Apart from scientific expertise in a chosen field, I don't know of any others.
MR. AARON: Q: Okay. So these are 14 people who have quite a lot of influence. Correct?
DR. BAILEY: A: These are 14 people who participated in this review.
MR. AARON: Q: Mm-hmm. But to the extent that ICNIRP engages in a weighing of the evidence analysis, which in your testimony in responding to cross-examination by my friend, William Andrews, you said that the weighing of evidence process does entail judgment.

And it does entail the exercise of opinion.

DR. BAILEY: A: Guided by scientific methods and procedures, yes.

MR. AARON: Q: And the ICNIRP judgments in that respect do have an influence on other standard-setting bodies, such as the IEEE and Health Canada's Safety Code 6.

DR. BAILEY: A: I don't know exactly how to gauge the influence that you refer to, but I'm sure that different standard-setting bodies are aware of the activities of other agencies, and I know in the case of IEEE and ICNIRP, there have been discussions in the attempt to figure out ways to see if it was possible to harmonize the standards so that there would not be discontinuities going from one part of the world to the other.

MR. AARON: Q: So, you sit on the ICNIRP subcommittee -- sorry, the IEEE subcommittee. At the same time, IEEE is one of the standard-setting bodies to which you defer in your E^{x}ponent Report.

DR. BAILEY: A: That's correct.

MR. AARON: Q: All right. Mark Warren gave evidence that he called you by telephone, and then you did a purchase order for the preparation of the E^{x}Ponent Report.

DR. BAILEY: A: Yes.

MR. AARON: Q: Is that purchase order in evidence?

MR. WARREN: A: Not to my knowledge.
MR. AARON: Q: Would you provide a copy of it? By way of undertaking?
MR. WARREN: A: Yes.

Information Request

Proceeding Time 4:01 p.m. T71

MR. AARON: Q: Does that purchase order specify E^{x}ponent's fee for its services with respect to the E^{x}ponent Report.
MR. WARREN: A: I believe it does, yes.
MR. AARON: Q: Is E^{x}ponent charging an additional fee above and beyond the E^{x}ponent Report preparation for participation in these proceedings?
MR. WARREN: A: Yes.
MR. AARON: Q: And is that set out in the purchase order?
MR. WARREN: A: I cannot recall.
MR. AARON: Q: Would you undertake to provide particulars in that respect?
MR. WARREN: A: Yes.

Information Request

MR. AARON: Q: Thank you.

I move now to this issue of chronic long-term exposure, which means we've survived the conflict of issue -- the conflict of interest issue. Well, I don't know if we've survived it, but we've moved past

it.

So I'm going to start by reference to the Safety Code 6 review 1999, and I apologize. Whenever --

MR. WARREN: A: Are you talking Safety Code 6 2009?

MR. AARON: Q: Sorry --

MR. WARREN: A: Or Royal Society 1999?

MR. AARON: Q: The latter.

MR. WARREN: A: Royal Society.

MR. AARON: Q: Yeah.

MR. WARREN: A: Okay.

MR. AARON: Q: And I apologize to everyone here that every time I refer to this document I suffer a delay in finding the provision that I need to refer to, because the numbers I've referenced by PDF don't correspond to the page numbers. And so I'm looking at page 115, where under the heading "Epidemiological Studies" the second sentence:

> "Microwave communications, including cellular telephones, have not been in general use for a duration sufficient for all potential health effects to have emerged."

Would you agree with that statement?

DR. BAILEY: A: For some types of diseases we have -- there's not been enough, a long enough time to exhaust

all possibility of assessing the risk, because the time frame is -- for which we have good data anyway, is probably 15 years or so. And some types of tumours might take longer to develop than 15 years.

MR. AARON: Q: So what's the answer to my question?

DR. BAILEY: A: So the answer is yes, that there are for some types of diseases, there may not have been long time enough for these potential effects to be fully investigated.

MR. AARON: Q: So is the answer yes, you agree with that statement?

DR. BAILEY: A: I said yes at the beginning, sir, and then continued.

MR. AARON: Q: Yeah, so do you agree with that statement?

DR. BAILEY: A: With the modifications that I gave. I said yes and followed up with my explanation.

MR. AARON: Q: Okay. Is your explanation at all inconsistent with that statement?

DR. BAILEY: A: It limits it, sir.

Proceeding Time 4:06 p.m. T72

MR. AARON: Q: Okay, well, let's look at it. It says

> "Microwave communications including cellular telephones have not been in general use for a duration sufficient for all potential health effects to have emerged."

And you're saying, well, some tumours -- there has been enough time for some tumours to emerge, but not for others to emerge. Correct?

DR. BAILEY: A: Assuming that there is a causal relationship, it's possible that there -- that the studies have not examined a period long enough to capture some -- the possibility of some tumours emerging that have very long latencies, maybe 30 or 40 years.

MR. AARON: Q: Yeah, okay. Well, it sounds to me like you agree exactly with that statement. So I'll move on.

So, then you would agree with me that the passage of time -- on the basis of this statement with which you agree -- is a factor in the emergence of potential health effects from exposure to RF emissions.

DR. BAILEY: A: Time is a factor in the assessment of potential health effects for RF and any such exposure.

MR. AARON: Q: All right. In fact, at page 2 of your report, of the E^{x}Ponent Report -- starting on page 1 of the last few words, you say:

> "The main public questions that arise in regard to these devices are about cancer risks from long-term exposures."

DR. BAILEY: A: Yes.

MR. AARON: Q: And that would reflect the principle of chronic exposure. Correct?
DR. BAILEY: A: Yes.
MR. AARON: Q: And also at page 3, in the context of discussing hazard identification, you say -- the second sentence, second paragraph:

> "The next step, dose response assessment, is an evaluation of the data from the hazard identification to determine what intensity and duration of exposure causes adverse effects that have been identified."

DR. BAILEY: A: Correct.
MR. AARON: Q: And your reference to duration is also a reference to the factor of chronic exposure. Correct?
DR. BAILEY: A: It could also be a factor in acute exposures as well.
MR. AARON: Q: For thermal levels.
DR. BAILEY: A: For anything.
MR. AARON: Q: Right. How long?
DR. BAILEY: A: Just -- we -- you don't just consider studies of one particular duration. That we have examined studies at short exposure levels, medium-term exposure levels, and longer-term exposure levels.
MR. AARON: Q: And then duration is also considered -- over in the next sentence, you say "The exposure assessment evaluates the amount of exposure," and by

amount of exposure you would also include how long an individual is exposed for. Correct?

DR. BAILEY: A: Yes.

MR. AARON: Q: And you go on to say "The final step this characterization, compares the dose response pattern to the amount of specific exposure." Again, a reference to factors which include how long a person was exposed for, right?

DR. BAILEY: A: Yes.

MR. AARON: Q: And so, duration, or amount of exposure, is central to hazard identification, dose response assessment and specific risk characterization. Correct?

DR. BAILEY: A: It is an element of all of those.

Proceeding Time 4:10 p.m. T73

MR. AARON: Q: All three? And at page 5 under "Epidemiological Studies" you write:

> "One aspect of epidemiology research provides descriptive statistics on the population such as birth rates and mortality rates to help characterize health and disease in the population. These data are collected by public health organizations such as Health Canada to show trends over time or differences amongst places. Examples include data that show changes in

heart disease deaths over time."

And again in the last sentence of that paragraph you say:

"The data are compared to actions in the population that might affect cancer, such as comparing rates of lung cancer and heart disease over time."

So the passage of time is, in the context of the epidemiological studies that you refer to here, a central factor in the conduct of those studies.

DR. BAILEY: A: Yes, for the type of studies we're discussing here and for some other types of studies, there -- they said there are other epidemiology studies that might be concerned with very short-term effects that would not be involved in long duration period. But those are different -- you know, the purpose of the studies are for a different reason.

MR. AARON: Q: And also the same goes for cohort effects that you describe on page 6 and the third sentence:

"In a cohort study, a group of people are observed over a long period to determine whether the disease develops in relation to various exposures at various levels. This type of epidemiological study typically provides the most relevant and reliable

information, particularly for conditions that develop over years."

And you would agree that those conditions include certain times of tumours.

DR. BAILEY: A: Correct.

MR. AARON: Q: And at the last sentence of the second paragraph, which begins with "To obtain," the last sentence of that paragraph you write:

"Another challenge in the case of controlled studies is that they are retrospective in nature. That is, the study starts after the onset of the disease, so past history of exposure must be evaluated."

So is it true that in that kind of the study of passage of time is also a necessary element for the study? You're looking into past exposures.

DR. BAILEY: A: It's not a necessary element. There are studies that are done prospectively. Case control studies in which there is a different direction in which you're looking forward rather than backward, but I would agree that time is a factor in those studies as well.

MR. AARON: Q: Okay, and the last two lines of this page, you write that acute effects -- now, what do you mean by acute effects in this context? Would that be burns?

DR. BAILEY: A: Acute effect could be anything that would occur within a short time. Depending upon the study that could be defined from the matter of hours to weeks or maybe even a month or so.

MR. AARON: Q: So you say

> "Acute effects occur typically from short-term disclosures, but chronic effects such as cancer typically are linked to long-term exposures at low levels."

DR. BAILEY: A: That's been the pattern that's been observed for many chemicals, and so that same kind of observation has been made with regard to radio frequency fields. That very intense high exposures can lead to immediate effects and to evaluate effects that might take a longer period of time that occur at lower levels, you would have to look over a longer period of time.

Proceeding Time 4:15 p.m. T74

MR. AARON: Q: The Interphone finding with respect to the association between high use telephone usage. And that showed a significant effect between that and a certain kind of tumours. And a significant high association -- what was that, three point -- do you recall what the association was?

DR. BAILEY: A: There are hundreds of associations reported in the Interphone study. I'll go back and

we'll check.

MR. AARON: Q: The one where there was an association, it was canvassed in cross-examination. It was three point something, O-R.

DR. BAILEY: A: Right. It was over 3, but I don't remember the decimal point after that.

MR. AARON: Q: Okay. That's fine. My question is -- and O-R stands for --

DR. BAILEY: A: Odds ratio.

MR. AARON: Q: Okay. My question for you -- those tumours, are they of the kind to which -- that you referred to as being the kind of things that you could only see with chronic studies? Long-term.

DR. BAILEY: A: You could not study the development of cancer in a short-term study.

MR. AARON: Q: Right.

DR. BAILEY: A: It would require a longer period of study and observation.

MR. AARON: Q: All right. And so, at page 11 of your report, at the top of the page, you say:

> "This incorporates the basic scientific concept of dose response, which refers to the principle that the probability of an effect occurring, or the severity of an effect, increases with a dose or amount of exposure."

And so, would this increase -- would the passage of time be a factor in the increase in the dose or amount of exposure?

DR. BAILEY: A: If exposure was continued throughout that period of time --

MR. AARON: Q: Mm-hmm.

DR. BAILEY: A: -- and if the biological response to that exposure was something that was cumulative.

MR. AARON: Q: All right. At page 4 of the E^{x}Ponent Report, you say "In a dose response assessment" -- oh, we already looked at this. Ah. No, we didn't. You say "In a dose …" Second paragraph, second whole paragraph.

> "In a dose response assessment, scientists evaluate the scientific research to estimate the amount of exposure dose."

And that's likely to result in a particular health -- sorry.

> "That the amount of exposure that's likely to result in a particular health effect in humans. This is important because many things that might impact human health only do so after a certain amount of exposure has occurred. A simple summary of the dose response principles is that for chemicals or physical agents that could affect biologic

function, more is worse."

Do you stand by that statement?

DR. BAILEY: A: As a general principle of toxicology, I do.

MR. AARON: Q: Yeah. And so, an agent can show no impact on human health at a certain amount of exposure, but can then show impact on human health with further exposure.

DR. BAILEY: A: Depending upon the agent, yes.

MR. AARON: Q: Yes. And at page 15 of this report, when you talk about the exposure -- chronic exposure, you talk about the SSM. What does that stand for?

DR. BAILEY: A: It's an abbreviation of a Swedish organization and I'm not sure that it totally is -- matches up the words in Swedish. But we've translated it as the Swedish Radiation Safety Authority in English.

Proceeding Time 4:20 p.m. T75

MR. AARON: Q: So, I mean, the points that passage of time is a real factor in whether exposure -- amount of exposure and duration of exposure is a factor in -- where exposure may result in adverse bioeffects.

DR. BAILEY: A: Correct.

MR. AARON: Q: And that's why Israel has a standard, whereby it has -- a two-tier standard. It has one standard for short-term exposure and a different

exposure for chronic exposure.

DR. BAILEY: A: I can't say that I'm familiar with that standard.

MR. AARON: Q: Okay, I'll take you to that later on in the evidence. But in the middle of the page of your report on page 15, it says,

> "The SSM distinguishes potential risk by short-term users from the risk for long-term use. The Interphone study…"

As quoted by SSM,

> "The Interphone study could not finally resolve whether use of mobile phone causes brain tumours. At least a short-term risk can be excluded with a high degree of certainty. But uncertainty still remains regarding the very intensive and long-term use."

And so there again, that factor emerges, the passage of time in our ability to ascertain risk, correct?

DR. BAILEY: A: Correct.

MR. AARON: Q: And cancer has a latency period, right?

DR. BAILEY: A: Yes, it varies with the type of tumour.

MR. AARON: Q: You say that -- in your report you say, at page 19, last sentence, top paragraph, that

> "For most cancers the duration or latency period between exposure and diagnosis is

decades, not years."

DR. BAILEY: A: Correct.

MR. AARON: Q: Right. And at page 23 you reference the Hardel report. Bottom of the page. Fourth line from the bottom. One of the Hardel studies, you say it

> "…reported positive associations for mobile phone use in brain cancer, which tended to be stronger with increased hours of use."

You're seeing that in the -- there you're seeing again the factor, the passage of time as a factor emerging in a report on the impact of RF exposure, correct?

DR. BAILEY: A: Yes.

MR. AARON: Q: And my question for you is in assessing -- in your risk assessment with respect to the AMI meters, is there any part in the E[x]ponent Report where you consider and make an analysis with respect to the fact that Fortis customers are going to experience chronic exposure to these meters, day in and day out, for the life of the meter, which could be 20 years, and a baby could be born and spend 24 hours a day sleeping within three feet of one of these meters and grow up in this context of chronic exposure. Where in the E[x]ponent Report have you considered that factor?

DR. BAILEY: A: The research that we have reviewed considers chronic exposure to radio frequency fields

from a variety of sources. So, for instance, there are studies that have -- that I have reviewed that looked at the cancer mortality experience of persons who had intensive exposure to radio frequency fields as part of their military work, and the health experience of those individuals were followed for a period of 40 years, following this exposure to radio frequency fields while they were in the military.

Proceeding Time 4:25 p.m. T76

MR. AARON: Q: You're free to go an insight those studies.

DR. BAILEY: A: But I'm telling you, this is the kind of information that I had considered in my thinking in writing this report.

MR. AARON: Q: Right, and where is that set out in your report? Or is just a latent --

DR. BAILEY: A: I did not cite it --

MR. AARON: Q: -- consideration that --

DR. BAILEY: A: Again, the purpose of my report was to provide an overview of the status of scientific research on radio frequency fields and health and issues of -- such as a report that I just described and others are cited in the reviews that I indicated in the E^{x}ponent Report.

MR. AARON: Q: So you're saying "Other people considered this in their studies and I read their

studies, but I didn't engage in any explicit analysis in the body of my report on the factor of chronic exposure."

DR. BAILEY: A: I didn't not draw specific attention to that.

MR. AARON: Q: Okay. Now, Safety Code 6 doesn't specify a limit on exposure duration, does it?

DR. BAILEY: A: No.

MR. AARON: Q: And in Maisch, in his report on page 3, when he speaks about this working group and its criticisms of the IEEE on a number of fronts, one of -- he notes that one of the working groups' complaints was -- was this. That a fundamental issues was the standards failure to address chronic, and he brackets that, low intensity prolonged, as opposed to acute high intensity short-term exposures. This was seen, he says, in the standards limiting the definition of an adverse effect due on the acute exposure situations, and the use of time average calculations that were not suitable for prolonged exposure situations, and therefore may not adequately protect the public.

The failure of Health Canada to specify any limit on exposure duration clearly fails to factor in what you have admitted over the last 15 minutes. That is that the passage of time is a key factor in the

assessment of the adverse bioeffects from RF exposure.

DR. BAILEY: A: What's the question?

MR. AARON: Q: Don't you agree with me? That it's -- that the failure of Safety Code 6 to specify a limit on exposure duration is inconsistent with the notion that passage of time is a central factor? You've admitted it for the last 15 minutes, that passage of time is a central factor. Safety Code 6 doesn't speak to the passage of time. So you would agree that it's a problem there, right?

Proceeding Time 4:29 p.m. T77

DR. BAILEY: A: The passage of time as we've discussed is an important aspect of risk assessment. The relevance of that passage of time to certain health effects is determined by the assessment of the scientific evidence, and to my knowledge no scientific of health agency, or regulatory agency that has set a standard, has concluded that there is, from their assessment of all the evidence to date, that there is a basis to conclude that exposure at very very low levels, such as that are associated with smart meters, would cause adverse health effects including cancer.

So, the fact that Safety Code 6 did not set out a standard for chronic exposure reflects the scientific consensus that there is not a sufficient scientific basis to develop such a standard.

MR. AARON: Q: And part of the reasoning why there is not a scientific basis to set such a standard is because, as you say, latency period on cancer could be decades.

DR. BAILEY: A: The standard bodies and agencies can only review evidence that they have, and they have assessed the evidence and concluded that based upon what is available to date and the latency periods evaluated, that there is not a basis to conclude that there are adverse long-term health effects including cancer.

Out of an abundance of caution, of course we should continue this monitoring so that we have the same kind of 40-year follow-up such as the occupational study that I described.

MR. AARON: Q: Well, we could do a study of Fortis customers. Wouldn't that be a great opportunity? To monitor the long-term effects of exposure to low level?

DR. BAILEY: A: I'm sure such a study could be done. I'm not sure that many scientists would be interested in it, but --

MR. AARON: Q: I'm just not sure that the subjects have agreed to participate.

Now, Don Maisch at page 8 of his report raises another point on this which I'd like to put to

you. And that is that Safety Code 6 doesn't address the fact that smart meters are transmitting on a brief but regular basis over a 24-hour time. So I put it to you that this person, who wrote his Ph.D. on these industry standards, shares my view that Safety Code 6 is insufficient as a regulatory code. It's silent on the fact of transmissions over 24-hour time frame on a regular basis.

Would you recommend that the authors of Safety Code 6 put their mind to setting a standard in that regard?

DR. BAILEY: A: In a sense that they have addressed this in the sense that the standard is -- says so long as you're below the limit, whether that exposure lasts for one minute, one second, one month, one year, they believe that is protective of public health.

MR. AARON: Q: That's your inference from the omission to set a long-term standard. They haven't said that explicitly.

DR. BAILEY: A: That's correct.

MR. AARON: Q: Yes. Now, the Safety Code 6 review at page 110 --

DR. BAILEY: A: Are we talking about Safety Code 6 or--

MR. AARON: Q: I'm sorry, I'm always talking about the Royal Society when I --

DR. BAILEY: A: And I'm sorry, the page number again?

MR. AARON: Q: 110.

DR. BAILEY: A: Okay.

Proceeding Time 4:34 p.m. T78

MR. AARON: Q: And it says there, second paragraph, where it starts "Based on its review", and then third sentence which says, "Because Safety Code 6", which is about six or seven lines down.

> "Because Safety Code 6 does not specify a limit on exposure duration, this would permit occupational exposures at these levels for eight hours a day, five days a week."

And then a few lines down it says,

> "Consequentionally the panel recommends that these exposure limits for worker exposures be reviewed with respect to both intensity and duration."

DR. BAILEY: A: And this is in the context here of thermal effects.

MR. AARON: Q: Do you think it would be applicable that concern to the context of non-thermal effects? The principle that where exposures -- do you think it would make any -- do you think it could make any difference to non-thermal effects, whether you're exposed once and not again, or whether you're exposed nine hours a day, 365 days a year for 20 years, do you

think that would make any difference, perhaps?

DR. BAILEY: A: Depending upon the nature of the interaction it might or might not. For instance, we know that many responses to things in the environment are what we call threshold acting, that only exposures above a particular level have a -- produce biological effects or adverse health effects, and you know, if you look at most of the restrictions that we have on the use of chemicals or additives in food or other kinds of things, the EPA and other agencies sets these requirements not at banning any exposure at all, but if their research shows that the amount of exposure up to a certain level is without any health or adverse biological effect, then that is permitted.

So, in that example, continued use of a product throughout your life time, if that exposure is below that threshold, would not have any implications for long-term health effects.

So, it would depend very much upon the nature of the interaction.

MR. AARON: Q: Right, so you said it might or might not.

DR. BAILEY: A: Correct.

MR. AARON: Q: Which I can say from your answers that it might.

DR. BAILEY: A: Correct.

MR. AARON: Q: So, the Safety Code 6 1999 review of the Royal Society document says that -- at page 113, under the heading "10 Research Recommendations", second paragraph, last line. It says

> "Epidemiological studies are needed to monitor the potential health effects of long-term exposure to radio frequency shields [sic]."

Would you agree with that?

DR. BAILEY: A: I don't have any dispute with recommendations for further research.

Proceeding Time 4:39 p.m. T79

MR. AARON: Q: And it's one thing to have no position. But my question is whether you agree with that. That epidemiological studies are needed. The authors of the review are identifying a need. And I'm not saying, asking if you have an issue with it, the prospect of further studies. I don't see who would. I'm asking if you share the view of these authors that epidemiological studies are needed to monitor the potential health effects of long-term exposure to radio frequency fields.

DR. BAILEY: A: The answer is yes, and in 1999 we did not have the type of research that is available today, and I think with the Interphone and other studies we have tremendously enhanced our knowledge, and I think

that probably further research to resolve the issues that were raised by the Hardel and Interphone -- parts of the Interphone study should be followed up on.

MR. AARON: Q: So 1999, it's been 14 years, that's not very many decades.

DR. BAILEY: A: That's correct.

MR. AARON: Q: In relation to the latency period of the cancer.

DR. BAILEY: A: Yes.

MR. AARON: Q: This is one ongoing experiment we're in, isn't it?

DR. BAILEY: A: I don't know if I'd characterize it as an experiment, but it's certainly a topic that will be followed for years to come.

MR. AARON: Q: And Fortis is willing to subject its customers to this when there are alternatives? Mr. Loski? Mr. Warren? And they're denying an opt out program? Please.

MR. LOSKI: A: If I can answer.

MR. AARON: Q: Please.

MR. LOSKI: A: Please. Yes. Again as I stated yesterday, we look to the competent authority here, being Health Canada and Safety Code 6 standards, and we are in compliance with them, and as I read out yesterday, Health Canada saying that smart meters are safe, do not create adverse health effects for people.

And yes, we stand by, we stand by that and stand by the program.

MR. AARON: Q: You're not concerned by Mr. Bailey's evidence that Safety Code 6 doesn't address long-term exposure.

MR. LOSKI: A: As I said, you know, we certainly -- again as experts here, we have to look to the authorities and as I said, we understand that Health Canada looks at all -- continually or ongoing monitors the appropriate science to come to its conclusions, and we take comfort in the role that Health Canada plays in that regard and again comfortable with -- confident in the fact that the emissions from the advanced meters that we're proposing are significantly lower than the thresholds that are set out in Safety Code 6, and again, take comfort in the fact that we are compliant with those regulations.

MR. MACINTOSH: And I just want to make sure the record is clear. I don't think my friend properly summarized Dr. Bailey's evidence in saying Safety Code 6 in some way is ignoring long-term effects. I think Dr. Bailey's evidence was far more refined than that and said that the analysis has indicated that there was not harm, whether it be one second, one month, one year, et cetera. That was the gist of that evidence. I don't think that was a correct summary.

MR. AARON: Well, he agreed with my statement that -- several times, that Safety Code 6 does not specify a little on exposure duration, and that's all.

MR. MACINTOSH: There's no dispute about that.

MR. AARON: Yet. All right.

MR. MACINTOSH: And if that's all that my friend meant to say, that's fine.

Proceeding Time 4:44 p.m. T80

MR. AARON: Q: I mean, the assertion, Mr. Loski, is that because it doesn't specify a limit on exposure duration, the suggestion is that Health Canada hasn't stepped up to the plate in regulating long-term exposure. And yet Fortis takes the position that, well, we rely on Health Canada and their standards in that regard. But they don't have standards in that regard on a matter of chronic exposure, which the evidence shows is very relevant to adverse bioeffects. You're welcome to respond to that.

MR. MACINTOSH: Well, I'm going to speak first, if I may.

THE CHAIRPERSON: Yes, thank you, Mr. Macintosh.

MR. MACINTOSH: What my friend has done is embark upon a long discussion with Dr. Bailey, who has said in essence that the absence of a duration component, prolonged exposure component, in Safety Code 6 does not lead to the conclusion that Health Canada has not taken longer-term exposure into account.

His evidence was that the duration could be -- his time frame or his time references were one second, one minute, one hour, a year. But the thesis there was that at these levels the longer duration does not adversely impact health. That's fine. That's a discussion that was had between my friend and Dr. Bailey.

For my friend to then take that 20-minute analysis and place it in front of Mr. Loski, and say, "Well, Mr. Loski, how can you possibly be proceeding when Safety Code 6 doesn't take into account duration?" is mischaracterizing the evidence. And it's unfair to Mr. Loski to, in my submission, to drag him into that debate.

MR. AARON: I'm willing to move on.

THE CHAIRPERSON: Please. Please do.

MR. AARON: Q: Back to the Royal Society, at page 111. The paragraph two-thirds of the way down starting with

> "Studies of exposed human populations provide the primary means of directly assessing the potential effects of RF fields on human health."

I just want to highlight the last sentence there, is that:

> "The panel recommends that the results of these investigations be carefully reviewed

when completed, and any implications for Safety Code 6 be carefully considered."

And I put it to you that the concern of chronic exposure to RF, Dr. Bailey, long-term exposure, is a concern that carries much weight amongst the scientific community.

Proceeding Time 4:47 p.m. T81

DR. BAILEY: A: Yes, it's an aspect of our concern and evaluation of that potential health risk.

MR. AARON: Q: And Martin Blank at Appendix C9-14 in responding to the CEC information requests, specifically question 12.1, says:

"Total RF exposure is of concern. It is the result of many individual sources. Since it's steadily rising, all sources need to be considered. Sources in the home such as smart meters have a relatively greater impact because of their proximity…"

one, and two,

"…their sustained nature."

So Dr. Blank has identified the characteristic of the AMI project, which he says is going to have a relatively greater impact due to the sustained nature of exposure. And I'm going to ask you if you agree with that.

DR. BAILEY: A: I think there's several things in the

statement that I would disagree with. Smart meters, to my knowledge, the deployment would not be deployed within homes as he states, and would not have a necessarily greater, relatively greater impact because of this proximity. And the sustained nature in fact, even though the exposure, as you said, will occur over years, the time -- and again, let's go back to time again over which that exposure occurs on any given day, is very very short, and I'm going to ask Dr. Shkolnikov to properly characterize and respond to Dr. Blank's allegations regarding the relatively greater impact of smart meters. And it's the issue of contribution to total exposure.

Proceeding Time 4:50 p.m. T82

MR. AARON: Q: Okay. Well, there is several -- and let's do all of that. But let's do it in an organized fashion, one point at a time. There is three issues. There is contribution to total exposure, there is proximity, and there is sustained nature.

Can we deal with sustained nature first? Because that's the topic I'm on.

DR. BAILEY: A: Okay.

MR. AARON: Q: Okay. I know there was a lot in that statement. And you say that you disagree with the fact that sustained nature of the proposed AMI meter will have a relatively greater impact. Correct? And

maybe we should flesh out what he means by relatively greater, and let's hypothesize what he means.

Relatively greater than an exposure that is not sustained. For example, if I go to someone's house and they have a smart meter, and I stay there one day, it will have a certain impact. But relative to that impact, there will be a greater impact if I go to a home and spend 20 years there and have exposure on a daily basis.

In relation to the two scenarios, Dr. Blank is saying the second scenario will have a relatively greater impact. Is that a proposition you can agree with?

DR. BAILEY: A: For that comparison, but the difficulty is that he is making the comparison of the smart meters in comparison to other sources, and for that you have to take into account the duration of exposures. And that's why I wanted Dr. Shkolnikov to address the duration of smart meter exposures in comparison to these other sources.

So, Dr. Shkolnikov.

DR. SHKOLNIKOV: A: Yes. So, one of the things to consider is, there was a misconception between saying AMI provides -- a smart meter provides 24/7 exposure. It provides short exposures, as I mentioned earlier. If you were to take a six-minute period, about one-

fifth of a second, you would get exposure. Is this exposure repeated throughout the day at a very low rate? The answer is yes. That is not exclusive of smart meter.

Proceeding Time 4:53 p.m. T83

The cell phone that you have, whether you use it or don't use it, actually continuously transmits. On that definition of word continuously transmits, the signal. About 30 times a minute, your phone in your pocket communicates with a tower. It does it for purposes of notifying that you're still available to receive phone calls, to receive control information to know how to communicate with the network. And so from that perspective, if you were to use that definition of "continuous", there are a lot of technologies that do it. Say cordless phones, cellular phones.

And then if you start going to more traditional signals you have TV, FM, AM radio, in additional to cell phone towers I've mentioned, that are continuously exposing you, and in those cases they actually do it not even on, you know, low duty cycles, not for just a fraction of a second, but they do it in continuous levels.

And then we start going into natural sources of RF exposures, and those are also continuous

sources of exposure that actually have an average roughly equal to the peak but they are continuous, regardless of whether you want to be exposed to it or not, just by nature of you living on Planet Earth.

MR. AARON: Q: Could I stop you? You and I are going to have an extensive discussion tomorrow on the nature of the emissions and the characteristics of the emissions, and I'm going to ask you to explain all of this in the context of questions. I'm not prepared to deal with this topic now because I'm in the topic of the effect of chronic exposure, now, and I appreciate that they're interrelated factors and the effect of chronic exposure will depend on the nature of the exposure itself. Is that your point?

DR. SKOLNIKOV: A: Well, and from a just general perspective, unless you plan to go to outer space or to ban all TV, FM and AM radio stations from this point on, you are going to receive chronic multi-year exposure to the signals.

MR. AARON: Q: Right, and I'm going to deal with that and I've got questions to cross-examine on that. I just want to -- I just want to deal with them in an organized fashion when I get to that concern. I don't want to cut you off, but I assure you you're going to have an opportunity to get all into this.

DR. SKOLNIKOV: A: Okay.

Proceeding Time 4:56 p.m. T84

MR. AARON: Q: With respect to the third point, Dr. Bailey, with respect to proximity, this isn't a point that I'm raising now, but it's a point that you raised in your answer. You said that you disagree that the meters are going to be placed in the home. They're going to be placed outside of the home.

DR. BAILEY: A: Outside of the home.

MR. AARON: Q: Correct.

DR. BAILEY: A: And with the directionality of the radio frequency field pointing away from the home.

MR. AARON: Q: Away from the home. Does the field only go in one direction?

DR. BAILEY: A: That -- it doesn't go only in one direction, but I was saying that the main -- the highest exposure is directed away from the home.

MR. AARON: Q: Okay. It's a 360-degree emission, isn't it?

DR. SHKOLNIKOV: A: Well, in -- I think it's -- you know, the simplification is to talk about direction of radio frequency signal. But it is important to know that radio signal goes in many directions. There is a measure of that, it's called "directivity". And without getting into the technical details, the idea is that, yes, it goes in all the directions but if you look at the smart meter that when it's mounted in the

smart meter panel and that's how it is installed, only -- if you look at the ratio of how much signal is going away from the house versus towards the house, the ratio is approximately a factor of ten. So, you know, ten -- the values we're talking about were computed in front of the smart meter. And if you were to go a similar distance to the back of the smart meter, you have to divide the signal by a factor of ten.

MR. AARON: Q: So one-tenth?

DR. SHKOLNIKOV: A: About one-tenth. Not including building materials, just from the --

MR. AARON: Q: From being behind it.

DR. SHKOLNIKOV: A: From the meter panel, yes.

MR. AARON: Q: But in terms of the question of proximity, the system proposed by Fortis, the AMI program, could result in a meter being on one side of an exterior wall and on the interior side of that wall there could be a headboard or a baby's crib. And so, I put it to you -- I mean, is that -- am I correct?

DR. BAILEY: A: That's a possible scenario. But simple proximity is not enough to describe someone's exposure in relationship to other sources.

Proceeding Time 4:58 p.m. T85

MR. AARON: Q: Oh, I agree that there are lots of factors. But proximity is one factor, and that degree

of proximity could be two feet, three feet. Correct?

DR. BAILEY: A: You can assume any scenario you want. But the point to realize is that proximity to a source does not necessarily describe what the exposure is. So, you know, you have a very high intensity source, an AM or FM radio station, you could be a long way away from it and still have a very appreciable exposure. Or you could be close to a very weak source and have a very low exposure.

MR. AARON: Q: I've seen that. I've seen information that the greatest exposure to a cell phone tower is not necessarily at its base, correct? It's a little bit back, 30 feet back, where the plume hits. Correct?

DR. BAILEY: A: It's depending upon the way the antenna is configured, that will be observed at times, yes.

MR. AARON: Q: But we're repeating ourselves a little, and I'm trying to nail you down on this point. You're saying proximity isn't the be-all and end-all of exposure. And I'm saying it's a factor. And I'm asking you to affirm that.

DR. BAILEY: A: It is a factor that determines exposure, but it can't be looked at in isolation.

MR. AARON: Q: Absolutely.

DR. BAILEY: A: Okay.

MR. AARON: Q: And that factor, in the case of the AMI

system, could be, in terms of physical proximity, a matter of two or three feet, correct?

DR. BAILEY: A: Yes.

DR. SHKOLNIKOV: A: I --

MR. AARON: Q: I don't believe Fortis is issuing a warning to smart meter recipients saying, you know, "Don't put one of these outside your bedroom wall." Mr. Warren, Mr. Loski, are there plans for this?

MR. WARREN: A: We haven't got any plans to do that, and I note that of course that we have calculated the exposure limits, which are a thousand times less than Safety Code 6 limits at a distance of a half a metre.

DR. SHKOLNIKOV: A: I would like to address --

MR. AARON: Q: But I'm talking about proximity. And I realize those -- that we're talking about proximity to low-level RF emissions that are below Safety Code 6. Correct. And that proximity is what Dr. Blank refers to in this statement, and he says that's going to have a relatively greater impact, and I'm --

Proceeding Time 5:01 p.m. T86

DR. BAILEY: A: But he is -- you know, in terms of relatively greater impact, I mean, look at cell phones that are used at the head, or kept on the waist. In touch with the body. Not too feet away, but in touch with the body.

And so therefore these kinds of blanket

statements without careful description and analysis are very difficult to agree with.

MR. AARON: Q: I think it's difficult because we don't know what he means by "relatively". We don't know what he means in relation to what. But I think what he means is in relation to exposure that's not so proximate. But you would agree that there would be more exposure where a person has a cell phone on them all the time in relation to a person who has their cell phone in a desk drawer at the other end of the house.

DR. BAILEY: A: Right.

MR. AARON: Q: So there lies the factor of proximity.

It being five o'clock I'm going to canvass your needs, Mr. Chair.

THE CHAIRPERSON: Yes, I think we'll conclude for the day and continue tomorrow.

Mr. Fulton has a comment to make obviously. He's standing at the microphone.

MR. FULTON: Two actually.

THE CHAIRPERSON: Two, and I may have a comment depending on his comments.

MR. FULTON: The first one is to ask counsel and the interveners who are yet to cross-examine to stay after we recess tonight because I do need to address the issue of time estimates and scheduling for the balance

of next week -- or for the balance of this week and next week, and it's something that we need to do now, in my view. So that's one request that I have.

The second request relates to the document that Buryl Slack sent to the Commission. We're not able to get a better copy, I understand, so I would ask that the letter that Mrs. Slack sent in that was dated March 1st, 2013 be marked Exhibit C16-2.

THE HEARING OFFICER: Marked Exhibit C16-2.

(COPY OF HANDWRITTEN LETTER DATED MARCH 1, 2013 MARKED EXHIBIT C16-2)

THE CHAIRPERSON: Thank you. My comment related to the first point that you made, and that is I would like to start the day tomorrow with a report from you outlining the schedule for the remainder of the cross-examination, please.

MR. FULTON: Thank you, Mr. Chairman. So Exhibit C16-2 and then we can recess?

THE CHAIRPERSON: Yes, we'll conclude for the day and begin at 9:00 a.m. tomorrow morning.

MR. FULTON: Thank you.

THE CHAIRPERSON: Thank you, everybody.

(PROCEEDINGS ADJOURNED AT 5:04 P.M.)