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Thursday, November 15, 2012
Upon commencing at 9:00 a.m.

THE CHAIRMAN: Good morning. We'll reconvene now. Today is a day devoted to Consumers Association of Canada. I don't think there is any opening business we need to take care of, so I'll turn it over to Mr. Williams.

MR. WILLIAMS: Thank you, Mr. Chair, and good morning members of the panel.

Before I introduce our witnesses and allow Ms. Johnson to do her thing, I have -- just in terms of the agenda of the day from our clients, the first witnesses are going to be Drs. Gunn and Noble on cumulative effects, and we expect that they will take a fair bit of the morning, certainly past the break. Next up is Mr. Skinner on wildlife and his presentation. He's not from Newfoundland so we expect him to be considerably shorter than Mr. Noble.

THE CHAIRMAN: That can almost be inappropriate language.

MR. WILLIAMS: I think Mr. Noble will forgive me in this case.

THE CHAIRMAN: How about the rest of the Newfoundlanders?

MR. WILLIAMS: I retract that statement unequivocally, Mr. Chairman.

In the afternoon we want to focus on health issues, Dr. Brown and Dr. Lee will be up. And then issues related to adaptive governance and management with Dr. Fitzpatrick and with Dr. Diduck.

Mr. Chair, just from you, in terms of guidance for the morning break, we'll obviously break when the panel tells us to. We're tentatively planning around, there's a natural break around page 39 of the PowerPoint presentation. We'll seek your guidance, but that's the one we'll suggest.

THE CHAIRMAN: Well, more or less 10:30 is our standard. So when we get close to 10:30, if there is a natural break, either a little before or a little after, let us know. I'll keep an eye out for page 39.

MR. WILLIAMS: Thank you, Mr. Chair. And just finally for the panel, we have the PowerPoint presentation of Drs. Gunn and Noble. And also there is the bound written evidence of November 8th, and we will be moving back and forth between the two on occasion today.

With that I'm going to let Bram and Jill introduce themselves, and then Ms. Johnson will have some information for you.

MS. GUNN: Good morning, my name is Dr. Jill Gunn. I just want to outline a few of my qualifications.

MR. WILLIAMS: We'll do that in a few minutes.

MS. GUNN: All right.

MR. NOBLE: Bram Noble from the University of Saskatchewan. And I see you placed a sign here to speak slowly. Was that specifically for me?

MR. WILLIAMS: We're going to turn things over to Ms. Johnson for a second.

Dr. Bram Noble: Sworn.

Dr. Jill Gunn: Sworn.

MR. WILLIAMS: Drs. Noble and Gunn, if I can just get you to briefly turn to page 3 of your November report, and for the panel that's at tab 1. And Dr. Gunn, if I can get you to outline your qualifications as they relate to this presentation?

MS. GUNN: Sure, I'll do that. I wanted the panel to know a little bit about my

background that's directly related to this particular review. I have a Master of Science degree in Natural Resources Management, with a specialization in looking at land use management strategies on electric utility transmission rights-of-way. I have a Doctor of Philosophy in Environmental Assessment, specializing in strategic environmental assessment and also cumulative effects assessment.

For about six years, between 1997 and 2003, I was a consultant on an ongoing basis to B.C. Hydro. And when I was a consultant for them, we were looking at vegetation maintenance specifically as a way to integrate a variety of natural resource values that were important on transmission rights-of-way in the north. That research resulted in quite a number of technical reports to do with species at risk, for example, but also wildlife and vegetation in general throughout the north.

I also co-wrote National Guidance, that was endorsed by the Canadian Council of Ministers of the Environment on regional strategic environmental assessment, which is understood to be the "gold standard" for cumulative effects

assessment. That guidance is now used by the Province of Alberta as the basis for their innovative land use management framework. So those are the qualifications I'd like you to be aware of on my side.

MR. WILLIAMS: Before we turn to Dr. Noble, just a couple more questions for you Dr. Gunn. Could you give us some insight into some of the other organizations to whom you have provided expert advice?

MS. GUNN: Sure. I have provided expert advice over the past 15 years to quite a few organizations, including the Canadian Environmental Assessment Agency, Alberta Environment itself, Fisheries and Oceans Canada, the Canadian Institute of Planners, and a variety of more local organizations.

MR. WILLIAMS: Okay. And that's probably fine for now.

We'll turn to you, Dr. Noble. And I do retract any statements about Newfoundland, sir.

MR. NOBLE: I'm a Professor in the Department of Geography at the University of Saskatchewan. My Ph.D. work specialized in environmental assessment. And the area that I

work in and practice in is primarily regional and cumulative effects assessment, methodologies for cumulative effects and strategic assessment. Over the years I have provided guidance and direction on environmental assessment and cumulative effects assessment practice to the Canadian Council of Ministers of the Environment, Canadian Environmental Assessment Agency, National Energy Board, Office of the Auditor General of Canada, and for a few industry proponents, including Cameco and Nalcor Energy on the Churchill Falls hydroelectric project. I was also the scientific co-lead for a fairly comprehensive regional cumulative effects assessment in Southern Saskatchewan between 2005 and 2007 as well. And I serve on a number of international editorial advisory boards for scientific journals that publish in environmental and cumulative effects assessment.

MR. WILLIAMS: And, Dr. Noble, in terms of what, if any, textbooks you have written, is there anything you want to share with the panel? Don't be modest, sir.

MR. NOBLE: I didn't bring copies. I have authored what is sort of considered the

leading textbook on environmental assessment practice in the Canadian context.

MR. WILLIAMS: Okay. Thank you for that.

And, Dr. Noble, I understand that you and Dr. Gunn are going to be switching on and off with the PowerPoint, but I think you are leading off, so maybe you can start running us through your presentation.

MR. NOBLE: Sure, thank you.

So we're going to tag team a few parts of this presentation. And I'll start with an outline in terms of the areas that we do want to cover. And our presentation is in three parts, an introduction with some context in terms of how we are approaching cumulative effects and what are some of the requirements of good practice and best practice in that area.

The primary focus of our presentation is broken down into four sub components, and this presents the results of our analysis of the cumulative effects assessment.

And we'll wrap it up with some overall conclusions and recommendations that we'd like to make concerning the Bipole III cumulative effects

and also cumulative effects assessment practice more broadly in Manitoba. So that's the plan.

So the cumulative effects assessment completed adopts a very standard and well-accepted definition of cumulative effects, adopted from George Hegmann's Cumulative Effects Assessment Practitioner's Guide, focused on changes to the environment caused in combination with other past, present, and future human actions. And I have added emphasis to the "in combination with" because that's a critical core component to understanding the nature of cumulative effects and how we assess particular projects. But I'd like to sort of, you know, focus on that for just a little bit in terms of how we are approaching cumulative effects and to characterize it a little more specifically for the panel and others in attendance.

Cumulative effects have been sort of variably been described, a number of terms have been used; progressive nibbling, death by a thousand cuts, or the tyranny of small decisions. And the point is that cumulative effects often emerge from what we often perceive as very small, sometimes very insignificant impacts or, you know,

another drop in the bucket doesn't count for a whole lot. But in hindsight, when we look back on how things have changed over time, we can see, you know, as we move across that progression of landscape, we can see that the small decisions and small impacts add up. And they can be quite significant over space and over time.

Now, before moving ahead to the Bipole EIS, what I would like to do is just illustrate this in a couple of other examples and cases, just so we can really appreciate the context in which we have approached this assessment.

The Athabasca River being sort of one example where we have seen some significant cumulative change over time. I just highlighted on this slide a few examples in terms of, from the decade from '66 to '76 to '96 to 2006, where we see an increase in the number of pulp mills discharging into the river system. Water withdrawal increases from 12 million to 595 million cubic metres per year, and the number of oil sands leases increasing from two to over 3,000. And three-quarters of those water withdrawals were attributed to oil sands operations.

We can see some significant measurable changes in environmental parameters. But the point in showing this is that for all of these assessments, none of them were deemed to have any significant cumulative environmental effects. So it sort of begs the question of, how do these changes occur? How do we end up with these sorts of significant changes if every individual action doesn't contribute to a cumulative change?

To take it on a smaller scale in an area where I spent quite a bit of time working in Southern Saskatchewan in the Great Sandhills, where we see these dots on the landscape, many of which are not much larger than the screen that we're looking at in front of the room here. We have sort of seen the landscape where a number of these gas wells have increased from 49 to over 1,500 over a series of three, three and a half decades. Again, it seems relatively insignificant on an individual basis. And this is a 1,900 square kilometre area with 1,500 gas wells. Attached to each of those gas wells are a series of road networks. So each well has an access road, there are access roads for cattle grazing, recreation and so on and so forth, over 3,000

kilometres of access road. There were five environmental assessments completed for those 1,500 gas wells. The others were deemed individually too insignificant to trigger an assessment, and the five that were completed deemed too small to be worried about, there's no cumulative effect. But this region has experienced considerable landscape fragmentation and biodiversity loss over space and over time over the past 30 to 40 years.

So it comes to the question then, which is sort of core to our examination of the Bipole cumulative effects, is how does this happen? And part of the reason why these types of scenarios play out on the landscape is, every time there is a project, or often when there's a project, it's deemed as marginal or relatively insignificant when compared to the magnitude of other changes on the landscape; or the magnitude of the project impacts are measured against or compared to the impacts of other things, as opposed to measuring them in addition to the impacts of other things; or it's argued to be the responsibility of other proponents or future projects to address cumulative effects.

And I highlight these as common errors or misinterpretation in cumulative effects, and there are three that we'll highlight as we move along, that we observe in the Bipole project. And the key sort of point here that we're trying to make is that you can't do good environmental assessment without assessing cumulative effects. So a good EA, if you're looking at the impacts on VECs such as caribou or wetlands, you can't understand the significance of a project's effect unless you understand the total effect of other actions on that VEC.

Now, we've sort of designed -- well, we didn't design but we have approached cumulative effects in four phases. And this is consistent with Hegmann's view, as well as other views on what cumulative effects consists of. And our analysis of the impact statement is based on these four phases as well. Where cumulative effects starts with a scoping component, so identifying essentially what's included in the cumulative effects assessment, what's excluded, what are the spatial boundaries, what are the temporal boundaries, and what are the indicators?

The second component of cumulative

effects assessment is about looking into the past to identify, what were the conditions of the VECs in the past? What are the conditions today? How have those conditions changed over time? And what might have been some of the key drivers or reasons contributing to that change? So what we try and do in cumulative effects at this stage is identify some relationship between drivers on the landscape and response in the things that we value or deem important in the environment. Because it could be that, you know, looking at conditions today, a VEC may already be past a threshold or already be unsustainable. So looking to the past allows us to determine how conditions have changed. We can use that information to develop models or assumptions about relationships, but we can then predict into the future to identify how might those conditions change moving forward? And what are the impacts of the project on the VEC?

And then the final component is management actions to try and reduce, offset, mitigate, or avoid the potential incremental effects of the project on current and past conditions that we have observed.

So our approach to reviewing the

Bipole cumulative effects assessment is slightly of a different standard, in our view, than what was set out in the Environmental Impact Statement itself. And I have highlighted three sections from the Environmental Impact Statement that identifies the approach to the cumulative effects assessment.

First, it's noted that the assessment process in general will focus on guidelines, procedures and best practices. Section 9.1 of the EIS identifies guidance documents, including Hegmann et al's Cumulative Effects Assessment Practitioner's Guide. And the scoping document for the EIS, in our view, sets the bar really high and identifies cumulative effects that will be based on CEA guidance, as well as best and current practices, including regional and strategic environmental assessment approaches. That's a very high bar, and our review of the assessment --

THE CHAIRMAN: Can I interrupt, Dr. Noble? When you refer to Hegmann et al, that's the practitioner's guide that was done for the Canadian Environmental Assessment Agency?

MR. NOBLE: Yes, the 1999 Cumulative Effects Assessment Practitioner's Guide.

THE CHAIRMAN: Thank you.

MR. NOBLE: Thank you. So we did adopt Hegmann's guide as part of our standard. We didn't adopt regional and strategic assessment, which is a very high standard. And our approach to reviewing the cumulative effects assessment is based on what we considered reasonable, good, or at least a minimum standard that can and should be achieved in a cumulative effects assessment for a project of this nature.

And we sort of used the guide, as well as some of the best practice guidance, we looked at what was happening in Alberta, publicly available information sources in terms of what's considered reasonable or good practice. And we separated our analysis of the impact statement based on these four phases that we have identified to provide us with some structure and guidance.

MR. WILLIAMS: Dr. Noble, before you leave this slide, if we think back a few slides ago, you said that environmental assessment without good CEA misses the point. And here you ask the question, does the Bipole CEA meet a minimum standard? And so my supplementary question to you, sir, is, if one was striving to

undertake an assessment of projects which might or might not have significant effects on the environment, is it possible to do so in the absence of a cumulative effects assessment that meets this minimal standard?

MR. NOBLE: No. In order to understand what the significance of a project's effect is on any VEC, you have to be able to put into perspective of what the other sources of stress and the other effects are on that VEC. You have to be able to put into perspective of how that VEC has changed over time from past to present day. And you know, it sort of comes back to those three points I had mentioned where a project is sometimes seen as relatively small or relatively insignificant, but if we're this close to a threshold, then a very small disturbance is cumulatively significant. So we can't understand the significance of that small contribution without understanding the cumulative effect, past to present conditions.

MR. WILLIAMS: Thank you.

MR. NOBLE: So for each of these four components, we identified a series of questions to guide our review. So our review of the impact

statement was based on a set of components, the scoping phase, the retrospective phase, and a series of questions that we asked in looking through the EIS and the technical reports. I'm not going to read through those questions right now because we're going to address them in turn throughout our presentation.

So it's important to note that we weren't focusing specifically on, you know, caribou or specifically on forest, we were looking at the cumulative effects assessment process as was applied throughout the entire assessment across the suite of VECs that we were able to review. So cumulative effects assessment practice, regardless of the VEC, was the focus of our attention.

In doing so, I have a little road, an attempt at a road map to display how we approach the analysis. We were asked to review the cumulative effects assessment, so we started with chapter 9. Chapter 9 of the EIS refers to the cumulative effects as a high level screening, not necessarily an analysis of cumulative effects. And there is reference to other chapters in the EIS, so we follow those references to the effects

assessment, to the baseline, to the scoping document, and also reviewed a number of the technical reports. And we weren't comprehensive of all of the technical reports sort of identified there in a table, and it's in our report which ones we looked at specifically in our analysis.

Overall, in conducting this evaluation, we observed that the cumulative effects assessment doesn't meet a minimum standard, based on our analysis of good practice in cumulative effects. We certainly don't believe that it meets the standard that was set out in the environmental assessment itself in terms of the regional or the strategic or the best practice guidance that is available.

So we're going to work our way through the components, the four areas. And I'm going to pass it over to Jill, who is going to address her results of the analysis of the scoping phase of the cumulative effects.

MS. GUNN: Okay. And so what we're going to do, as Bram said, in four parts, we're going to take a look at each stage of the CEA process, and we're going to do essentially a process audit, if you want to think of it that

way, so guided by different questions. I'm going to begin with talking about the scoping phase in a CEA and what that should look like and how the Bipole III measures up.

Scoping is really critically important, really critically important to a cumulative effects assessment, because this is when you decide what is going to be in the assessment and what you are going to leave out of the assessment. So you can think of it almost like focusing the zoom lens on your camera. Okay. So you can either focus it in very narrowly or you can focus quite broadly. And in a cumulative effects assessment, it's quite critical that you are focusing broadly. And we'll get to the reasons for that.

So six questions guided our analysis in the scoping phase. The first question was, is the CEA methodology distinct from the project impact assessment?

Now, that's the very first thing that we looked for, can we see a distinct CEA methodology? And what we mean by that is that we would be looking for a scientifically based systematic step-wise procedure, a collection of

methods that together would allow you to assess specifically cumulative effects. And that is undetectable for us in the Bipole III CEA.

Now, chapter 9 does provide two, what are called high level screening assessments. Those are essentially short checklists that briefly screen for direct and immediate coincidence of the project effects with a short list of environmental sub components.

Now, there are a few issues with that. Both of those checklists, they rely upon analysis that was done for the direct effects assessment in chapter 8, and also the chapter 6 baseline. In other words, the CEA methodology is highly enmeshed with and indistinct from the direct effects assessment. Further, there's no explanation about how decisions for the checklist itself were taken. How did they check the boxes? Those kinds of decisions aren't explicit. But if we take the checklist, if we accept the checklist as the CEA methodology, the point has to be made that checking for a cumulative effect is not the same as analyzing if there is a cumulative effect.

The next question that we looked at was, does the CEA consider all types of activities

and stresses that may interact with a project's direct effects on VECs?

Now, cumulative effects are the result of a combination of threats to VECs. When I say VECs, I mean V-E-C, that's just my short form for V-E-C. So they are the result of combined threats to VECs over time via multiple environmental pathways, whether they be biological, possibly chemical, definitely physical, and also psychosocial. Okay.

So the Bipole CEA does initially consider a modest list of project disturbances. So are they looking at all disturbances? Well, they do look at project disturbances, yes, and those are listed in the checklists provided. Unfortunately, many of those project disturbances, if you read further, if you read past the checklists themselves to more of the fine print, you will see that many of those project disturbances are subsequently screened out of the CEA analysis. And one of the more notable project omissions or disturbances, in our view, was the omission of the Bipole I and II right-of-way. The reason being that obviously that's another major linear disturbance within range of the proposed

linear development.

Now, further, natural disturbances are not generally considered in the Bipole CEA. I did note that natural fires are considered in the caribou technical report. There could be a few others. But in general, natural disturbances, actually they are not mentioned at all in the chapter 9 CEA.

Now, whereas natural disturbances might have been considered and probably would have been considered, or should have been considered if the science was in place to support that, because the logic behind that is simple. Obviously, changes to the landscape are not only human induced, there are obviously natural ecological changes and cycles that are ongoing, that we should pay attention to, and that will interact with the human induced changes.

So, for example, Dr. Cherie Westbrook, who is a hydrologist at the University of Saskatchewan, she just had this comment. Events that could be predicted with some accuracy include 50 and 100 year flood events, and if there is a long-term water survey of Canada stream gauge nearby such as exists for the Nelson River, it

would be correct to say that in the next 25 to 50 years, it's roughly equally likely that floods and droughts would occur in Northern Manitoba and thus be of concern for Manitoba Hydro.

Further, other types of human induced stress are not considered, particularly related to the operation and the maintenance of the Bipole III right-of-way. The first one that popped in my mind was vegetation management, also sometimes just called vegetation maintenance. Now, that is not considered a significant feature activity contributing to environmental stress. Though, in fact, vegetation maintenance, in my experience, is a core determinant of the level of stress that will be put upon the environment over the course of the lifetime of the right-of-way. That's primarily -- that's the primary determinant as to what is going to happen on that landscape over the next 50 or 100 years. So to me that's a human induced stress that could rightly be considered.

Just one other example briefly, changes to wildlife management regimes in the project area are not fully considered. There were a couple mentions of, you know, closures to this hunting area, possibly a change to that wildlife

management area. When you have those dynamics happening in the project area, those can really shift how, for example, hunting behaviour occurs. In my experience, I have seen that when you put a right-of-way through a forested area, and I'm talking about a caribou range in Northern B.C., and the caribou would come over the hill, they would go, every year the same thing, over the hill, down in the valley, and across into the old growth forest to eat the lichen. And when a right-of-way was put through that path, the caribou still came, they came over the hill, down on the ground, across to eat the lichen. And so that was right near a substation and there was an access road there. And the hunting pressure upon that caribou herd increased dramatically, and we saw that all the time. We'd be out on the right-of-way and you would see other trucks on the access road. And I'd say, well, who is that? Well, it's more hunters. So you do have to consider these other types of human induced stresses.

MR. WILLIAMS: Dr. Gunn, before you leave this slide, let me play devil's advocate with you for just a moment. It's rare that I'm

gentle on Hydro, but aren't you asking a bit too much of Hydro? Why should it be considering such a wide range of disturbances?

MS. GUNN: The reason for that is that cumulative effects are a different class of effects. They are not the same as direct effects. So when we think about assessing cumulative effects, we're talking about -- there are over 50 different terms in the literature describing different types of cumulative effects, a few of the more common are additive effects, compounding or magnifying effects, synergistic effects. You're looking at effects that are insidious, they are incremental, they are perhaps unnoticeable in the short-term. But over the long-term, they are incredibly important and they can really destroy an environment. So it is important to cast the net quite wide when you're looking at the possible ways that a VEC could be impacted, in combination with the project.

MR. WILLIAMS: Thank you.

MS. GUNN: So the third question is, does the CEA adopt an ambitious ecologically based scoping procedure? Now, ambitious scoping basically means that you're taking a liberal

interpretation of your mandate. The scoping document, as Dr. Noble pointed out, it does adopt a very ambitious premise for the CEA. The scoping document says that the CEA framework will be based on Canadian Environmental Assessment Agency guidance, as well as best and current practices, including the consideration of regional and strategic environmental approaches.

Unfortunately, starting from that ambitious point, the scoping exercise degenerates into what we might call a rationality ritual, which is simply put, the tendency to rationalize by whatever means necessary the proponent's own view on what is important to include in the CEA. Some examples to support that statement, example one, chapter 9 states the CEA only includes VECs with an adverse effect of the project that overlaps both spatially and temporally with the effects of other identified projects and human activities, and to further qualify that, the CEA addresses its own significant adverse residual effects only if the ongoing effects from other such projects are expected to change over time to the extent that there would be a measurable effect on the existing environment that was not already

addressed in chapter 8. So, in other words, if we are taking that camera lens, it starts wide, and then by a process of rationalization, it becomes narrower and narrower and narrower, until it's really quite narrow.

Now, ecologically based scoping is simply that which adopts ecological health and functioning as a core determinant effects selection, boundary setting and other aspects of the CEA analysis. Scoping in the Bipole CEA is clearly project lead and not VEC lead. For example, it is scoped according to -- mainly according to the residual effects analysis in chapter 8, and ecology is not a factor.

The second example, projects and environmental sub components that are considered are not scoped expansively enough to detect and analyze trends related to healthy or unhealthy ecosystem functioning and the proposed project's possible contributions to those dynamics. So in other words, because the Bipole is scoped so narrowly, consideration for biophysical and socioeconomic VECs is highly restricted by definition. It couldn't be any other way but that.

MR. WILLIAMS: Dr. Gunn, before you leave that page under, example one you say, ecology is not a factor. I'm not quite sure I understand what you meant by that?

MS. GUNN: In a CEA what you want to do is you want to scope the analysis or the assessment based on ecology or the VECs, the health of the VEC, the health of the ecosystem, the health of the environment, and what is important to maintaining that health and functioning. That would be your core basis for determining what is in the CEA and what is out of the CEA. But the Bipole EIS in many different places makes it clear that really the basis for what's included in the CEA is actually the residual effects analysis in chapter eight, and that's all. And now it's not to say that that shouldn't be a component, it should, and we'll get to that a bit later. It should be a little bit wider than that.

The fourth question, is an explicit rationale for valued ecosystem component selection documented? It's, unfortunately, very common in impact assessment for proponents not to end up reporting the rationale behind, you know, the

scoping procedure and the VECs that are included or not. The fact is that there are quite a wide range of rationales that can be used to designate VECs in a CEA, over and above regulatory concerns, and even over and above ecological importance.

So if we take a much broader view of the project environment and the developmental history of an area, a VEC could actually hold very great social value, cultural value, human health value, spiritual value, education value, value of scientific interest, there are many reasons why a VEC, taking that broader view, should be included in the cumulative effects assessment.

And again, as I mentioned earlier, the only documented rationale for VEC selection in this case is that it has significant adverse residual effects in the direct affects assessment.

And this brings me to a key point under the scoping exercise. The main issue is that the Bipole CEA should, but it does not, rationalize that some insignificant project effects may actually need to be elevated to the status of significant adverse, when considered in combination with the effects of other projects. And that guidance is taken directly from the

Hegmann guidance that was established in 1999. It's a well-accepted principle.

We'll just take one quick example. And just to be honest, I just sort of pulled this just at random from, you know, I just looked quickly at some of the VECs and the analysis in chapter 8, and I happened upon the wolf pack habitat, and I thought, well, this is a good example for the point I'm trying to make. So if we look at wolf pack habitat ranges in chapter 6, map 621, if you take a look at the polygons there, there are quite a few overlapping ranges. If we reconsider the project effects from the perspective of cumulative habitat fragmentation caused by multiple linear corridor developments, including highways, including the Bipole I and II, and all of the other development pressures that would be in that region, concern for the incremental effects upon that wolf habitat may have elevated it to a VEC of concern in the CEA. So this is just an example of how we might reconsider, we might reconsider the significance assignment in the direct effects assessment and bring some VECs forward into the CEA.

Unfortunately, the re-evaluation of

VEC importance is not part of the scoping procedure.

A couple of other questions. Do the spatial boundaries reflect the natural distribution patterns of VECs selected for the CEA?

Good CEA focuses on the receiving environment and considers all effects on ecologically significant receptors, including those of the proposed project. For that reason, spatial boundaries used in the CEA should be sensitive to the natural distribution patterns of VECs.

Now, the spatial boundaries for the CEA are clearly focused on the project itself and, again, not on natural distribution patterns of VECs. So I have a few examples to support that observation. The executive summary reads:

"As potential routing sites were narrowed, local study areas were identified, these consisted of three mile wide bands down the centre of which the right-of-way would run."

The executive summary also states:

"Included in the local study area were

the areas immediately surrounding the other project proponent."

So we have a three mile wide band and we're also going to take a look at the area right around the other project components.

Finally chapter 9 says:

"Residual adverse effects considered for some biophysical effects are effectively limited to the immediate rights-of-way and footprint area."

So again three statements that tell you that the boundaries are focused on the project and not on the ecology or the distribution patterns of the VECs.

So, not only are the spatial boundaries of the project -- are they project oriented, the study area was further compartmentalized into 13 segments to ease analysis. That is what is known as the problem isolation paradigm in natural resources management. And this is a common mistake that is made. What the problem isolation paradigm is, it's a very common phenomenon, and it's when you take an environmental problem and you think, well, because this is so huge, how could we possibly

address it? The way forward is to break it down into solvable component parts, solve each problem in turn, and try to recombine those individual solutions back into what we might think of as a whole. Now we have addressed the whole problem as it was. But the problem is that that doesn't work very well. So, basically, when you do that, you tend to miss some really key dynamics that exist at that higher scale, life sustaining dynamics between the component parts that are never looked at, because you are not looking at the parts, you're not assessing it as a whole in the first place. So that problem is something that we observed.

The point is that boundaries to assess cumulative effects typically would reflect functional ecological units or scales, even though the project in question would generally have a localized nature.

The final question, does CEA adopt pre-disturbance conditions as the historic temporal limit and capture other certain and reasonably foreseeable future projects and activities? So, does it adopt pre-disturbance conditions as a historic temporal limit? No. The

appropriate baseline for considering the significance of biophysical cumulative effects is that point in time in the past when the VEC was the most abundant. So, usually this is before any developments would take place. That does not happen in this case.

Now, of the six past and existing projects that were deemed to have significant adverse effects overlapping with other projects with significant adverse effects, three were said to be in the checklist included in the CEA. And if we go with that for now, if we say they were included based on that checklist, if you take a look at those according to the red boxes there, and then you move across to the temporal reference for those three, you will see that those three projects are either not yet completed or there are no temporal bounds indicated. So obviously they are not taking the pre-disturbance point as the basis for assessment.

If we think about socioeconomic effects, no specific historic temporal limit is set for socioeconomic effects because they are effectively excluded from the CEA. Now, a reason is given for that and the example there repeats

that reason that's given in chapter 9. It is expected that through the project there will be additions to recent signs of improvement in socioeconomic conditions and that the project will not result in a cumulative adverse effect to the particular socioeconomic VECs identified in the table as potentially of concern.

So, again, historic temporal limit is not established for socioeconomic VECs, though it likely could have been easy to do that. Some of the background information that I read let me know that generating stations and related infrastructure have been in development in the region of Gillam for, you know, 50 years, sometime in the 1960's. So you could have possibly gone at least to that point and back quite a bit further for socioeconomic effects.

Now, in terms of setting a future temporal limit, there really is no standard in CEA for setting a future temporal limit, although it is generally accepted that CEA utilizes definitely long-term boundaries in its analysis. No specific time horizon out into the future is actually given in the Bipole III CEA. So it doesn't make a statement that we adopt a time horizon of ten

years, 50 years, a hundred years. It does say, though, elsewhere, that a project life of 50 years is anticipated. That's not the same thing as saying we adopt a hundred year time horizon for the CEA analysis.

If we look to the lists of future and perspective future projects that are provided, and these are my last two slides here, the maximum future temporal limit for the CEA is approximately 12 years to 2024. So if we look at the future projects that were included in the CEA, the Keeyask generating station and transmission projects, there you see a time horizon to about the year 2021. And if we look at prospective projects, and we look at the Conawapa generating station, there is an expected in-service date of, I think, 2024.

So, basically, 2024 is sort of the maximum future date that's considered as far as the cumulative effects that are analyzed. And 12 years is, in our view, it's unquestionably insufficient to be able to evaluate cumulative effects properly.

MR. WILLIAMS: Dr. Gunn, just before you leave this page, if 12 years is not enough, do

you have any advice or sense of what would be enough, or what would be better?

MS. GUNN: Yeah. Well, as I said, there is definitely no standard, it's not that everyone is following the same procedure in that regard, but there is established guidance on that and again, if we go back to the Hegmann 1999 CEA guidance, they offer three options there. The one that is going to be the shortest time frame will be when the operational life of the project ends. So the operational life of a transmission right-of-way, those are built to last, in my opinion, I would expect a hundred years. I'm not saying that I'm expert in understanding, you know, how that infrastructure is meant to last. But the operational life of the project is one option.

The second would be to go a little bit further than that. It's through to the end of the operational life of the project, but then also including the time it would take for reclamation decommissioning and reclamation. Okay. So you could add that to it.

The final option is really way out in the future, and that's when not only is the operational life over, it has been decommissioned,

it has been reclaimed, but the area returns once again to its undisturbed state. So once the grass, you know, grows again naturally as it might have 150 years ago, that's the third option.

MR. WILLIAMS: Thank you.

MR. NOBLE: Jill focused on this component, the scoping and evaluation. And I want to now focus on the retrospective, or the part of the cumulative effects assessment that establishes the baseline in terms of what are the conditions against which we are assessing the effects of the project?

So we're looking at how did things look in the past, how have things changed over time. Have things changed significantly due to, you know, effects that have accumulated over the past few years in the environment? That's needed background information to construct the baseline against which we can assess potential cumulative effects.

So there were a few questions that guided this analysis, and the first one, which really builds off Jill's last question and analysis is, does a baseline analysis delineate past and present cumulative effects? And does it

identify how VECs have changed over time?

Now, this notion of pre-development, or pre-disturbance, as Jill had identified, we're not saying in using that terminology that, you know, the past condition in a cumulative effects assessment that a proponent could reasonably assess is a time when there were no lines on that map. We're simply saying that we can at least go back to the time of initial Hydro development or linear features. At a minimum we could go back to Bipole I and II. Those are sort of within easy reach in past conditions and in examining how things have changed over time.

The concern that we had with the cumulative effects in this regard is it establishes, you know, what we sort of say is a new normal. And others have referred to it as a shifting baseline. But the idea that, you know, the baseline is today's current conditions, and not appreciating or considering the baseline as, you know, a cumulative effect. In other words, VEC conditions have changed over time. So when we examine what the baseline looks like today, in order to understand the health of VECs and the impacts of a project on those VECs, we need to

understand how things have changed. So those are cumulative effects, that's cumulative change.

And the Bipole assessment establishes a new normal, assuming that past change, past effects are the new baseline. And so if we were to look forward to a future development or a future project, if they were to adopt the same model, then any impacts of Bipole would be again completely absorbed in the baseline.

I just remind you back to the introduction where we had a map with all those dots on the landscape. That was just an example, every dot was just considered part of the baseline. Well, in hindsight, it doesn't seem to make much sense to do something like that when we're looking at a cumulative effect.

A couple of examples, and these are just illustrations to help make the point about this new normal. Wetland area, just as an example, 137,000 hectares in the study area, 1,400 hectares along the preferred route. The impact assessment identifies agriculture, drainage, forestry, right-of-way activities, as threats to wetlands, and those effects are evaluated against current conditions. So in doing

that we're not able to determine the significance of the effect, because there's no characterization of wetlands in the past. In other words, a very simple metric, what's the percentage of wetland cover on the landscape over time? What have been cumulative loss of wetlands in the study area, spatially or temporally? So these are not difficult parameters to identify over such a large landscape, and they had been done in assessments in Saskatchewan and Alberta on a number of occasions in terms of looking at how these VECs change over time. That's core to understanding the cumulative effect, how the conditions have changed from past to present day.

Another example to illustrate this concerns plans of conservation concern and Aboriginal use. And the terrestrial ecosystem and vegetation technical report identifies residual effects in the right-of-way on plans of conservation concern, or of concern for Aboriginal use and value. And more than 80 plant species are identified that are of some significance. The problem is, it's difficult to understand what the cumulative effect of the Bipole project is on those plant species if we haven't quantified, or

at least qualified the conditions in which they existed in past. So the status in terms of what those plant species are in terms of their distribution and abundance in past conditions is not known. Have they declined broadly within the region? What's been the significance of that decline? Then we can understand what the additional effects might be in the right-of-way.

So, in our view here, at a minimum, one could consider the loss of these similar plant species in the Bipole I and II right-of-ways, at a minimum. Those would be relatively easy to achieve in terms of setting a standard. What has already been lost, and then what new loss might be occurred as a result of a very similar type of project?

So that's another example. And there are a number of these examples throughout the impact statement where we're missing that retrospective baseline trend.

And it's not a new observation, it's not unique to this project. And we looked at the panel's report on the Wuskwatim project, generation transmission project, and identified the exact same problem or criticism that we're

raising for the Bipole. This notion of, you know, not using the words of a new normal, but this problem of absorbing adverse past effects into the current baseline condition precludes possible remediation, restoration or mitigation for VECs that may already be in an unhealthy or undesirable condition.

So, you know, our observation in terms of the Bipole III is not new in that regard, it's a problem that's persisted from past projects as well in the region.

The second question that we focused on in guiding our analysis is, does the baseline establish trends in terms of how conditions have changed over time, and known or suspected relationships in terms of what's causing that trend or that change in the VEC?

The impact statement identifies the baseline as a description of the existing environment, inventories and data summaries, and that's important. That's an important part of doing a cumulative effects is what is the existing environment, we need to collect data, we need inventories and summaries. However, we must also do an analysis of that in terms of we must look at

past data, trends, changes and inventories. So cumulative effects assessment in establishing a baseline is an analytical exercise. What are the trends, and can we explain how conditions have changed over time, not simply describing them?

And this is identified in Hegmann's -- or, sorry, the Cumulative Effects Assessment Practitioners's Guide as how this ought to be done. And even Hegmann's guidance is not new in that regard. Some of the early work by Gordon Beanlands and Peter Dunker, back to EARP, and that was in the early '80s, where they identified ecological guidance for cumulative effects assessment, emphasize the importance of trends and being able to explain changes in baseline conditions. That's the information that we need in order to predict impacts into the future. So if we don't understand the past change, it's very difficult to model or predict how things might change moving forward into the future.

I'll just highlight a couple of examples. Again, a descriptive overview of water courses intersected by the line, the aquatic habitat, aquatic environmental technical report, sorry, identifies surface water quality, fish

habitat, as key issues or key indicators of concern. So the question then that we ask, and we thought was an obvious, or very low hanging fruit to grab on to, what's the relationship between the number of stream crossings in the study area and changes in water quality or changes in habitat over time? How have stream crossings affected water quality parameters? What's the relationship between past stream crossings and fragmentation of aquatic habitat?

This is, as identified here by Salmo Consulting -- and this is work by Terry Antoniuk who does many cumulative effects assessments in Western Canada in particular -- and this notion of stream crossings is not new and it's fairly well established. It's an easy approach to identifying how aquatic conditions or habitat may have changed or be affected over time. And we also observe that the B.C. Provincial Government, B.C. Forestry and B.C. Environment, 1995, in their guidelines, they actually have identified how many stream crossings are appropriate within the reach of a river system before aquatic conditions start to decline. And they have identified thresholds for particular fish species at which the density of

stream crossings becomes critical on that VEC.

So, you know, in our view this is sort of an example of what we thought would have been a relatively straightforward component to capture in looking at past conditions. Because we recognize that, you know, data on many VECs, it can be difficult, but simple things like stream crossings are relatively easy to obtain and access in terms of data for developing trends.

Just another example in terms of terrestrial ecosystem and vegetation report, sort of related to my previous example around wetland area. It identifies current area of wetlands, current threats. So the questions we asked is, well, how have wetlands changed over time? What is the decline in recovery rates for wetlands in the area? Some simple air photo analysis or interpretation over time would give us that very basic information, even if in a very crude fashion, it's information that we can use to establish a trend. So basic percentage of wetland cover on the landscape as being a possible example that one could pursue in looking at change over time.

The third and final question in the

retrospective is this notion of thresholds, always a controversial one in cumulative effects and in environmental assessment in general.

The point is that unless you have some established threshold, you can't really identify or comment on the significance of the cumulative effect. Now, those thresholds, they could be ecological limits. So in the case of caribou and habitat, we may have minimum viable population levels, or minimum habitat in terms of, you know, fragmentation metrics on the landscape, what's the minimum that is required to sustain a population?

They can be ecological. Thresholds can be benchmarks, or simply this is an acceptable amount of change from past conditions, or they can be stress, limits of disturbance. So going back to the example from B.C., you know, we can accept these many stream crossings in a river system, after that point we see a significant decline in health of fish or aquatic habitat. So they can be thresholds based on how many linear features can we tolerate before the VEC condition declines?

So the reason why we need this is to reiterate a point from earlier. Some VECs may already be unsustainable. They may already be

past a threshold. So any project effect, regardless of how minimal, is a significant cumulative effect in that case. So we need to know what those thresholds are to the best that we can for some of these data.

And this is recognized maybe implicitly in the impact statement, in the scoping document that says the adversity of environmental effects will be determined based on predetermined factors and criteria. Now, I read that as meaning some standards, some thresholds, some limits. But other than caribou and caribou habitat, we weren't able to identify what those thresholds are that are being used against which, you know, to support the determinations or conclusions about whether an effect, and a cumulative effect is significant or not. So we don't know what the standard or what the bar is that it's being measured against to support the conclusions about the significance of cumulative effects.

The third component, and maybe this one is a little longer so --

MR. WILLIAMS: We'll, take the Chair's guidance.

THE CHAIRMAN: It's just after 10:00.

I think it's a little early to take a break yet, so we should continue. How long do you think this section might take? It's about 20 pages.

MR. NOBLE: Within half an hour.

THE CHAIRMAN: I think that would be a good time to break then.

MR. WILLIAMS: Are you getting tired, Dr. Noble?

MR. NOBLE: No, I'm good.

So this third component -- okay, so following on from our previous phases, the scoping, the retrospective, the idea in cumulative effects, we take those past relationships, now we build some models, assumptions, and look towards the future, so the perspective part of cumulative effects assessment, the most interesting in my view, I think.

So a series of questions guided this analysis. Number one, and relating very closely to Jill's comment on the scoping, this time in terms of the predictive component, is a time scale for the cumulative effects assessment predictions and analysis sufficient to capture the scope of cumulative effects? And again, we go back to a previous assessment, previous generating and

transmission project that was criticized because the future's component, the predictive component, was not extended beyond a ten-year period. We found this assessment to be even more restrictive than that ten-year period in terms of supporting analysis for cumulative effects.

And I'll give a few examples to illustrate that. The effects analysis for caribou and habitat fragmentation adopted a five-year future. Neither Jill nor I are caribou specialists, so we're not saying what you can or can't do with the caribou population in terms of modeling. But what we are saying is that you can't conclude, as the EIS does in chapter 9, about the significance or insignificance of a cumulative effect on caribou or habitat, 10, 15, 20 or 50 years into the future, if the analysis only went five years into the future. So you can't draw a conclusion about a cumulative effect ten years out, if you analyze only, or model only five years of the assessment.

The terrain soils, groundwater, aquatic technical reports, those reports identify a 20-year future. All of them consistently adopt a 20-year future. But there's no analysis of

cumulative effects over the 20 years. There's a statement that it adopts a 20-year future, but there is no analysis of, let's say risk to terrain and soils over the next 20 years due to other developments. It's descriptive of the current baseline condition, but not predictive in terms of how might cumulative effects actually unfold and affect those VECs? And it sort of -- and we were looking through this component, we found it I guess a little confusing in places, because we have a five-year future for caribou, 20 year for those components, and a 50-year project time line identified. So there isn't consistency in the analysis moving forward in the cumulative effects to capture the lifetime or the life cycle effects of the project.

The second question concerns whether there is sufficient analysis, or is there sufficient evidence to support the conclusions that are made about cumulative effects? And again, we'll go back to the scoping document which says that methods, assumptions, analysis will be documented in the EIS. And our main point here is that we weren't able to find documentation of the analysis of cumulative effects going into the

future. We found some descriptions, and in chapter 9 a high level screening assessment of cumulative effects. And I have to say that -- I can't say I have seen that often in cumulative effects assessment. It sort of implied to me that there wasn't an analysis.

THE CHAIRMAN: You have or have not seen that reference?

MR. NOBLE: It doesn't sound familiar to me in terms of an approach to cumulative effects assessment. My first glance in reading through chapter 9 on that was, well, was that an analysis or something different? So in looking through the technical reports in the previous chapters, I'm assuming it's something different, because we simply couldn't find an analysis. Again, the exception in terms of the technical reports that we did review was caribou and habitat associated with caribou. But, again, I will point out, the five-year limitation around that analysis.

And, again, sort of some examples, cumulative effects on terrestrial ecosystems, vegetation and cultural heritage, we couldn't find any analysis to support any of those observations

or conclusions in table 9.3. What we sort of went looking for was, okay, are these areas mapped, and into the future are we seeing some overlays or risk assessment of other linear disturbances, other features that may cause a cumulative effect to terrestrial ecosystem, vegetation, or culture, heritage and landscape. So we weren't able to find that in the analysis.

The Dorsey-Forbes project was interesting. It's noted that it's excluded from the cumulative effects assessments due to no overlap of effects with the project. I have a point a little later on that in terms of the interpretation of cumulative effects and a particular problem with that. But the point is that it's noted in the EIS that this project is addressed in the baseline and earlier effects assessment. At least based on our search, we didn't see it in the baseline. And the only reference in the analysis is with regard to noise levels during construction. So we were wondering how it can be dismissed without some analysis to show there is no overlap of the effects of this project. And I'll come back to this example a little later in a slightly different context.

A third example, no adverse cumulative effects on the aquatic environment in coincidence with the Wuskwatim, Keeyask and Conawapa. Again, we weren't able to find the analysis of cumulative effects. How was that conclusion reached? What data? Where, you know, the stream crossings for these other past and future projects, is that analysis there? What are the effects on the aquatic environment? What are the effects on linear features or habitat? So we weren't able to identify data or models to support those conclusions. Maybe that sort of relates back to, you know, the high level screening assessment approach adopted through the cumulative effects may explain the reason for that.

A third question is, are the methods, are the tools and techniques that are used in the cumulative effects assessment, are they appropriate? Can we actually capture the complexities about cumulative effects and the thresholds? So, are the tools adequate? And again, going back with a reference to the scoping document, identifying effects that we identify using checklists, matrices, GIS, and computer based modeling and so on. Some of the cumulative

effects analysis appears to be checklists and matrices, which are not analytical tools, they are tools for displaying information. That's sort of a well-accepted communication tool, but not a tool for analyzing or predicting cumulative effects.

GIS computer based models and simulation are well-accepted tools and techniques for cumulative effects assessment. But, again, these weren't tools that we found evidence of being used for the predictive component. They were used for describing and mapping the current baseline, but not for the predictive component, again, with the exception of the caribou and habitat five-year study. So we were looking for and expected to see things like simple regression to advanced simulation, and the ALCES model, the landscape cumulative effects simulator, which has been used -- had numerous applications in Western Canada, but also in other areas of Canada, as a very, you know, reasonable tool and one that you would expect to see in a project that involves linear disturbances.

Statistical spatial modeling is something that we found absent to support the analysis of cumulative effects. And what that

sort of lead us to conclude here is that when we get to chapter 9 and we find tables, I believe it's 9.2.3, 9.2.2, the tables that summarize cumulative effects findings, we weren't able to find or tie those to analytical evidence, so we weren't sure where those conclusions came from, either analytical evidence from the EIS or from the technical reports. So we were unclear how those effects were identified.

MR. WILLIAMS: Dr. Noble, if I can stop you here for just a second? You can have your sip of water.

And just to play devil's advocate again, are you being too tough on Hydro? Is there something about a project of this length that would make these basic cumulative effects assessment too difficult?

MR. NOBLE: That's an interesting question, and I tend to think an approach that's quite the opposite, really, where oftentimes for site specific developments, like if we're looking at a particular mine site that's very concentrated, sometimes that can be a very challenging task for a project proponent to identify all the other disturbances or

developments and connect their project to it. For a large scale linear project such as this, they probably don't come easier in terms of approaching cumulative effects assessment. I mean, looking at linear disturbance across a landscape is one of the more easier types of assessment that we can approach, using some basic tools, some basic regression, some basic modeling, ALCES is available for application in this. In the Great Sandhills work I did in Saskatchewan on cumulative effects, we use a spatial tool for looking at road density, linear features across a broad landscape. So it's really one of the easier contexts to capture cumulative effects when you have a project over such a vast area, and when you're looking at fragmentation, for example, or stream crossings as being some of the key issues of concern.

Just with reference to these types of models, this is just again from work by Terry Antoniuk of Salmo Consulting, where they are explaining these tools and metrics and how they can be used for these large projects, so things like basic fragmentation metrics, how a landscape has changed over time. It's one of the easier measures we can do in terms of looking to the past

and predicting that into the future. The density of linear features, doesn't matter if it is a transmission line or a road, we can treat it as a linear feature on the landscape and assess the cumulative effects quite readily.

The bottom example is sort of looking to road and trail density, and this is an approach that we also used in Saskatchewan for an assessment that I spent some time working on. We can document and understand past linear disturbances and we can look to future linear disturbances. So future road networks, future transmission lines, known projects, simulated projects, there's really a wide range of options here. But the point is we can connect the bottom graph to the top graph. So we have the tools, and it's been commonly used in practice to connect the disturbance, the linear feature, to the habitat condition, and then that's connected to the caribou let's say, as an example.

So the tools are there. They exist, They have been applied. But we didn't observe these in the effects assessment.

And I'll highlight an example here where it's noted that this could be, you know, 50

years or beyond. And the EIS notes that there is limited ability to predict project activities within that time frame, particularly when we're dealing with cumulative effects assessment. And I couldn't disagree more with that. In terms of a disturbance that causes linear disturbance and fragmentation on a landscape, it's one of the, as I said before, low hanging fruit, easier things that we can predict. And you know, the guidance on this points towards using scenario based approaches as one possible example. So we could do that for the caribou, caribou habitat for example, looking at different densities or possibilities of stream crossings. Even if, you know, we go on the assumption that we can never be 100 percent accurate on these things, we can at least look at some best and worst case scenarios in terms of what the effects might be, and establish what's an acceptable level of development, or what's an acceptable level of linear features before VEC conditions start to decline.

So in our view these are very tangible things that we know work, but we didn't see them being applied in the impact assessment.

Are trends and linkages established in the past that we can use to inform predictions going into the future? Aside from caribou and habitat, simply put, no, they are not.

Question five, this is where in our view, aside from the analysis, we sort of ran into some of the more challenging aspects of the cumulative effects assessment. Is the cumulative effects analysis centred on the total effects on the VEC?

The Cumulative Effects Assessment Practitioner's Guide, I would bet a modest amount of pocket change that any guidance you read on cumulative effects assessment will tell you that cumulative effects are approached on the total effects on the VEC. So understanding the total effects of all these activities on the VEC first, then identifying the project's contribution to that.

The impact statement doesn't approach it this way, based on our analysis. It doesn't adequately consider the total effects on VECs from all of these interactions. And I'll highlight a couple, you know, just one illustration here. This is the old version of table 9, 9.3-1, and I

apologize for not getting the updated one in there. The updated version separates future from prospective projects, so it sort of labels these as future and those as prospective, if I remember correctly on the titles. It doesn't affect the point that we're trying to make. This analysis, or this high level screening of cumulative effects identifies the coincidence effects, so the coincidence effects of the Bipole project with every other disturbance. So the effect on -- I can't see it from here -- the effects on mammals and habitat, for example, in comparison, in coincidence with another project. So it identifies a relationship, right, between every individual project, individual activity in the Bipole.

Simply put here, a cumulative effect is taking all of these considerations and, for lack of eloquence here, summing them up. That's a cumulative effect. It's a just a total effect. And you know, those are the only effects that matter in an environmental assessment. Those are the ones that we ought to be concerned about. Those are the cumulative effects.

The second sort of problem associated

with this is the cumulative effects of the project are often deemed negligible based on the magnitude of the project's effects measured against the effects of other activities. So in other words, my contribution is less than your contribution, so my contribution is insignificant.

That's a misinterpretation, misunderstanding, or a misrepresentation of what is a cumulative effect. So it doesn't matter how small the contribution is, it's still a cumulative effect. So because other disturbances may be larger than the project, doesn't mean we can say the project's effects are insignificant. Because cumulative effects are about the total effects on the VECs. What's the incremental addition? That's what matters when we're talking about cumulative effects. And in our view, this is a major flaw in the cumulative effects analysis that's completed for this project.

And the first example that's shown there, and I won't read through it, it's in the PowerPoint and in the report that we have completed, but this first example is simply an incorrect interpretation of what a cumulative effect is.

The second example is something we pulled out as an incorrect interpretation of the significance of a cumulative effect. And so I just underline here, this is throughout the assessment when cumulative effects are being discussed, it's in comparison to other activities, or it's minor compared to other human actions. Well, again, to emphasize that point, that doesn't matter. It's not how minor it is compared to something else, as what's the outcome when you add it to something else? That's the cumulative effect that is of concern when we're dealing with project actions and project developments.

Example three, no adverse cumulative effects associated with roads on the aquatic environment. Section 6.4 of the aquatic environmental technical report compares the crossings of the Bipole in contrast to permanent road crossing. So they are negligible compared to other road crossings. Again, that's a misinterpretation of what a cumulative effect is. The question should be, what is the effect of Bipole's crossings in addition to the effects of permanent crossings? So the question being approached is incorrect from a cumulative effects

perspective.

The third problem on this particular question that we have observed, and again it's closely related, is that sometimes projects are excluded from cumulative effects assessment because they are perceived to be small or limited spatial overlap. So other projects will have a greater influence, or the impacts of Bipole will be small in their magnitude, they can be fully mitigated. And the point we're trying to make here is that it's incorrect not to include other projects, regardless of how small they are. It's the same error as dismissing the impacts of your project because they are so small. Again, cumulative effects are the total effects.

So, at a minimum, we would suggest that all other Hydro projects and transmission lines should be considered, at least within the class of projects, if not other disturbances. At a minimum, these shouldn't be dismissed when we're looking at what's the magnitude of the effects.

And a couple of examples, the Dorsey to Portage transmission line project is not included because of no spatial overlap. The point is that it's affecting the same VECs. So it's

affecting agricultural land, it will potentially affect aquatic habitat and wildlife, crossings and easements are noted for the Dorsey-Forbes project. They are the same VECs. So there is a cumulative effect. The question is, is it significant not to dismiss it as not having any effect?

The same sort of example for the Keeyask generating project, in the reports being considered negligible but not addressing the total or cumulative effect on the VEC, when we consider other activities on those VECs.

So some examples to illustrate what it is that we're getting at with this particular component.

Two other ones, and the top one we found interesting in terms of the terminology, the new international transmission line is not included because of minimal spatial overlap and only incremental effects. Well, we thought that's kind of funny, because if there is minimal spatial overlap, there's still spatial overlap. So there's still the potential for a cumulative effect.

And again, to reiterate my point, the size of the individual effect doesn't matter, it's

the total effect. And incremental effects are cumulative effects. I mean, that's exactly what we're talking about. So we found it odd that this one would be dismissed. And again, you know, not being able to predict the new international transmission line, we're likely dealing with effects on the same VECs, wetlands, agricultural lands and so on.

And it's similar in the habitat technical report in terms of the prospective analysis of other projects, the Conawapa project here being sort of a key example.

And I think I'll be on time for the break, so...

THE CHAIRMAN: That's fine.

MR. NOBLE: The fourth and final one that we sort of identified is that the cumulative effects assessment, in our view, really passes the buck, passes the buck for who is responsible for assessing and managing cumulative effects. Here is an illustration from the terrestrial ecosystem, the vegetation technical report. And it's comparing sort of, it's saying that other projects, they will also have to undergo a licensing process. Other projects will have to

undergo an EIS. Other projects will have mitigation, both past projects and future projects. And so as a result of mitigation for the Bipole project, and when we consider other activities mitigating their impacts, there is not going to be any significant cumulative effects.

So it's sort of passing the buck in terms of saying that other projects, well, they will have mitigation plans as well, and we will have mitigation plans, so it's impossible for a cumulative effect to happen if we approach it that way.

I bring you back to the Athabasca River example. Every project in the Athabasca region had a mitigation plan, every single one of them, yet cumulative effects occurred, because nobody was looking at the cumulative effect, it was passed on to the next project proponent.

So the point here is that this completely undermines the purpose of doing cumulative effects assessment. And really, because other projects may or may not have an impact statement, or may or may not have good mitigation, doesn't mean that the project proponent shouldn't be responsible for cumulative

effects. It doesn't relinquish them.

Now, we're not saying that Manitoba Hydro is responsible for the effects of other project developments, we're not saying that. What we're saying is that there is a responsibility to do an analysis of cumulative effects and to identify the significance of their incremental contribution so that it can be effectively managed. There is no responsibility for a proponent today to be accountable for the effects of another proponent five years into the future. But they are responsible for analyzing potential cumulative effects and managing their own contribution to it.

And you know, the point is that if it's deemed acceptable that a proponent can identify a project as unlikely to cause cumulative effects, based on a point that other projects and other future projects will also have an impact statement and also do mitigation, then there is no point in doing a cumulative effects assessment in the first place. It completely undermines the reason why we would even require that it be done. And again, I'll remind you of those examples from the introduction. Cumulative effects do happen,

so they clearly have to be coming from somewhere. And this is sort of one of those reasons why we see those sorts of outcomes we have seen in some other regions.

So that's the end of this section, and I'll pass it back in case there is a break.

THE CHAIRMAN: Any final comments, Mr. Williams, on this section?

MR. WILLIAMS: We suggest the break at the appropriate time, Mr. Chair.

THE CHAIRMAN: Okay. We'll break for 15 minutes, come back about five to.

(Proceedings recessed at 10:38 a.m. and reconvened at 10:55 a.m.)

THE CHAIRMAN: Can we come back to order, please. Mr. Williams?

MR. WILLIAMS: Yes, thank you members of the panel. And Dr. Gunn, I think it's your turn.

MS. GUNN: Okay. Just to reorient the Chairman and members of the panel, I'm going to take you through the mitigation on management phase of the CEA. It won't take me too long to do that, many of these points we have heard before. And then Dr. Noble will conclude with the major

findings of the analysis and move on to the recommendations.

So the cumulative effects management phase is used to determine the significance of impacts predicted and suggest appropriate mitigation strategies for those that are deemed adverse. Five questions guided this particular part of the analysis.

The first was, is the significance of a project's cumulative effects measured against a past reference condition and not simply the current cumulative disturbed condition? And I'll just give you the quick answer on that, and it's no. And if we move to the bottom point, as Dr. Noble stated earlier, the Bipole III CEA erroneously absorbs all previous disturbances into the baseline for the project.

Question number two, is the significance of cumulative effects adequately described and justified, and based on VEC sustainability? The executive summary explains the following, and I'm going to read this passage.

"Given the project's significant effects were judged as small in magnitude, short in duration, (no more

than five years), and confined to the project footprint or study area, and taking into account proposed mitigation, monitoring, and adaptive management programs, they were deemed insignificant from a regulatory perspective."

And the exact same reasoning is applied to cumulative environmental effects.

If you go to chapter 9 it further states:

"In conclusion, local study area incremental cumulative effects of the project during construction and operation on biophysical components were considered to the extent feasible in chapter 8 and are not considered significant."

So broadly speaking, as a class, the cumulative effects of the project are either missed or they are dismissed.

Question three, are the incremental impacts of the proposed initiative traded off against the significance of all other disturbances or activities in the region? In other words, are

those incremental impacts minimized or masked? The answer there is yes. And I have, I believe three examples. The first, in a response to a public information request, the proponent makes the following statement:

> "It would not make sense from a methodological perspective to assess cumulative effects for VECs when there are no residual adverse direct effects."

In fact, we have established this morning that it does make sense in some cases to have a second look at the significance determination for project effects, because sometimes they do need to be elevated to the status of significant when they are viewed in light of other changes on the landscape.

The second example, chapter 9 reads as follows:

> "Manitoba Hydro is participating in several future projects considered in the CEA. This facilitates Manitoba Hydro management and/or reduction of potential cumulative effects. As part of the licensing process for these

other projects, Manitoba Hydro will be required at that time to develop sufficient mitigation measures, monitoring and follow-up programs to ensure there will not be significant residual adverse effects for these projects."

So, again, to us what that is basically saying is, we have other projects in the future, not to worry, we'll capture it or we'll address it at that point.

The third example, also from chapter 9.

"The future projects identified table 9.2-3 will, if and when they proceed they will be subject to their own review process, and as part of that review process they would need to satisfy regulators that there would be no significant adverse effects, including cumulative effects. Given that these projects and activities are prospective and the timing and spatial extent of the effects are not well understood at this time, they are

addressed only to a limited extent in this CEA, only to note prospective overlap."

There is what we might call perhaps a bit of a "pretend to innocence" about the nature, timing and extent of the proponent's own future prospective projects. And we can take the Conawapa generation project as an example. The statement or the passage above says that it's unclear about the timing and the spatial extent and the possible effects from such a project. But, in fact, in this EIS there is an expected date of service recorded. Obviously Manitoba Hydro has built generating stations many times in the past. They should be pretty clear what types of effects would come from such developments.

So the point to be made here at the bottom is that the practice of displacing responsibility for cumulative effects from one project to the next is unacceptable. And it almost ensures that cumulative effects will never be adequately addressed in any one of the projects, or for the projects cumulatively, all together.

The fourth question, and now we come

to management and mitigation. Are mitigation measures identified that help offset significant cumulative effects, and if so, is consideration given to multi stakeholder collaborations to develop joint management measures?

Well, significant adverse cumulative effects of the project are essentially not anticipated. So it's curious then that chapter 9 still goes on to specify and to make it known that there will be a range of management initiatives and partnerships in place to absorb any emergent cumulative effects of a project. So if you're not expecting any significant adverse cumulative effects, why go on to make sure that people know that you are ready to absorb them?

MR. WILLIAMS: Dr. Gunn, could I interrupt you just there for a second?

MS. GUNN: Um-hum.

MR. WILLIAMS: Isn't that the point, though, isn't a robust mitigation plan and a robust adaptive management plan the answer to a flawed EIS and a fundamentally flawed cumulative effects analysis?

MS. GUNN: So you're asking me, is a robust adaptive management strategy good enough?

MR. WILLIAMS: Yeah. Assuming that there's a flawed EIS and a flawed --

MS. GUNN: Okay. Well, no, it wouldn't be, you know, good enough, because you can have the most robust management plan or mitigation plan, but if you don't know what the cumulative effects are, how can you know if the mitigation strategy will address them? So it's illogical that -- it's possible, it's possible that a robust mitigation and management plan could possibly, you know, capture or address some cumulative effects just by happenstance. But we can't know if that would happen for sure unless we know for sure, or at least with a reasonable amount of certainty, what the cumulative effects would be.

So as I said, chapter 9 does go on to identify and specify a number of management initiatives and partnerships. So I'll give you just two examples. One is on the biophysical VEC side. Apparently Manitoba Conservation will be expected to play a key role in monitoring mammal populations. It's also mentioned that the Province of Manitoba will be expected to support adaptive management initiatives related to

caribou. If we look at the socioeconomic VECs, chapter 9 states, referring back to chapter 8:

> "Chapter 8 has identified and described a robust approach to address project effects related to public safety and worker interactions in Gillam."

So those are just a few examples of the management partnerships that they are going to rely on.

Of course, chapter 11 of the EIS goes on to describe the full mitigation management program to offset project effects, namely Manitoba Hydro's environmental protection program and related environmental protection plans. And as well, we have noted that the proponent has tabled a comprehensive mitigation commitment chart or table. We know that those exist. However, because the CEA does not actually find significant adverse cumulative effects, we don't comment any further on mitigation strategies.

The final question that we asked, and that you would look for, is whether or not adaptive management is identified to address significant cumulative effects? Now, adaptive management is an iterative process whereby current

conditions are used to determine subsequent management actions. It's used a lot when uncertainty about future conditions is high. So we don't necessarily know how things will unfold, therefore, we will watch and observe, and over time if we see some change that wasn't expected or that we didn't plan for, we will go back and adapt the management plan or the mitigation strategy as necessary.

So, in other words, it establishes a regular feedback loop in order to gauge VEC responses and feed that information back into the management or mitigation plan.

Now, despite the fact that the Bipole III CEA does not find significant adverse cumulative effects, adaptive management is still proposed as a means to address them.

We concluded that with respect to the project's direct effects, the proponent generally appears to have a good, quite a good adaptive management strategy in place. But, again, because the EIS doesn't find necessarily any significant adverse cumulative effects, a comprehensive review of the adaptive management strategies was not undertaken in our report.

So, now I'll turn it over to Dr. Noble who will take you through our main conclusions and recommendations.

MR. NOBLE: I want to take the last few minutes of our presentation to just recap some of our major observations, major conclusions about the cumulative effects assessment.

And overall, we found what we would consider, based on the Cumulative Effects Assessment Practitioner's Guide and other good practice guidance or reasonable expectations, we found what we would consider to be some significant deficiencies in the cumulative effects assessment.

So I just want to highlight those key points that we have raised throughout the morning, and I won't spend too much time to go through these in detail since they really just recap some of the key points that we have already made.

The first sort of concluding point or observation that comes out of our analysis is this shifting baseline problem, that past effects, past disturbances are considered part of the current condition, so establishing the new normal, as we have said earlier. And this is a problem that was

raised again by a previous panel for a past project as being equally problematic in that particular case.

The second sort of overall conclusion or observation that we draw is that there are a lot of assertions about cumulative effects, or non cumulative effects, but not necessarily analyses that support the evidence, or not analysis to support the conclusions, I should say, about effects.

The baseline itself is largely descriptive of current conditions. So we don't have that retrospective analysis of change and we don't have that prospective or futures modeling of cumulative effects being presented.

The third observation and concern that we raise is about the temporal scope of the assessment. There are a number of inconsistencies in terms of the scope of the cumulative effects assessment moving into the future. And again, you know, many of these are five years, as we have identified for caribou and habitat, 20 years for some other components, but largely descriptive with project timelines identified as 50, more likely a hundred years plus. So we didn't find,

you know, consistency within the temporal scope of cumulative effects, but more importantly, we found that it was really restrictive in terms of how far into the future cumulative effects were being analyzed, different than described or screened, but how far into the future they are being analyzed to support those conclusions in chapter 9.

A fourth observation, which is related to Jill's comments earlier about the spatially ecologically restricted approach where much of the analysis on VEC conditions was within the ROW, within the right-of-way, and very little attention aside from caribou and habitat, again based on the scope of the reports that we reviewed, very little attention to thresholds, either ecological thresholds or disturbance thresholds.

The fifth concern that we raise is again this notion of will we, appropriately or not, the term passing the buck in terms of who is responsible for cumulative effects. And throughout the cumulative effects assessment there is, you know, an approach, a view that these cumulative effects will be absorbed either through mitigation or the assessments and mitigations of

other project proponents within the region.

Finally, and perhaps most significantly, is that cumulative effects are viewed incorrectly and interpreted incorrectly. And the cumulative effects assessment consistently examines the significance of the effects compared to the effects of other disturbances, as opposed to in addition to other disturbances, the total effects. I'll emphasize that point that it's the total effects that matter. Those are the cumulative effects. That's not the approach adopted in the cumulative effects assessment in the EIS.

So with that in mind, we will venture a number of recommendations about cumulative effects, particularly concerning the Bipole III EIS and its cumulative effects assessment. And I want you to imagine for just a moment that number five on this slide doesn't exist there right now, it's supposed to be number 10 on the next slide. I'm just going to skip through it and come back.

The first sort of recommendation is that, at a minimum, the cumulative effects assessment should consider other Hydro projects, past and into the future, many of which are

screened out of the cumulative effects assessment or simply not included from the outset, so the scope in terms of other developments on the landscape. And we can certainly appreciate challenges around looking at other projects from other proponents into the distant future, but at a minimum, the minimum is that projects within the same sector should be included in the cumulative effects assessment.

The second point is the environmental impact statement itself notes the uncertainty around prospective and future developments. And that's true, prospective and future developments are often highly uncertain. So we recommend that a scenario based approach be adopted to looking at such matters as rivers crossings, habitat fragmentation, looking at a range of potential futures in terms of different outcomes and different cumulative effects.

A third recommendation is that the significance about the project's environmental effects be re-examined based on total effects on the VECs, as opposed to only the individual project effects on those VECs. So reconsider whether the impacts are indeed significant by

examining the total or cumulative effect.

A fourth recommendation, and a fairly basic one is we recommend that there be some analysis of cumulative effects to support the conclusions that are presented about cumulative effects. So modeling, trends extrapolation, some scenarios, something to provide a chain of evidence, if you want, from the baseline to the conclusion about significant or insignificant cumulative effects.

Related to that is that the baseline be reconsidered to include previous disturbance conditions. Again, not pre contact, not going back to a point when there was nothing on the landscape, but at least reaching back to the early years of Hydro development, at least reaching back to Bipole II and Bipole I as a minimum, at least going back that far in an attempt to identify trends and thresholds for the VECs.

So that's related to our seventh point, is that the baseline consider these trends and disturbances over time within the study area. So how have linear features and the density of linear features changed? What's been the rate of change or increase or loss of wetlands and river

crossings and so on? Developing those basic trends to support an analysis of cumulative effects.

We recommend that the scope temporally of the cumulative effects assessment include all of those projects and activities identified in chapter 9, rather than dismiss them as having no spatial or temporal overlap. The same VECs are being affected within the same region.

The analysis, again, sort of related to chapter 8, that the cumulative effects analysis extend beyond five, ten and 20-year horizons and be consistent with the life cycle of the project. Again, we'll sort of emphasize that the technical reports do identify 20 years, but there isn't an analysis of cumulative effects over those 20 years. It adopts a timeline, but doesn't perform the analysis.

And number ten is that the predictive component of the cumulative effects assessment identify the maximum disturbance limits, thresholds. It can be difficult to identify thresholds for individual VECs or individual ecological components. It's relatively more straightforward to identify what's the maximum

density of linear features, what's the maximum number of river crossings? We've done that in previous assessments. The B.C. Government has identified it in some of their earlier guidelines in the 1990s, as I mentioned earlier.

And the fifth, which is the new number ten recommendation, is that simply the project not proceed until a cumulative effects analysis is completed.

We also were maybe a little bold and thought we'd offer a number of broader recommendations to be considered in terms of the state of cumulative effects assessment, and how to ensure better practice moving forward. And we recommend some consideration and any recommendation to the province that the Environment Act more explicitly state the need for or the approach to cumulative effects assessment for developments occurring on the landscape.

Another sort of broad sweeping observation and recommendation, which sort of relates to Jill's earlier comment about often compartmentalizing big problems into little pieces, is some of the issues around phased-in approval processes, and reconsidering that

allowance under the Environment Act in terms of what the implications might be for undertaking thorough, comprehensive, good cumulative effects assessments.

The third recommendation sort of stems directly from the EIS scoping document. And the EIS, as we have said on a couple of occasions, refers to region and strategic approaches to cumulative effects assessment, which it set out or identified as its standard, but certainly didn't approach it that way. We recommend that a regional strategic assessment be completed by the province, particularly in the northern portion of the study area, to identify future land use, alternative developments and disturbance, establish limits and thresholds on the landscape.

We completed a similar type of assessment in Southwest Saskatchewan between 2005 and 2007, and that approach was modeled after other approaches. And Jill and I provided guidance through the Canadian Council Ministers of the Environment on the tools and approach for these types of assessments. So, you know, the know how and the knowledge is there, and it's a good way to set a context for what types of

developments and what types of disturbances are appropriate and what the effects are.

The fourth approach, and this is something that will help improve all environmental assessments moving forward, and you, having been involved in environmental assessments, can appreciate the challenge of data and having good data. Well, through a regional monitoring program, watershed health, monitoring river system conditions over time, even monitoring land use disturbance and change over time. So a recommendation that this sort of regional monitoring be adopted by the provincial government, that can provide future project proponents with a consistent, comparable and reliable data set. So proponent A, their data is comparable to proponent B on a select few indicators and, you know, some simple obvious things in cumulative effects assessment that will give us extremely rich information for understanding the cumulative effects of a project and identifying thresholds of ecological change and development in the region.

So those are four broader recommendations that we felt were emerging from

our analysis of the Bipole project, but also pulled in from examples and best practices in other contexts.

And that brings us to the end. Thank you.

THE CHAIRMAN: Thank you. Mr. Williams, do you have any?

MR. WILLIAMS: I believe it's your show now, Mr. Chairman, or the panel's show.

THE CHAIRMAN: Okay. Thank you.

We'll now turn to cross-examination or questioning of these witnesses. Manitoba Hydro, Mr. Bedford?

MR. WILLIAMS: I thought you might have questions of clarification. If Hydro is ready -- we'll proceed as you wish.

MR. BEDFORD: I think the confusion was that Mr. Williams' next expert has a presentation of approximately 30 to 40 minutes. And that was going to go now, and I'd be pleased to ask questions, but was expecting to do it this afternoon.

THE CHAIRMAN: Okay. I wasn't expecting that. Mr. Williams?

MR. WILLIAMS: I just worry about,

again, fairness to my friend, I had advised him that Mr. Skinner would be up, but I don't want to --

THE CHAIRMAN: It's your day and that's not unreasonable. So what you're suggesting then is that Mr. Skinner make his presentation and then we begin questioning after lunch?

MR. WILLIAMS: If I could have a moment to talk with my learned friend, Mr. Chair? Just give me one second?

THE CHAIRMAN: Certainly.

MR. WILLIAMS: And Mr. Chair, I apologize for my confusion and I'll ask for Ms. Johnson's assistance just to help us set up Mr. Skinner, and then I'll consult with the board secretary at lunch in terms of how you'd like it proceed with the afternoon.

THE CHAIRMAN: Okay. So we're going to hear Mr. Skinner now?

MR. WILLIAMS: Yes.

THE CHAIRMAN: So you're excused temporarily.

MR. NOBLE: Thank you.

MS. GUNN: Thank you.

MR. WILLIAMS: Just while Mr. Skinner is setting up, in terms of we'll be referring both to his PowerPoint presentation and also his written evidence of November 6th, which appears at tab 2, and we'll actually be starting at page 14 of that document, the very last page.

Thank you, panel, and I apologize for the confusion.

THE CHAIRMAN: No problem.

MR. WILLIAMS: Mr. Skinner, perhaps you can introduce yourself and then Ms. Johnson will do her thing?

MR. SKINNER: Okay, my name is Doug Skinner. I'm a professional wildlife biologist.

MR. WILLIAMS: And we'll stop you there and we'll just let Ms. Johnson ask her question.

Douglas Skinner: Sworn.

MR. WILLIAMS: Mr. Skinner, I have asked the panel and I'll ask you as well to turn to page 14 of your report dated November 6, 2012, and outline some of your credentials?

MR. SKINNER: Okay. I am a principal wildlife biologist with a company named Worley Parsons. I'm based in Edmonton. I have two

degrees, a BSc and an MSc, both in Zoology and both from the University of Alberta. I have, depending on how you look at it, between 30 and 35 years experience as a wildlife biologist. I have done work on native ungulates, quite a lot of work on fur bearing mammals, small mammals, waterfowl, raptors, amphibians, and I have done a little bit of work on dickie birds, but I wouldn't say that I know very much about them.

I have also been involved in a number of environmental impact statements, or assessments, as I am probably going to call them. Probably between -- I have probably been involved between 25 and 30 of them, in a couple of capacities. I have been involved in preparing the wildlife section of a number of them. I have also been involved in critical reviews of eight or ten of them.

In addition, at one point I was seconded to the Natural Resources Conservation Board in Alberta, which is a quasi-judicial panel, much like you guys are. And my role there was to provide them with some expertise about wildlife issues related to development in the Bow Valley corridor near Banff.

MR. WILLIAMS: Thank you, Mr. Skinner. I have a few more questions in terms of your credentials. And just directing your attention specifically to the first paragraph of your biography here. In terms of your areas of expertise, what would you characterize them as?

MR. SKINNER: I'd say they are probably primarily the ecology of wildlife, mostly mammals. I have developed a few wildlife management plans. I have looked at how wildlife is associated with habitat. I have also done a fair amount of wildlife work related to stuff like linear developments, like roadways and aboveground pipelines. And I have also done a lot of work looking at the effects of disturbance and development on wildlife.

MR. WILLIAMS: In terms of linear projects, can you advise this panel what, if any, work you did in terms of the joint review panel in terms of the Mackenzie Valley pipeline, sir?

MR. SKINNER: I was hired -- I was self-employed at the time -- I was hired by the Gwich'in Tribal Council and the Gwich'in Renewable Resources Board to assist with intervening in the Mackenzie gas pipeline. So I reviewed the impact

assessment, I provided them with information about what I thought were the good points and the deficiencies in the impact statement. I also assisted them with developing information about cumulative effects, and I presented that information at the joint review panel hearings.

MR. WILLIAMS: Now, Mr. Skinner, you state in your biography on page 14 that you provided critical reviews of EIA's, both for the Alberta government and First Nation groups. What, if any, work have you done for proponents or for business?

MR. SKINNER: I spent most of my career as a consultant and I have done -- most of my work in preparing wildlife sections of EIA's has been for business. I have done EIA's for a couple of road developments. I have done it for water, done them for water storage projects in Southern Alberta. I have done them for gas plants. So I had been involved in a lot of roles where I was working on behalf of the proponent.

MR. WILLIAMS: Now, it's not the biography on page 14, but am I correct in suggesting to you that in around 2000, 2002, you did some work as provincial habitat programs

manager for the Alberta Conservation Association?

MR. SKINNER: That's correct. That was the provincial habitat programs manager for the Alberta Conservation Association. They are a non profit organization but they work closely with Alberta Fish and Wildlife division. And my role there was to, among other things, was to develop strategies to conserve, enhance, and create wildlife and fish habitat.

MR. WILLIAMS: Thank you. And Mr. Skinner, perhaps we can get you to turn to your PowerPoint presentation and assist the board in working through it?

MR. SKINNER: Okay. The way I approached this review of the impact assessment is I tried to take a fairly even-handed approach. I tried to look at what I thought was good about it, what I thought was poorly done, with the objective of providing you with some constructive criticism and perhaps some recommendations about how it could have been done differently.

So the way I'm approaching this talk, to give you an outline, first I'm going to take you through a general environmental impact assessment process for wildlife. You have

probably been through it before, but I think it's important to what follows. I'm going to talk about some of the potential effects of linear features, which again you probably heard a lot of them, but I'll try to explain maybe in a little more detail about what they are and what they do. I'm going to talk about some of the positive aspects of the environmental impact statement. I'm going to talk about some of my concerns. Then I am going to try to wrap this all up with a set of conclusions where I kind of summarize what I had been talking about. And then I am going to provide you with some recommendations for you to consider.

So on to the EIS process, the way an EIS for wildlife is undertaken depends on quite a few things. It depends on the nature of the project, what kind of impacts it's going to have, where it's located, what kinds of wildlife it's going to affect. But the process that I'm going to outline here is fairly commonly used for new projects and, in general, it's the process that was used for the Bipole III project.

So the first thing that the wildlife study team usually does is they get their hands on

project drawings, plans and maps. And the reason they do this is they have to know, first, what they are facing, secondly, where it is, and third, how the infrastructure is going to be distributed across the landscape. They usually then select some wildlife species to represent other wildlife species. And the reason they do this is, in many parts of Canada, there are 200 or 300 wildlife species, and it's just impractical to look at them all. In the area I'm most familiar with, central Alberta, there's probably 250 or 300 wildlife species, depending on whether or not you count birds that stop by the area during migration.

So once they have identified representative wildlife species, they will go out and they will collect information about wildlife. So that might be, and usually involves going out and actually doing directed field studies in the project area, they will also review literature, and they will talk to knowledgeable people, for example, local wildlife biologists or First Nations elders.

They take the information they have collected about wildlife, and what they know about the project, and then they try to describe what

they think -- what wildlife project interactions they think are going to occur. So what effect is this project going to have on wildlife?

Based on the interactions they identify, they develop some mitigation measures to reduce the effects of the project. And somewhere along the line, perhaps not at this step, but somewhere along the line they have to identify some impact criteria. These are the variables that they are going to use to define, or at least rate the significance of the impacts. And these include things like magnitude, duration, and there are others. I'm going to get into these in a little more detail later on.

Anyway, going back to the mitigation measures, after they develop their initial set of mitigation measures, they will assess the residual impacts. Those are the impacts that are left over after the mitigation measures have been applied. Then they will classify those residual impacts using impact criteria. So based on their impact criteria, though, they will say those residual impacts are not significant, significant, or something else.

Then usually they develop additional

mitigation, or perhaps monitoring for the impacts they identify as significant.

So an important thing, I think, in this slide is that how the criteria is defined goes a long way towards determining what level of significance is going to be assigned to an impact.

Okay. What are some of the effects of linear features? And you may have heard these before, but I'll try to describe them so they are clear. There's direct habitat loss. For example, if you're a species like marten who prefer forest cover, and they clear the forest cover, you have lost habitat.

There's habitat alienation. This is where a chunk of habitat looks like it's suitable, but for some reason isn't used. It might be because of human disturbance. It might be, say if you're a marten again, there is a block of suitable habitat but it's surrounded by open areas you're not willing to cross to get there.

There's habitat fragmentation. This is where you take a block of habitat and you keep cutting it up, and eventually it can become unsuitable for wildlife. And I sometimes refer to this as a death by a thousand cuts. And you have

heard that term before, I'm sure.

There's altered wildlife movements. Some wildlife move along linear corridors and others like marten probably avoid crossing them because they don't like to be in open areas.

There's increased predation. Wolves, for example, are known to travel along linear corridors. And in doing so, they increase their mobility and their search efficiency, so the predation rate goes up.

There's also increased human access, say by hunters, trappers and other outdoor recreationists like snowmobilers. So this can open up what were formerly remote areas to human disturbance.

Okay. What are some of the positive aspects of the EIS? I think the way they went about selecting the final preferred route was a nice proactive approach that has great potential to mitigate impacts to wildlife. In their selection of the final preferred route, they looked for a route out of a number of alternatives that would minimize the impact of the project, and wildlife was an important consideration. So in theory at least, it should have gone a long ways

towards reducing the impacts to wildlife.

I think it's perhaps commendable that they were willing to modify the final preferred alignment when the Manitoba Conservation Wildlife Branch expressed concerns about it. And I realize there's still some ongoing dialogue about how that should be handled, but at least it showed flexibility on the part of the proponent.

I found that the impact statement and the supporting documents were well written and easy to understand. I looked at the supporting reports where they describe their wildlife studies, and I thought that the methods that they used were mostly appropriate, and in some cases were very sophisticated.

I promised a couple of slides back I was going to talk about impact definitions in a little more detail. I know the Bipole III uses more impact criteria than this, but I'll just talk about these six.

There's direction, whether impact is beneficial to wildlife, has no effect or adversely affects it.

There's magnitude, which is the degree to which an impact will affect wildlife. It

ranges from small to large. And in the Bipole III project it's measured against some level of acceptable change.

There's the geographic extent. That's the area that will be affected. In the case of the Bipole III project, they talk about the project footprint or site. And a local study area, which is roughly ten kilometres wide centred on the Bipole III right-of-way. And then there's a project study area, which I attempted to calculate the area of, and it's very large, my estimate was somewhere around 100,000 or 125,000 square kilometres.

The frequency at which an impact will occur, and I'm not sure I'm exactly quoting the Bipole III EIS, but they go from occasional, which might be just a few times over the life of the project, to a continuous impact.

And then there is reversibility, which describes whether at some point you can actually reverse the impact.

And this stuff is important. This next slide, I borrowed this out of the environmental impact statement. I think it's figure 4-22. And what it attempts to do is it

attempts to show you how three of these impact criteria are combined to arrive at a significance value.

So across the top we have the duration, short-term, long-term, medium term. Along the side we have magnitude, small, moderate large. And along the bottom we have the geographic extent, which is a site or footprint, the local study area, and the project study area.

And what's significant about this figure is that there are 27 possible combinations of ways to assess impacts according to this diagram. And the probability of assessing a significant impact is only one out of 27, or about 4 percent. On the other hand, if you look at non significant impacts, the probability is 17 out of 27, or 63 percent. And somewhere in between we have what they call potentially significant impacts, and based on probability alone, they would be assessed as potentially significant, 33 percent of the time.

And the other thing that I think is important about this figure is it shows that only long-term impacts, in the case of the Bipole III environmental impact statement or impacts more

than 30 years are considered significant.

This was supposed to be a pretty picture of woodland caribou, because I'm going to use woodland caribou as an example of why I'm concerned about these impact criteria. It doesn't look so good there, sorry.

Woodland caribou are listed in schedule 1 of the Canadian Species at Risk Act. This means that they are officially at risk in Canada and they are a legally protected species. They are also listed as threatened by the committee on the Status of Endangered Wildlife in Canada, COSEWIC, and the Manitoba Endangered Species Act. So there's clearly a lot of concern about Woodland Caribou in Canada, and it's because in general their populations are low and declining. But despite these concerns and the sort of fragile status of the woodland caribou, according to the criteria that I showed you on the last slide, if there was a severe caribou decline that covered most of the project study area, say for the sake of argument 25 or 30,000 square kilometres, if that decline persisted over 40 years, it wouldn't be defined as significant according to the criteria, it would be defined as

potentially significant, but not significant. And I think this is incorrect.

In the Bipole III Environmental Impact Statement, they talk about short-term durations, which are zero to five years, medium term durations, which is less than 50 years, and long-term durations that are more than 50 years. It's notable that no long-term impacts have been identified for wildlife. And I think this is simply incorrect. The Bipole III transmission line, according to their impact statement, is likely to last 50 years. But there's evidence that it could last up to 100 years. The Concepts Review Panel in 2011, in a report that was done for Manitoba Hydro, indicated that they could last up to 100 years. And I think there's been some evidence presented earlier at these hearings that indicates the same thing.

So this transmission line could last up to 100 years. And even after it's decommissioned, it's going to take time for the habitat to recover, no matter what they do for reclamation.

So to give you an example of how long this might take, woodland caribou, which everybody

is talking about today, they prefer old growth forests. And it can take maybe 80 years for a forest to recover to the point where it becomes optimal habitat for a caribou.

So the impacts of the Bipole III project could last say 150 or 200 years, which is clearly a long-term impact.

In addition to that, I think even their medium term impacts have the potential to have a significant effect on wildlife. One of the reasons for this is that if you look at the longest lived wildlife in the Bipole III study area, it's probably moose, wolves and caribou, and probably those animals typically don't live more than ten years in the wild. So we're looking at five generations of say the longest lived animals in there.

For smaller animals like marten, they might live say six years, eight years, somewhere in there. So we're looking at maybe eight generations of smaller animals.

The reason this is a concern is because these animals typically developed traditional movement patterns, say between seasonal habitats, natal and foraging habitats,

and if you disrupt those movements over the long-term, then you might be alienating habitat, because it might take them a long time to start moving back into them.

I also want to point out that the durations used in the Bipole III Environmental Impact Statement are very long compared to other environmental impact statements that I have looked at.

On the left here, we have the Bipole III criteria for duration. And this compares them with some of the other environmental impact statements that I have looked at. So the northern gateway, which is another linear project, they used from 10 to 30 years, but they also have an additional classification which is permanent, which is more than 30 years after decommissioning. Some of these other things like Long Lake, Suncor and Muskeg River, these are oil sands operations, but their long-term impacts are typically in the 10 to 20 year range. And an oil sands operation is going to be in operation much longer than that.

In this slide, I'm going to talk about it now because it's here, but it didn't end up exactly where I wanted it, but it's very brief so

I'll just go ahead with it. I think one of the things that Manitoba Hydro should consider, and maybe other proponents for mega projects, is adopting a policy of no net habitat loss. That is, if you destroy habitat somewhere, you do something to either create it or enhance it or conserve it somewhere else. This is, from my understanding, one of the policies of the Northern Gateway pipeline, and in some of the environmental impact statements, especially for water projects in Southern Alberta, we recommended that as a mitigation.

Back again to impact criteria. Sorry for the brief interruption there. So I think one of the problems with the impact criteria is that the EIS tries to adopt a common set of impact criteria that covers everything. So they use the same impact criteria for wildlife and for say socioeconomic impacts. And I just don't think they are appropriate for wildlife. For example, I hopefully pointed out, even medium term impacts would affect many generations of wildlife. I think I have also pointed out that habitat could be potentially affected for a lot longer than 100 years. So most of the impacts to wildlife are

probably long-term, and based on the number of generations they could affect, they could reasonably be considered permanent rather than medium term.

And the Bipole III EIS also indicates that all impacts are reversible. And I agree that at some point they probably will be reversed. But, again, because of the long time period involved and the many generations of wildlife that they could affect, I think they could reasonably be considered not reversible.

So I think a key point here is that using the criteria that you used in the Bipole III Environmental Impact Statement makes it almost impossible to define an impact as significant for wildlife. And I'd also like to point out some other environmental impact assessments do use discipline specific criteria, so it's not an impossibility.

Some of my other concerns -- one is that there's little discussion about animal movements. I have talked a little earlier about how some animals might move along a transmission corridor, and other critters like marten might avoid crossing them. And there is some discussion

about movement of wolves. But for most animals, there's no discussion about how the right-of-way is going to affect their movement.

I found the assessment to be mostly qualitative. They don't use much numerical and quantitative data to allow me to understand how they have arrived at their conclusions. For example, if they are talking about the importance of moose habitat, throwing some numbers in there like good habitat supports 2 moose per kilometre squared, poor habitat supports .5 moose per kilometre squared, would make it easier for me to determine how they arrive at their conclusions.

The effects assessment doesn't provide enough detail for the rationale for impact ratings to be determined. Again, the use of quantitative data would help. In other impact assessments that I have reviewed, some of them have used the scoring system, so they would give a score of say 15 to a high impact magnitude, maybe a five for a low impact magnitude, and then they would sum some of the scores from all the criteria to arrive at an impact rating.

And I also found that some of the conclusions in the impact statement appeared to be

unsupported. The example I'm going to use is, in the impact statement they say there's no significant impacts to wolverines based on the fact they saw a low number of wolverine tracks. But the fact of the matter is, the number of wolverine tracks anywhere is always low. And to give you an example, and this is from my own experience, is that back in the 1980s we did a wildlife tracking study which is fairly extensive in Northeastern Alberta, and it's a very remote area, so it should have supported wolverines. In that study we counted, and I don't remember the exact number, but something over 20,000 animal tracks in the two months, and I think two or three of them were wolverine tracks. So wolverine tracks are always uncommon. And the question isn't, is the number of wolverine tracks low, the question is, how low is it, how does it compare with other areas? What they should have done with statements like that is they should have said, okay, we look at another area of Manitoba or boreal Canada and see how many tracks they saw, and compare them in terms of say tracks per kilometre day, which is a measure of comparing track frequencies.

There's another pretty little picture that didn't work out.

So my conclusions are, I think that the proactive approach to selecting the final preferred route has the potential to be an effective method of reducing impacts to wildlife. If you decide how your infrastructure is going to be distributed across the landscape and take wildlife values into account, it's clearly going to reduce the impacts.

I'm concerned, however, that they examined 30 wildlife species and groups, and not one of those was found to have any significant impact associated with it. And I think this may be inaccurate and maybe even incorrect, because the criteria they used for wildlife were not appropriate for wildlife.

I'm also concerned that the rationale for assigning impact ratings is unclear because there's little use of numerical data in the report. As I said, the use of things like moose per kilometre squared, tracks per kilometre day, some measure of relative abundance and perhaps a scoring system would have helped.

Okay. This leads me to a set of a few

recommendations. I think for projects like the Bipole III Environmental Impact Statement, the proponent should attempt to develop a set of criteria that's specific and realistic for wildlife. They could, for example, talk about magnitude in terms of a percentage population change or something of that nature. They could also say look at duration in terms of maybe use the life span of the species of greatest concern as a baseline. Where it's possible, I think they should provide comparative data. I realize it's not always possible, but I think in many cases it is. I think it's fairly easy to determine moose densities and track frequencies and stuff like that if you are inclined to do so. So I think it should provide comparative data so that when they make statements like, this habitat is poor for marten, that we know it's poor, there's less marten here than there are somewhere else.

I also think they should use quantitative data to justify their conclusions about abundance and the importance of habitat. As I just said, how many caribou are in black spruce forest as opposed to aspen forest, for example? And it would also help us to understand what the

actual effects of the project are, like how many animals are actually going to be affected by clearing the right-of-way? And it would also help us to understand how they arrived at their impact ratings.

And finally, I think proponents of mega projects like this, for example, Manitoba Hydro, should consider developing habitat compensation and enhancement programs as mitigation for some of their impacts.

And that concludes what I have to say. Thank you for your attention.

MR. WILLIAMS: Mr. Skinner, I just have a couple of quick questions before we presumably break for lunch. The second last slide, what was that cute animal there, sir?

MR. SKINNER: That was a marten. That's one question.

MR. WILLIAMS: Hopefully the next one is better. I'll ask a similar question to you that I asked to Dr. Gunn. Let's assume for a minute that there is a flawed impact assessment. Can a flawed impact assessment be corrected by good intentions on mitigation and adaptive management?

MR. SKINNER: I don't think it can only be corrected by that. I think that the purpose of an impact assessment is to determine what the impacts are and to develop mitigation for those impacts. And I think that has to be done up-front. If you attempt to mitigate impacts through adaptive mitigation and monitoring, I think you might find that, based on the results of your impact assessment, you are trying to manage and monitor the wrong things, and you're not monitoring and managing the things that are of most concern.

MR. WILLIAMS: Thank you. And Mr. Chairman, subject to your advice, we are prepared to break for lunch.

THE CHAIRMAN: Thank you, Mr. Williams. We'll resume in an hour, and at that time we will have cross-examination of Drs. Gunn and Noble and Mr. Skinner?

MR. WILLIAMS: We had initially planned to bring Lee and Brown, but if that's the Commission's will, we're happy to do it in that manner.

THE CHAIRMAN: When you and I talked during the break, I understood that's what we were

going to do. In fact, I thought we were going to deal with each one discretely.

MR. WILLIAMS: I had misunderstood you, sir.

THE CHAIRMAN: I thought it was pretty simple and straightforward.

MR. WILLIAMS: Ms. Johnson's with me. Sir, we're happy to present those witnesses for cross-examination immediately after lunch, we are more than happy to.

THE CHAIRMAN: Well, we're open and will consider it over the lunch break.

MR. WILLIAMS: And we are at your direction, sir.

THE CHAIRMAN: Okay.

(Proceedings recessed at 12:03 p.m. and reconvened at 1:00 p.m.)

THE CHAIRMAN: We'll reconvene.

I guess we're going to split the difference. We're going to cross-examine the first two witnesses who presented, or first three, pardon me, the first two panels who presented on what might broadly be called biophysical effects, and then that will be followed by your health effects experts; is that correct?

MR. WILLIAMS: Yes. And Mr. Chair, at this point in time, we are at your direction. So if you'd like Mr. Skinner to sit down, we can do that as well.

THE CHAIRMAN: No, when I said first two, I meant the first two presentations, not the first two witnesses, I misspoke. So Drs. Gunn and Noble and Mr. Skinner now.

Mr. Bedford?

MR. BEDFORD: Dr. Gunn, Dr. Noble, good afternoon. I know that we were introduced this morning, but I have discovered during the course of this hearing that when I have been introduced to learned people, they tend rapidly to forget who I am. So I will re-introduce myself. I am Doug Bedford and my role at this hearing is the role of counsel for Manitoba Hydro.

And before I turn to our presentations, I must also observe that over the course of I think the last six to seven weeks, Mr. Williams and Mr. Meronek have been teaching my witnesses that cross-examination sometimes amounts to death by a thousand nibbles.

I'd like to go to the two examples with which you began your presentation, which

also, of course, appear in your paper. And I'll tell you that in preparing for today, I largely had recourse to your paper because it arrived about a week ago. And I found, I will tell you, both of your examples of how important cumulative effects assessment is to be quite remarkable.

You, of course, in the paper, although you reverse the order in the presentation, but in the paper you began with this situation in Southwest Saskatchewan where only five apparently of 1,500 natural gas wells had received what you describe as an environmental assessment. I conclude from that example that not only naturally and logically was there then no environmental assessment for some 1,495 natural gas wells, but there was also no cumulative effects assessment either. Would that be correct?

MR. NOBLE: That would be correct for the individual projects that were assessed. The cumulative effects assessment was completed in 2005 to 2007, if I remember correctly, which looked at all of those gas wells and road networks combined.

MR. BEDFORD: I gather then some years after all those natural gas wells were in

operation?

MR. NOBLE: Yes, some of them were in operation, some sites had been abandoned sites. There were new proposed well sites coming down the pipe, for which a moratorium was put in place on their development until the cumulative effects were assessed.

MR. BEDFORD: Can I safely conclude then that it was, and is at least sensible with respect to the Bipole III project, that we have an environmental assessment, though I appreciate you are both quite unhappy with the cumulative effects assessment portion of the environmental assessment?

MR. NOBLE: Well, I guess I'll be cautious not to conclude in terms of, you know, my assessment of the environmental impact assessment itself, for the reason that if we were tasked with reviewing that, we may have adopted a different suite of criteria, slightly different on some aspects perhaps. So I'll reserve any conclusions to only the cumulative effects assessment portion.

MR. BEDFORD: Turning to your second example, I must confess I found that even more alarming, the conditions in the Athabasca basin

and the staggering withdrawal of water to which, I notice both in the presentation and of course in the paper, you attribute to the oil sands. I am sure you'll agree with me that the choice of oil sands in the Province of Alberta and what's happening with them is probably an example of the most polarizing project that Canadians are presently discussing?

MR. NOBLE: Perhaps next to the Keystone pipeline project, I would say yes.

MR. BEDFORD: I'll reveal to you that I began this week listening to an interview on our local radio station with a fellow who is a specialist in the same field that both of you are. And I heard him say to the reporter who was interviewing him that the most significant environmental issue that our society currently faces is our society's addiction to the use of fossil fuel to create energy. And he went on to say, which I found quite alarming, but I have heard it before, that if our society does not curtail that addiction to the use of fossil fuels, nothing else we do is going to save our environment. Would you agree with that?

MR. NOBLE: That's a very good

question. I'm not sure on the spot. I would have to think about it, whether I would agree with it's the most significant problem. It's certainly a key problem, I will maybe stop there than saying it's the most significant. But I will certainly say that fossil fuel use is an important issue, and particularly in Western Canada.

MR. BEDFORD: Would you agree with me that one thing we can do in our society to address that concern is to encourage projects that are associated with renewable energy?

MR. NOBLE: Renewables and demand reduction strategies, yes, are important.

MR. BEDFORD: And on the general very depressive predictions of the gentleman I heard interviewed on the radio, it occurred to me, as I heard Dr. Gunn, in concluding the presentation today, suggest to us that good cumulative effects analysis for the Bipole III project really should consider a timeline of say 100 years. And of course, I'm sure many of us wonder how on earth can we determine what the planet will be like in 100 years? But I know the answer you have given us is you use scenario analysis, Mr. Bedford, with so much uncertainty looking out so many years.

So, again, thinking back to the interview that I heard earlier this week, I thought had we done that, surely one scenario might have been, 100 years from now, life after humans. Would I be correct?

MR. NOBLE: I really couldn't guess that far into the future, over 100 years in terms of life after humans. I would say that scenario analysis has proven to be extremely valuable in how we approach cumulative effects assessments. You know, we can certainly run scenarios 100 years into the future, 500 years into the future should we choose to do so. The amount of uncertainty, yes, increases the further you go into the future. And one thing that, you know, we are very careful to make note of at the start of our presentation is, you know, there is an ideal way to do this. And looking 100 years and beyond is an ideal. We obviously recognize the constraints on practice and resources and the predictability of the systems. And you know, we're not saying that in this case we would expect to see a 100 year plus scenario against which we'll be accurately predicting cumulative effects. But we certainly are looking to the use of these tools and

scenarios beyond the 5 and 20-year time period as indicated in the cumulative effects assessment report.

MR. BEDFORD: Dr. Noble, I'm sure I recorded correctly towards the beginning of your presentation, your observation that the scoping document for the Bipole III project sets the bar really high for cumulative effects analysis. Did I write that correctly?

MR. NOBLE: Yes, you did.

MR. BEDFORD: And then Dr. Gunn took over her initial share of making the presentation. And Dr. Gunn, I'm sure on the same theme I heard you say that the scoping document on the topic of cumulative effects analysis is very aggressive. And then you added, but degenerates into a rationality exercise with respect to the VECs and tying the VECs to a focus on adverse effects. Did I write that correctly?

MS. GUNN: Um-hum, correct.

MR. BEDFORD: Well, in listening to you both as you said that, it occurred to me that part of what may be a problem here is that this project began with what I will call a flawed scoping document that has some inconsistencies

within it. Would you share that observation? Do you agree?

MS. GUNN: No, I wouldn't say that the scoping document was flawed. I don't think there's anything wrong with setting the bar high. An ideal cumulative effects assessment would take a regional or all-inclusive look at effect, so I don't think there's anything wrong or flawed with doing that. It's that the Bipole III CEA goes so far in the opposite direction.

So that when we're talking about a rationality exercise, basically justifications are made to narrow the view so small that really there is nothing much left to look at. And what we're arguing is that we're trying to hit, at a minimum acceptable standard, somewhere in between the ideal and really scoping so narrowly as to miss pretty well all of the important effects.

MR. BEDFORD: Is that concern about setting the view very small, the words I wrote that you said were "degenerates into a rationale exercise." Is the recipe for that set in the scoping document where I read repeatedly with respect to each VEC that what is to be sought is adverse effects on the VEC through the analyses

that are to be done?

MS. GUNN: I'm afraid I'm going to have to ask you to restate the question?

MR. BEDFORD: Is the, from your perspective, the mischief, the rationalizing exercise, does that begin when one is told to focus on adverse effects?

MS. GUNN: No, it doesn't. Where that begins is taking a project oriented view toward the project's effects rather than an ecologically focused view.

MR. BEDFORD: One of the repeated themes, of course, that we hear in your presentation, and we certainly read, I certainly did in your paper, is that the cumulative effects analysis, such as it is in the Bipole III EIS, does not consider all types of activities and all stresses on the VECs. Have I grasped that accurately? That is a concern that you both have?

MS. GUNN: Correct.

MR. BEDFORD: And as an example, I accept that you do have a valid concern that for some 325 kilometres, more or a little less, of a 1,384 kilometre transmission line route, Bipole III is planned to be within 50 kilometres of the

existing Bipoles I and Bipole II. Now, the concern about how close the new route will come to the other routes in that 325 kilometre corridor, I can tell you, has been considered in the hearing to date, although I concede the focus was on other reasons than cumulative effects analysis. But in reading and listening to you, I'm sure you're not suggesting that the entire Bipole III route is running, as you say in your paper "roughly parallel" to Bipoles I and II, are you?

MS. GUNN: Well, we acknowledge that the Bipole III route obviously sways west of the Bipole I and II for a significant portion. I think what we have to come back to, to think about, is not so much is it, you know, just in close approximation to the Bipole I and II, but is it in close approximation to all kinds of other disturbances, whether they be linear or not linear, just disturbances, period. So we would have to bring that back to focusing on the total effects.

MR. BEDFORD: And you also encourage us to be aware, as Manitoba Hydro, bringing forward our Bipole III project, to be cognizant of the development plans in other sectors of

industry. And I see in the written paper that you criticize my client's approach as saying that our awareness of development plans of others is weak. And I believe, and you can confirm for me, please, that you mean Manitoba Hydro's awareness of the plans of mining, forestry, and other private sector industries; is that correct?

MR. NOBLE: Within the context of cumulative effects and considering the future developments of other projects in the regions, and yes, that's correct. When we consider the scope of a good practice cumulative effects assessment, you know, our more immediate concern is, I won't necessarily say the awareness, but the inclusion of our types of disturbances. So it's not so much a matter of being aware of what a mineral claim block might look like, or what a forest harvest block might look like, it's being aware of the other potential for disturbance. And the advantage that is here in a cumulative effects assessment, over the size of the landscape of the Bipole III that it has there, is the opportunity to look at fragmentation measures and metrics as some key parameters. Which doesn't mean we necessarily have to know the intimate details of a

mineral claim block. So our criticism is really geared at the inclusion of other types of disturbances that might exist on the landscape, but more specifically other types of disturbances within the same sector as a Bipole project, as being perhaps a more immediate concern.

MR. BEDFORD: Would you agree with me that to do that well one does need to have strong, as opposed to your term, weak information, about the plans of mining and forestry and other private companies, and that generally one is unable to get into the boardrooms of private corporations and companies to get strong information about what they are planning to do?

MR. NOBLE: I would agree to an extent. And we saw this issue come up in the Cheviot Coal Mine case as well, where there was a criticism of Cardinal River Coals for not including the impacts and the detailed plans of other project developments in the region. They were sent back to the drawing board to gather that sort of information. It's difficult, yes, but this is where we can use these proxies such as, and I keep referring to extreme crossings and landscape metrics as some low hanging fruit. So

it's not necessarily needing to know, again, the exact spatial configuration or details of a type of mining activity, it's simply knowing, is there a possibility of mineral resource development in the region. And if there are mineral resources that are known identified or potential reserves in the area, it's not an onerous task to map those disturbances into a cumulative effects analysis over a broad landscape scale.

MR. BEDFORD: And I certainly heard the criticism that in the cumulative effects analysis there's been no consideration of Manitoba Hydro's own vegetation maintenance program for the period and life of the project when it's in operation. And I also, I'll tell you, notice the frequent reference in your paper as examples, the focus on vegetation and Manitoba Hydro's assessment of the effects of the project on vegetation, and the apparent absence from your reading about the project of our maintenance plan going forward. And hearing that Dr. Gunn has particular experience and expertise with vegetation, I now understand why the choice of many examples from that particular area. And I assume, having read the paper and listening to you

today, that you have likely not had any opportunity to review the presentations that were given by our Mr. Matthewson and our Mr. Ortiz. Because in fairness to you both, those presentations were given last week, and there would have been no opportunity whatsoever for you to have read them and thought about them for preparing your paper. And you were likely busy preparing your own presentation, and so not able to review their presentations. Am I correct that you are not familiar with their presentations?

MS. GUNN: That is correct. The materials that we were familiar with, we were tasked with reviewing the CEA and the EIS. We backtracked through the EIS to try to find evidence to support the CEA, and we branched out with respect to vegetation maintenance to look at the policy document that's available on line. I believe the latest version of that was 2007. So that was consulted to get a general overview of the types of vegetation maintenance methods that are under usual practice on the transmission lines.

MR. BEDFORD: You will certainly have observed, as we all have, that the Bipole III EIS

deals with 67 VECs, as I recall, 46 biophysical and 21 socioeconomic. And you do identify in your paper that you see that four of them, on the basis that they were found to be potentially, that there was found to be potentially significant adverse residual effects to them, found their way into our chapter 9 cumulative effects assessment. And I did note that on page 28 of your paper, if you have that handy and wish to confirm my own quotation, as I understand it, when you write on page 28 that the approach you found was taken in the Bipole III EIS, 67 VECs studied, four of them finding their way into a cumulative effects assessment on the logic that there were potentially significant adverse residual effects to them is, as you say and I now quote from your paper, towards the top of the page:

> "This is a common approach and therefore not unreasonable approach to the task."

And, of course, you go on then to qualify and provide some criticism. But I thought, in defence of the approach my client took, that is at least it is a common approach and not unreasonable?

MS. GUNN: Correct, yeah. Residual

effects analysis is basically part of any environmental impact assessment process. It's very common to find your CEA VECs in that fashion. But when I say that, you know, that it's reasonable, it's reasonable in the aspect that it is common, it's commonly done. But it's not -- when you go then forward to look at CEA VECs, that's not the only way that you should be trying to identify your VECs. There are a whole range of other rationales to introduce a new VEC perhaps, or there should be, as we have argued, we should consider re-evaluating the significance determination for the significant adverse direct affects of the project. So that is a starting point, I would say that is a common starting point, residual effects analysis, but it doesn't stop there, it shouldn't stop there in a CEA.

MR. BEDFORD: Indeed, as you do write on the same page, you would have liked to have seen Manitoba Hydro, for this project, go beyond the standard. And my understanding of the theory and the process that you have outlined for us so well today is that that might have resulted in a few more of the VECs finding their way into chapter 9. Have I got that right?

MS. GUNN: Correct.

MR. BEDFORD: And as a further thought, you have certainly said to us all that the boundaries for cumulative effects analysis should not be those just of the project, but as I see you write, you say they should be the natural distribution patterns of the VEC. Have I fairly captured that thought?

MS. GUNN: Correct.

MR. BEDFORD: And I believe you do make the concession in your paper, and I thought I heard it in the presentation, that we in fact did go beyond the boundaries of the project for the VEC boreal woodland caribou?

MS. GUNN: Correct.

MR. BEDFORD: What was less clear to me in the paper was a concession I think you do make, but I'm going to ask you to make it now, that we also did that for some of the socioeconomic VECs, and I particularly have in mind the VEC for public safety and the concerns we all have about my client's projects and their impact on the small community of Gillam and the two First Nations, there's actually four First Nations that lie within the general vicinity of

Gillam. Would it be fair for me to say that we did, in fact, capture the natural distribution pattern for the public safety VEC for Gillam?

MS. GUNN: I would agree with that. I think that that is true, and I think we did concede, as you mentioned, that, you know, there were some instances in the EIS and looking at the pieces that we looked at, there were some instances where there was a better effort and I think a more successful effort. But with respect to socioeconomic VECs, it is critically important to look at the area of Gillam and all the communities up there. But I guess it just occurred to me, you know, as somewhat objective, and not necessarily familiar with all the communities along the route, it occurred to me that there should be some sort of induced effects to more than just one community, being Gillam. I would have expected to see some sort of consideration of cumulative effects to other towns like The Pas, or whatever is along the southern part of the route. There are two or three communities I noted that are very close to where that new proposed line would be. And I would think to myself, knowing from my experience in

Northern B.C., that when you locate a new line close to a town that hasn't had one, there are going to be some induced socioeconomic considerations there.

MR. BEDFORD: Would you agree with me, Dr. Gunn, that when one brings into a community, Gillam, whose present population is about 1,200, some 350 construction workers, many of whom will come from well outside the area, who will live in a construction camp an hour's drive from Gillam for six years perhaps, and when one is thinking of two future projects, in particular the Keeyask dam and the Conawapa dam, which will bring significantly more workers for equally long periods, that there is potentially significant consequences from such a large construction force over such a long period of time on such a small community, whereas in the case of The Pas, whose population is larger than that of Gillam, the workforce that will be in the vicinity of The Pas from this project will be quite small, I am told 30 to 50 workers, many of whom we expect will be local residents for the clearing aspects of the project. But those 30 to 50 workers will be in the vicinity of The Pas for weeks or perhaps a

month or two, as opposed to six years. There's a significant difference in those facts, is there not?

MS. GUNN: There could possibly be. But without fully assessing what those effects are, we couldn't possibly know, and I couldn't possibly know, and nobody could possibly know without doing a full assessment of something like that.

MR. BEDFORD: It occurred to me when I read this particular part of your paper that perhaps the words "natural distribution pattern," Which resonate in my head for species of animals and plants, don't fit all that well for some of the socioeconomic VECs like the one we have just been discussing. Would you agree with me?

MS. GUNN: I would say that the term natural distribution pattern, you know, what we are really trying to get out there is, what did the conditions look like prior to the disturbances, if you are looking at a sector, then prior to the sectoral disturbance. So for me a natural distribution pattern related to socioeconomic VECs, it might have to do with traditional homelands, or traditional hunting

grounds, or however that will be defined by the communities in question. To me, that's how I would look at that.

MR. BEDFORD: I'm looking, at the moment, on the next page of your paper, page 29. And as a further example of something my client may have missed in cumulative effects approach it took, and the choice of boundary for the project, you observe a concern that landscape features, as you put them, of Cedar Lake, Lake Winnipegosis, Lake Manitoba, and the Chitek Lake reserve would be a concern to folks with your area of specialty. And can I suggest to you that we would have to be with the Bipole III project "in" the water before you would have a reasonably significant concern, or alternatively that you'd have to be cutting more than a 66 metre wide right-of-way, and thus adding perhaps some discernible increase in the watershed before you would have a concern about these lakes?

MS. GUNN: It goes back once again to the total effects, the total pressure on VECs in the region, and estimating that to the best of one's ability.

MR. BEDFORD: Of course you both had

much to say about identifying a baseline. And I appreciate the disappointment that you each have in how this was handled in the Bipole III EIS. And as I understand it, your advice is that one ought to, and I'm quoting words from your paper, I am sure you will recognize them, one ought to:

> "Pinpoint a historical period of pre VEC disturbance conditions on the landscape."

Have I fairly captured that?

MS. GUNN: Correct.

MR. BEDFORD: And my understanding of why one is encouraged to try and do that is that one wants to see what has changed over time. And that you need to try to see things as they once were in order to try and understand why they are the way they are today. Have I fairly summarized that?

MR. NOBLE: To the ability that we can do that for some VECs, or for proxies or indicators for those VECs. And I will sort of emphasize a point that we had made in our presentation that, you know, those pre disturbance conditions, again, in an ideal situation we could identify those pre disturbance conditions prior to

any human activity on the landscape. That's ideal. I can't think of anywhere where we actually have been able to pull that off.

So pre disturbance could be variably defined. The point is being able to identify how has that VEC condition changed? It may be from, you know, it's peak healthy condition, its lowest most unhealthy condition. The point in doing that is so we have information that we can bring forward into a future's analysis. Without doing that you don't have anything to bring forward into the future's analysis. So that's why we emphasize that point about that past or pre disturbance condition, however that might be defined in the particular context at hand.

MR. BEDFORD: And I saw that to illustrate this particular point you had chosen wetlands as an example. It appears several types in the paper. And I'll reveal to you that when I first read the paper, I thought that that was a good choice of example for Manitobans, because many of us, like me, are children of parents and grandparents raised on farms and in farming communities. And I certainly grew up with knowledge that the loss of wetlands in Southern

Manitoba has been a concern for several generations. However, I thought that perhaps a reader of your paper could potentially be mislead with your choice of an example, because in the Bipole III project, my client is not proposing to eliminate any wetlands. Do I understand that perhaps your intent was to imply that wetlands should have been a VEC for this project?

MR. NOBLE: My intent was simply to illustrate it as an example, an illustration of the need to consider these past changes and disturbances. And you know, as you say, wetlands is an example that we can easily identify with in terms of agricultural impacts on wetland loss and drainage. But the cumulative effect to wetlands, and we have done some analysis on highway developments, and through Saskatchewan twinning the highway from Saskatoon to Prince Albert, it's not the direct impact or necessarily the footprint on the wetland. I mean, there is a loss to wetland function simply as a result of disturbance on the landscape within the vicinity of these wetlands. So it's not simply the direct immediate physical footprint. So I would say that, you know, it's a good example as an illustration here

of the potential for effects. And we're not claiming in our analysis that, and we don't disagree with your statement about whether or not the Bipole III project will physically be placed in the middle of a wetland. We would assume that's relatively easy to avoid on any count. But that doesn't mean there won't be disturbance or indirect effects. And those are the incremental long-term cumulative effects on wetlands.

We could have used caribou or aquatic habitat as examples to illustrate that point.

MR. BEDFORD: It's in your discussion of baseline that you chastise my client for not considering Bipole I and Bipole II at all. I did notice that because you underlined it to make sure that I read it.

Can I suggest to you that it really would be a relatively easy exercise, in order to see perhaps what vegetation existed on the landscape prior to Bipoles I and Bipole II, if we all had an EIS for Bipole I and Bipole II with something like the chapter 6 in the current EIS?

MR. NOBLE: In principle it would be extremely easy if we had an EIS of similar content for Bipole I and Bipole II. However, we have

imagery and air photo data that can provide that information. It should be relatively easily accessible in this region. I can't say that with 100 percent, because I don't know what data imagery or air photo are available for this region. I am going on the assumption that it's available in other regions for these type of disturbances. Yes, I agree it will be extremely easy if we had the same analysis for the previous projects, but I would make the point that that doesn't mean we don't have data available from other sources in which to bring that type of analysis in to assess those effects.

MR. BEDFORD: I have assumed that you probably do both know that Bipoles I and II were built in the 1970's? You did know that?

MR. NOBLE: Yeah, okay.

MR. BEDFORD: And you may not know, but you probably safely concluded that they were built before we in Manitoba had an Environment Act, a Clean Environment Commission, and the requirement to prepare and file environmental impact statements. And I can't help but observe that in those days we Manitobans were living, so to speak, in the same state as residents of

Southwest Saskatchewan, obviously, where some 1,500 gas wells were established in their territory. Am I correct?

MR. NOBLE: Perhaps.

MR. BEDFORD: Pinpointing a historical period with a view to trying to describe things as they were then is indeed often much easier to recommend than it is to do, is it not?

MR. NOBLE: Again, I think we have to go back to the point that I have been emphasizing, and I will use the work we did in Southwest Saskatchewan as the example. We could not go back to pre contact times, however, we could go back to the 1970's, where we had data available on well productions and road densities from air photos. So, everything is easier recommended than done. And in this particular case, it's not incredibly difficult to do when we're looking at large scale landscape impacts.

Now, if we were looking at a point specific phenomenon, maybe it's a particular species in a particular region, boy, there may not be much data available on that for all VECs. But the caribou record, for example, extends back quite a ways. And air photo imagery and analysis

extends back quite a ways. We know when Bipole I and Bipole II were implemented, even without the EISs, we certainly know when the river crossings were made.

So to a point I agree that, yes, establishing that long historic record is difficult, but there are a number of ways where we have been and can do that, even if it's only back 10, 15, 20 years. I mean, the point that we've been trying to make here is that getting some trend to predict forward to assess the significance of an impact. And ideally, and I don't think anyone would argue that you have a pristine condition for any baseline as a starting point. We all recognize that's simply not possible in any context.

MR. BEDFORD: And I was cheered in reading your paper to see that you do make a kind acknowledgment that, with the example of caribou, we were able to find some data that goes back a reasonably long period of time, correct?

MR. NOBLE: Yes. And we keep referring to that example -- as you will note, you have read the report -- we keep referring to the example as, you know, that is sort of what we're

looking for in terms of the process and practice for cumulative effects. And you know, there is a model or an approach to take for other VECs and other types of disturbances. So, yes, I mean, that's sort of the approach that one would take in doing these sorts of assessments. And you know, we were sort of disappointed that it was restricted to caribou in terms of the approach, not necessarily the data, but the approach that was taken.

MR. BEDFORD: And are you also able to cheer me this afternoon when I observe that 25, perhaps 100 years from now, this Bipole III EIS will be a rich source of data for project study by proponents of projects in the future in these areas?

MR. NOBLE: No.

MR. BEDFORD: One of the challenges I have always thought, of looking into the past to try to see things as they once were, is that each year all of us continue to discover new data, artifacts, documents, photographs, scientific tests that yield new information, and some of us begin to pay more attention to the narratives of aboriginal elders, and all of that which happens

this year and will happen next year and the year after sheds new light on what once was. Correct?

MR. NOBLE: Absolutely.

MR. BEDFORD: And a further complication in this entire exercise is that each generation tends to revisit and to revise our understanding and interpretation of the past, does it not?

MR. NOBLE: Yeah, I would agree with that.

MR. BEDFORD: And I will confess to you that I certainly appreciate your frustration with what you have called a moving baseline. And I think part of the frustration comes, of course, from the fact that you as scientists look for certainty in your professional work, do you not?

MR. NOBLE: I'm going to disagree to an extent. I think the policy makers and decision makers look for certainty. Science is never certain.

MR. BEDFORD: I'm more familiar, I'll tell you, with historians than I am with scientists. But I have long thought that historians are generally more sympathetic to the challenge of "pinpointing" a historical period for

the purpose of quantifying anything. Is that fair comment?

MR. NOBLE: I am not sure I know enough historians to be able to agree or disagree with that, sorry.

MR. BEDFORD: It is true, is it not, that all that has passed has indeed been absorbed in the present?

MR. NOBLE: Yes.

MR. BEDFORD: You both make it explicitly clear to all of us that, in doing the work you do, that one needs thresholds for VECs to do a cumulative effects assessment, correct?

MR. NOBLE: A set threshold, there are many ways to couch those and establish them. They are not all ecological. They can be maximum allowable effects limits. And I'll just bring an example, an old example from, I'll use an East Coast example from an offshore oil project where the maximum allowable effects level set for crime -- so there's no scientifically agreed upon threshold for what's an acceptable level of crime. So the community said zero percent increase. And so any change beyond that was deemed unacceptable change. So the proponent had to work to

mitigation action to make sure it wouldn't exceed that. So what we're saying is that, yes, some benchmark, some target, I don't want to sort of, you know, be misleading when I say threshold that they are all ecological thresholds. But some target needs to be set in order to say this is significant or it's not significant. It's sort of a decision, you know, a way to support decisions. You know, I will be the first to admit that we don't always agree on what those thresholds are.

MR. BEDFORD: I did notice, Dr. Noble, that you and Dr. Gunn did not suggest in your paper any thresholds for the 67 VECs that are identified in the Environmental Impact Statement. And of course, you leave that, and I think quite rightly so, to the experts in the respective disciplines.

MR. NOBLE: That's right.

MR. BEDFORD: And I'm not sure you have, but I am anticipating you will agree with me that you appreciate that for some VECs, experts in those disciplines will tell that you there is no quantifiable threshold for a species?

MR. NOBLE: I agree with that.

MR. BEDFORD: And the challenge that

the specialists in certain fields have is that there's just insufficient known data today?

MR. NOBLE: Yes. However, I will refer the panel to the practices being adopted in B.C. and Alberta where they are dealing with this exact case of it's difficult to define thresholds. So the approach is to use benchmarking. So we know in terms of, you know, when might we be getting close to some unreasonable threshold? We can't quantify it, we can't target it specifically, but we know when we're within a range. And so we may not know exactly when we're going to fall over the edge of the cliff, but we can see it coming out there somewhere. We know there's an edge. And I think that's the point that we're trying to make here. And I do agree with you that for many species we don't know what that exact threshold is when a system will change. So the sliding thresholds benchmark approaches are designed for that purpose. It's a precautionary approach for those complex species or systems that we simply can't pinpoint an exact turning point on.

MR. BEDFORD: And I thank you for the illustration you gave us a moment ago of a

community on crime on the province on the East Coast, because I'm going to suggest to you that some experts in some fields look at society and say in effect to society, make up your mind and tell us, the specialists, what you want the threshold to be, correct?

MR. NOBLE: Sorry, could you maybe rephrase that?

MR. BEDFORD: Some specialists, in this search for a threshold, turn the question back on society, on the community, on our leaders and say, tell us what's tolerable to you, what do you want the threshold to be?

MR. NOBLE: Yeah, I think I would agree that happens in practice, and we see that, and that community example is one of those. I'm not sure it's such common practice for biophysical components, perhaps with the exception of, you know, using traditional knowledge to identify what some thresholds may be for certain species, where the science hasn't been able to nail that down. But, you know, not my area of expertise in terms of the social dimensions in that area. So, you know, I use the East Coast community example simply because of something that I know, not

necessarily I have an expertise in. But, yeah, there are cases where experts ask communities.

MR. BEDFORD: I'll tell you that this week at this hearing on Tuesday, if I was listening carefully, we had an expert on the subject of moose effectively put the same issue I just put to you to us, that even with a species such as moose, sometimes the experts say what is it you want government, society, hunters, you tell me what the threshold should be?

MR. NOBLE: Um-hum.

MR. BEDFORD: I would like to tell you respectfully that on page 40 of your paper, in your discussion of thresholds, I notice what I think is an imprecise reference. And the reference is to the threshold for what you describe as "caribou habitat." And I know you are seizing upon the 65 percent habitat percentage that we have learned is part of a national recovery strategy. I think you intended, when you made that reference to caribou habitat, to be a little more precise and intended to refer to boreal woodland caribou, which is a threatened species in this country. Am I right? And I'll remind you that you, in all fairness, told us that

neither you nor Dr. Gunn are caribou specialists.

MR. NOBLE: Oh, absolutely. You may be right, I'll give you the benefit of the doubt. No, maybe it was as you say. I don't recall offhand whether it was to the specific species or herds, so...

MR. BEDFORD: We have learned, those of us who have had to come to this hearing day after day, that in addition to the threatened species boreal woodland caribou, the Bipole III project will touch the lives of barren land caribou and coastal caribou, which I understand are not threatened species. We hope they never will be. But I'm drawing your attention to the oversight, certainly not to embarrass, but because I think it may lie at the origin of some modest confusion that I found in your paper. And you note several times a concern that a five-year time frame for trying to predict and assess the effects is too short a time frame. And it occurred to me that the problem, if it is a problem, that's developed in preparing this EIS is that there are two distinct aspects to this project. One is a period of construction, which is indeed some five years or perhaps even less in certain areas where

the towers and the conductors will be built, and a period of probably six years for the converter stations. And the effects, I'll suggest to you, are obviously a little bit different when caused by construction, because the nature of construction activities for a project like this are quite different than the effects of operating a high voltage direct current system. I think you'll agree with that?

MR. NOBLE: Yes. I will add to that, just for a point of correction. I didn't say that five years was too short for -- based on my knowledge of caribou, my statement was that five years is too short of an analysis period to say or to conclude about an impact 20 or 50 years into the future. So just so I'm clear, that was my --

MR. BEDFORD: And I'll tell you, I understood that when I read the paper. And arguably perhaps we'll find that caribou wasn't the best example you could have chosen, but you choose it several times in the paper. What I suspect that you weren't alert to is that the critical boreal woodland caribou herds that we have to be sensitive about in looking at this project are the Wabowden, Reed, and Bog herds,

which I will accept you are not familiar with. They will certainly be, we have been told, affected by construction of the right-of-way, the towers and the conductors. But I'll tell you that the location of those boreal woodland caribou herds lies hundreds of kilometres from the Keeyask dam project and the Conawapa project. And so given that, is it not a little more understandable why the analysis in the case of boreal woodland caribou focused on the five-year period of construction, and was really not concerned at all about projects hundreds of kilometres away to hydro dams which will be built in rather narrower geographic sites?

MR. NOBLE: It may be reasonable. But my concern was being able to find the analytical work in there to show that. And my point that I was making with the caribou and the time frame, again, is conclusions are drawn in chapter 9 about the significance of the effects on caribou. And I'm not disagreeing with you in terms of the proximity of projects to the particular herd, but the concern that we raise is in terms of, well, if we consider the cumulative effects of other linear disturbances on the landscape, where is that

analysis and how does this five-year analysis allow any conclusions to be drawn based on a 20 or 50 year time period? So I'm not disagreeing with you in terms of the geographic location of the projects and which caribou herds will be affected. I have no expertise in caribou and I'll emphasize that point. But to draw a conclusion about cumulative effects in chapter 9 with five years of modeling and prediction for other future projects sort of leaves me wondering how, how did you make the conclusion? And so the criterion that we use in our analysis is, is there evidence, is there sufficient analysis to support that? And so hence, that's our reasoning in terms of our finding and argument around that time, that five-year time frame.

You know, I don't know enough about the differences between the biology and the ranges of the caribou species in particular. And I'll defer that to the experts in the room to make any observations on that.

MR. BEDFORD: I believe that a similar oversight, understandable on your part, has probably contributed unfortunately to your concerns regarding trends and the usefulness of

seeking them when you use as an example river crossings and water quality, and how many river crossings can be tolerated in a region. And you do use this example more than once, that the Environmental Impact Statement for Bipole III doesn't establish a relationship between river crossings and water quality. I think that's an accurate observation on your part.

And you say for cumulative effects assessment, the concern, as I understand it, is that moving through the water, or perhaps causing along the banks of streams and rivers an increase in sediment that will find its way into the water, ought to have been addressed.

I can tell you that my understanding is that the majority, if not all of the crossings of waterways that will be required to construct the Bipole III project, are going to be done in the winter over frozen rivers.

Would you agree with me that knowledge of that fact is an important consideration in at least reducing the concern that you have identified, using your examples?

MR. NOBLE: First I'll go back to the earlier part of your statement. I don't believe

there was an oversight in my observations around caribou and the five-year time frame. So I don't believe I made an oversight there based on the questions and criteria that we use.

And I don't believe it's an oversight here in terms of the timing of the construction. We're looking at, and the stream index crossing that I identified there is not dependent on the timing at which the river crossing or construction occurs, it's dependent on the existence, the presence or absence against which the relationship is determined for increased run-off or erosion on a cleared site adjacent to a stream bed or within reasonable proximity of a stream bed.

So, you know, whether it's constructed in winter or not, obviously that helps mitigate the direct effects of the project by winter construction and winter crossing, absolutely helps mitigate it. But that's not the point that's being made in terms of the number of river crossings and indirect and cumulative effects that will persist over the lifetime of the project operation.

MR. BEDFORD: I noted your criticism, and it's at page 46 of your paper, example six is

the subheading in the middle of the page. I noted your criticism that there was no area calculation used to assess the cumulative effects on traditional plant harvesting and gathering.

Would you agree with me that to do such a calculation, the Aboriginal citizens of this province who did provide us with information about traditional plant harvesting would have had to have given us in their self-directed studies, or the interviews that some of them attended, enough precise detail so that such a calculation could be done?

MR. NOBLE: Yes. I'm sorry, I'm just trying to follow along here in this section. Yeah, there were two points that leads up to example six. One of those points was area is identified as an indicator for this analysis, in percentage calculation. And there are statements made about cumulative effects, but it says no area calculations were determined. So we are assuming that no area calculations were determined. It seems to be contradictory in terms of the way it's presented there.

I would agree with you that, you know, through the traditional use studies, and I'm not

familiar with how the traditional use studies were conducted in this particular assessment, I do know from past experience in working with an Aboriginal community in terms of traditional use, that was information that was shared with the team. And I agree that if it wasn't shared with the team, we couldn't specifically identify it. But, you know, there are other areas where if we know the types of plants that are used, then through ecological studies we can know whether they actually exist in certain areas or not, so...

MR. BEDFORD: And do I understand correctly that the views of both of you are that cumulative effects assessment should be centred on total effects on a VEC in a regional environment?

MS. GUNN: That would be the ideal.

MR. BEDFORD: And I gather, and you'll recognize I'm again quoting words from your paper, that it is also the view of each of you, and I quote from page 11, you'll recognize the words:

"Regional strategic environmental assessment is ultimately the responsibility of government."

Have I captured that fairly?

MR. NOBLE: That's my view.

MS. GUNN: Correct, yes.

MR. BEDFORD: And obviously that's why each of you is recommending to our Clean Environment Commission today that our province implement a regional strategic environmental assessment?

MR. NOBLE: Yes. And I think what really triggered that recommendation was the EIS said it was going to do that in terms of adopting regional and strategic approaches. And our view is that's extremely ambitious for a project proponent to do a regional strategic environmental assessment. I agree, it's the role of government, in partnership with industry and land users to undertake that type of analysis. However, that does not dismiss the responsibility of a project proponent to assess the cumulative effects of their project. So I think they are two different scales and layers of analysis.

MR. BEDFORD: I noted your criticism regarding the treatment in the Bipole III EIS of the effects on Bipole III, or rather on the VECs of what you call "other hydroelectric developments." You mean, I'm sure the proposed Keeyask dam hydroelectric generating station and

the proposed Conawapa electric generating station?

MR. NOBLE: And the international -- sorry the name escapes me --

MS. GUNN: Transmission line.

MR. NOBLE: -- international transmission line, other developments within the sector. I'm not exactly sure where in the report you are identifying that, but from my memory here, that's what we were referring to as other developments within that sector of activities.

MR. BEDFORD: And we all know here, and I suspect you do as well if Mr. Williams was diligent in briefing you for preparation of your paper and your presentations, that there are clear geographic and temporal overlaps with Bipole III and the Keeyask and Conawapa projects. Bipole III will be in the same area, at least the Keewatinoow converter station is being built fairly close to where my client proposes some day perhaps to build the Conawapa generating station. And it's not a great distance from the Keeyask station either. That obviously is something that logically has got to be dealt with in a cumulative effects assessment, which I think you observe, correct?

MR. NOBLE: Um-hum, that's correct.

MR. BEDFORD: And in thinking about those projects and recalling some brief information I gave you earlier about the size of the construction workforces, really close attention must be given to the socioeconomic VECs in a cumulative effects analysis, correct?

MS. GUNN: Ideally they would be, yes.

MR. BEDFORD: It's almost intuitive, without wanting to show any disrespect to the learning that you brought to this subject, it's almost intuitive that one must pay close attention to the potential challenges and harms that could flow again from bringing a very large construction workforce into a remote area?

MR. NOBLE: Yes. And even bringing a very small workforce into a remote area is important to consider when we're looking at the cumulative effect, and that's what separates that project from the cumulative. So I agree.

MR. BEDFORD: And appreciating all of the criticism that you have advanced regarding the way cumulative effects analysis was approached by my client for this project, did my client not at least get things right in a fashion by identifying three socioeconomic VECs as being potentially

significant and requiring additional careful thought on mitigation measures with respect to the Gillam and the surrounding vicinity?

MS. GUNN: I think our criticism there was around, again, going back to support for the conclusions that are drawn in chapter 9 in the cumulative effects assessment. Certainly those three socioeconomic VECs were brought forward. And it was noted that robust mitigation strategies are in place to capture those, and that's a good thing. And we wouldn't argue that.

I think what we were focusing on, as I said, was that we didn't see particular evidence to support the conclusions around socioeconomic VECs in total for the project.

MR. BEDFORD: Do you know that the proposed Keeyask hydroelectric generating station is not, narrowly speaking, a Manitoba Hydro project, but rather a project that will be promoted by a partnership, albeit my client is a significant partner in that partnership, but nonetheless a partnership of Manitoba Hydro and four First Nations. Were you aware of that?

MS. GUNN: I wasn't.

MR. BEDFORD: And similarly, were

either of you aware that a number of First Nations have for a number of years shown a very active interest in the Conawapa, the proposed Conawapa generating station?

MR. NOBLE: No.

MR. BEDFORD: Those of us who have been attending the hearings know that Fox Lake Cree Nation, which is certainly affected by the Bipole III project, and I may add is a partner in the Keeyask generating station project, has told this Commission that it has a very keen interest in the Conawapa project. News to you?

MR. NOBLE: Well, yes, I wasn't involved in previous parts of this hearing so...

MR. BEDFORD: Could you accept that the reluctance of my client, Manitoba Hydro, to disclose publicly in this hearing a lot of details such as they are about the nature, timing and extent of the Conawapa project may have much to do about my client's sensitivities, and the sensitivities of relevant First Nations, and their desire to know before anyone else in the world those particular details? You don't find, I grant you, in the EIS for Bipole III much specific details, as you observe in your paper, about the

nature, timing or extent of Conawapa. And I'm suggesting to you that perhaps the reason for that is that there are First Nations who are sensitive about such details becoming public before they had been privately shared with them.

MR. NOBLE: I don't know the -- I mean, I clearly don't know the reason behind that. I can certainly appreciate, you know, that point in terms of sensitivity of information. I don't know if, you know, the engineering design, technical details of a hydro project are necessarily needed to look at broad landscape effects. But I, you know, the issue around not knowing exactly when it might come on board, that can pose some challenges in terms of a cumulative effects analysis. But, again, you know, this is where we can use those scenario tools to address those potential gaps.

Having worked in a project that involved a number of Aboriginal communities in Southwest Saskatchewan and Alberta, I certainly can appreciate the difficulties around, you know, disclosing information around some of these projects, particularly for matters that are community sensitive. But it's not, you know, it's

not that we don't have a general idea what a hydro project and transmission line look like. And I would say that in terms of a mine site, we may not know the details of a mine site, but we have a general idea what the footprint looks like on the landscape.

So, you know, we are critical, and I wasn't aware of the reason why it wasn't included. That's really interesting and might make an interesting case study on something else. But it doesn't sort of change this notion that the footprint analysis shouldn't be included in a cumulative effects assessment, regardless of not knowing the specifics of an agreement or a project design.

MR. BEDFORD: Sometimes, will you grant me that such factors as I have just disclosed to you, can make it challenging or can interfere with the application of the pure practice of cumulative effects assessment?

MS. GUNN: On some level, yes, but I think we really have to back all the way up to, if we look at, you know, the first slides of the scoping presentation, the point is that you would begin by scoping widely and you would begin by --

I'm sorry, I lost my thought. Could you rephrase the question and I'll just finish that thought?

MR. BEDFORD: Sometimes factors such as the one that I have just suggested to you both regarding Conawapa and public disclosure of details of Conawapa, which has little or nothing to do with cumulative effects assessment, can interfere and impede the application of good cumulative effects assessment practice?

MS. GUNN: Thank you. Yes, it certainly can impede things as you are trying to move forward with your analysis. But you would still be able to scope it properly, you would still be able to set forth a methodology that is appropriate, that uses appropriate methods. Given the science that is available, the capabilities that you have, you can do all of those things. And if down the way, you are having trouble getting certain data or certain information, there are ways to deal with those types of gaps in your modeling, et cetera.

MR. BEDFORD: Before we leave this topic, because you chose to use the reference in your paper, I would like to suggest to you that given what I had now been able to tell you,

sometimes in life a pretense of innocence can be in fact an act of respect, correct?

MS. GUNN: The only -- yes, we obviously acknowledge that there were things going on there that we couldn't appreciate by simply reviewing chapter 9. We were asked to do a particular job with a particular set of documents, and we did the best job that we could with that information. So we certainly do appreciate that there are all kinds of other things at play that we weren't privy to. But I don't know that, you know -- in the end I don't know that the basic things that we're asking for couldn't have been considered.

MR. NOBLE: Can I add?

MR. BEDFORD: Of course.

MR. NOBLE: It's a really important issue that you're raising about this, the sensitivity around information. I don't think it's as relevant to the Bipole III Cumulative Effects Assessment as it will be to the EIS for the Conawapa project. And it really comes back to an issue that was raised earlier in a question, and the discussion about we may not know what mining company X is doing, we may not know the

details of a relationship between a First Nations community and their partnership role in a particular development project, but I'll emphasize that point, that doesn't mean we don't know what a transmission line looks like, and what the effects of linear features are on the landscape.

So I think it's really important to separate, you know, our analysis of this in looking at the process and the practice and the adequacy of the data that were used to draw conclusions about cumulative effects, and other processes that may be happening outside of this EIS that, you know, may or may not be constraining the cumulative effects assessment.

My own view on this is, I personally don't see those issues as explaining the lack of analysis of these projects.

MR. BEDFORD: These projects being the one under consideration, Bipole III, the two that we have just referenced, Keeyask and Conawapa, keeping that in mind, it's true, is it not, that if my client is, as you say, passing the buck, it's really just passing the buck to itself, is it not?

MR. NOBLE: Maybe -- or in case of the

Conawapa, as you mentioned, a project that's not directly 100 per cent under the control of Manitoba Hydro.

MR. BEDFORD: And I appreciate it may not resonate to academics from Saskatchewan, but I cannot help but observe for the historians here today, that this buck is not going to stop on the late President Truman's desk, but it is going to stop at President Scott Thompson's desk.

I have read your recommendations, and in particular the one that this project should not proceed until a cumulative effects assessment that would meet your description of a good cumulative effects assessment is done. And when I read that, I looked at my two cats and asked them what they thought about that, and got no reply from them. It occurred to me that to do that is going to take, or would take more than a week, and more than a month, I thought it would probably take about a year. Would I be correct?

MR. NOBLE: It could take up to a year. I guess the unfortunate thing is that it wasn't done that way from the outset and then the delay wouldn't need to happen. You know, we're recommending that if it's serious business here in

terms of a cumulative effects assessment, and that a cumulative effects assessment ought to be done, then our bottom line is it wasn't done here. So clearly, our recommendations are that if it's important and deemed important to understanding the significance of the project's effects on the VECs, which we believe it's absolutely foundational to that, then, yes, we stand behind that recommendation that it will take more than the week and more than a month. It may even take up to a year. It would depend on the level of analysis, I think, that could be undertaken and how coarse of a scale one would pursue that by. So I don't disagree with you on that.

MR. BEDFORD: And could I fairly predict that a year from now there will be a new best practice for a cumulative effects analysis?

MS. GUNN: I think the best practices we looked at have been around since the beginning of impact assessment in the early 1970's in Canada. And the best practice guidance that is referred to over and over in the Bipole III CEA is the 1999 Hegmann guidance. That's been around for a long time. There are a few of us in the field that would say that that does need some updating.

But is there likely to be a whole new way to play the game? Not likely, very unlikely.

MR. BEDFORD: I did observe in looking at your bibliography, and I did count them, a third of the articles and the books you cite, including Dr. Noble's two works which I think are dated 2012, that a third of the articles and books in the bibliography were all published in the last, I believe, it's four to five years, correct?

MS. GUNN: What was that figure again?

MR. BEDFORD: A third.

MS. GUNN: So that would be two-thirds weren't, correct?

MR. BEDFORD: The debate still goes on, on cumulative effects?

MR. NOBLE: Well, what debate? Sorry, I guess before I answer that I should ask you what debate are you referring to?

MR. BEDFORD: Best practices, how to approach cumulative effects analysis?

MR. NOBLE: Is it an area in which we are continuing to learn and develop new science? Sure. Do we all agree that Hegmann's work and Duinker and Grieg's work back in the '80s are the standards to go by? Yeah. There is some general

consensus that these earlier reports from the '80s and mid '90s set good acceptable standards for practice. Much of the advancement in cumulative effects that has been happening over the past ten years has largely been cumulative effects assessment at the regional and strategic scale. That's where most of the science and advancement has taken place, particularly in areas such as watershed based cumulative effects assessment, using different analytical tools and models. That's where much of the science has been advancing. But to come back to Jill's comment that I reiterate, much of what we deem acceptable, the foundation has been set for some time. And we would hope that things do continue to evolve as we move forward.

MR. BEDFORD: As I understand it, if Manitoba Hydro were able to invest a year to do a cumulative effects analysis, perhaps one under your direction, that there are three logical possible outcomes to such work. Number one, having done it, we might all discover that there is no change to the present conclusions; or number two, we might, as you so ably have explained to us, we might recognize that the total effects on

certain VECs are different than what we see them today, which would lead us to design more mitigation measures; or thirdly, I think it highly unlikely, but logically, thirdly, we might reach the conclusion that this project should not be approved.

Have I fairly summarized the three logical potential conclusions that could occur if a year's work were invested to do cumulative effects analysis as you are recommending?

MR. NOBLE: Yeah. And I think within the scope, as you are saying under point two that, you know, the total effects are different, which would lead to better management practices. And there may be options within that as well in terms, I mean, maybe there are other alternative designs that could be considered. I can't comment on the details. But I think overall, it would be one of those three or some variation of that as possible outcomes.

MR. BEDFORD: And so then finally, should your recommendations today find their way to our Minister of Conservation in Manitoba, would you agree with me that he -- it is a he -- would have to weigh the costs of a year's delay in

proceeding with construction of the project as against the probabilities that further cumulative effects, or a cumulative effects analysis, as you propose, would find a necessity for new mitigation measures?

MR. NOBLE: That's an interesting question. I would assume for any project that, you know, the Minister has to weigh the needs and the merit and the benefits against what the costs are, you know, the environmental, socioeconomic costs. I would assume that applies to any project, that choice has to be made. I guess in this particular case what the Minister is missing is information on the cumulative effects of the project. So he would have to make that choice and that decision based on incomplete information. And so hence, our recommendation that this is an important piece, because it's not possible for the Minister to understand the effects or the significance of the effects of the project without the cumulative effects analysis.

So, you know, whether an additional, or putting things on pause for a year and doing an analysis would change that decision, I have no -- I couldn't speculate. I really don't know.

MR. BEDFORD: Thank you both. I'm going to for one minute shed my role as an advocate for Manitoba Hydro. Something that over the last six weeks, my wife has wished I would do far more often. I am going to reveal -- well, firstly, I'd like to tell you that your paper I think is a remarkably fine piece of work.

MR. NOBLE: Thank you.

MS. GUNN: Thank you.

MR. BEDFORD: One thing I do know in life is good writing and this is good writing.

MS. GUNN: Thank you.

MR. NOBLE: Thank you.

MR. BEDFORD: This is well-reasoned and it was well presented today.

MR. NOBLE: I appreciate it.

MS. GUNN: Thank you very much.

MR. BEDFORD: Whether anyone else agrees with me or not, my personal opinion is that you have contributed greatly to the value of this hearing. And now I'll reveal to you that my colleagues, Ms. Mayor to my left, Ms. Johnson to my right, and I, having read your paper on the weekend have been insistent that it be read widely within Manitoba Hydro at a senior level. And I

know as of today that it has been.

So thank you very, very much. I am finished.

THE CHAIRMAN: Thank you, Mr. Bedford. Any questions of Mr. Skinner from Manitoba Hydro?

MS. MAYOR: Mr. Skinner, my name is Janet Mayor. We haven't been introduced. I'm also known as Mr. Bedford's junior, so here I am.

Now, my apologies to start out with because unlike you, I am not a biologist.

MR. SKINNER: That's forgiven.

MS. MAYOR: In fact, I must even confess that I did not take biology in high school for fear of having to dissect the frog in the first year. So my apologies.

You have indicated in your introduction to us today that you have done somewhere in the range of 25 to 30 environmental impact assessments, and those have been both for the proponent and as a critic?

MR. SKINNER: That's correct.

MS. MAYOR: Now, in general, your assessment of the Manitoba Hydro Environmental Impact Statement with respect to wildlife was that, and I think I'm using words very closely to

those used in your report and your presentation today, the methods used were appropriate, and I think you even indicated in some cases sophisticated?

MR. SKINNER: That's right.

MS. MAYOR: Now, you also commented positively about the use of information about wildlife abundance and the location of key wildlife habitats. In fact, I think you indicated that those were used by Manitoba Hydro and its wildlife experts proactively to select a final preferred route that reduced impacts through avoidance where possible?

MR. SKINNER: I agree to some extent. I think it was one of the factors. I think it was an important one.

MS. MAYOR: Now, you also discussed in your report the mitigation measures that have been proposed. And your indication was that they were both appropriate, and I think you said commonly used in your field?

MR. SKINNER: Yes, a lot of them, for example, disallowing firearms in camps and stuff like that, that stuff is pretty common, you see that everywhere.

MS. MAYOR: And some of the other ones that you viewed favourably were eliminating human disturbance during critical seasons for wildlife?

MR. SKINNER: Yes.

MS. MAYOR: The implementation of access management plans?

MR. SKINNER: Yes.

MS. MAYOR: The use of buffers around important wildlife features?

MR. SKINNER: Yes, I agree with, the ones that were cited in there, I agree with them. Like I said, they were commonly used, and if they aren't 100 percent effective, they at least help.

MS. MAYOR: You also talk about pre-construction activities to locate species and the use of bird deflectors.

MR. SKINNER: I beg your pardon? I didn't hear you completely?

MS. MAYOR: I am sorry. You also looked favourably upon the mitigation measures proposed that were pre-construction activities to locate species?

MR. SKINNER: Yes, that's also something that's used fairly commonly.

MS. MAYOR: And the use of bird

deflectors.

MR. SKINNER: Yes.

MS. MAYOR: Now, you had expressed -- I guess I'm taking a page from your book, do some positive and do some negative. So you also in your paper expressed some concerns about the caribou?

MR. SKINNER: Yes. I am not a caribou expert. I was using it primarily as an example of how the impact criteria fit together.

MS. MAYOR: Now, in terms of some of the information you had in your report, you talked about the need for data. And I think we just heard a little earlier Dr. Noble talking about his view that, vis-a-vis data, there was some good data going back on caribou. Now, if there had been, and in terms of an assessment of the level of significance, if there had been a higher level of significance for the caribou, you would agree that Manitoba Hydro, to improve its data collection, should continue with its various collaring activities?

MR. SKINNER: Yes, I agree. I think it's great that they are continuing to monitor throughout the life of the project. I have no

problem with that.

MS. MAYOR: And that would provide it and other wildlife experts with increased data in that area?

MR. SKINNER: Yes.

MS. MAYOR: Manitoba Hydro has also indicated through presentation of its environmental protection plans and its monitoring activities that are planned, that it has been participating on the Northwest Caribou Committee, and with Manitoba Conservation and Water Stewardship, along with various resource management boards on this species. And you would agree those were activities that would assist to gather further data on the importance of caribou?

MR. SKINNER: I can't really comment very well on that. I'm not really familiar with the activities of those committees or Manitoba Hydro's role in them.

MS. MAYOR: You also comment in your report about moose, and in particular you indicate that moose are often associated with edges and early successional forest stands which frequently provide woody forage in the form of regenerating shrubs. Do you recall making that statement?

MR. SKINNER: Yes.

MS. MAYOR: And you would agree with me that such regeneration of the shrubs often occurs along right-of-ways, and in fact during our presentations you saw many pictures of the regeneration over time?

MR. SKINNER: Yeah, it pretty commonly occurs in any area that's been either naturally or artificially cleared.

MS. MAYOR: And you would agree with me that that is habitat that is often favoured by moose?

MR. SKINNER: I would say yes and no, sounding very political here. There is research, well, as I said, they commonly occur where there is open areas. There's been some research done in Alberta that indicates that they don't like linear features. So I think the answer is unclear whether they are going to be there or not. And I think one of the things you have to appreciate, and it's clearly one of the challenges of being a wildlife biologist, which you have acknowledged you are not, but one of the challenges is, every moose, like every person, is an individual, so they are going to do what they are going to do.

MS. MAYOR: So no amount of study is going to convince the moose to give us some sort of trend?

MR. SKINNER: Well, no, you can come up with general trends. But I couldn't say in the context of the Bipole III right-of-way whether it's going to be a positive, whether the regenerating shrubs along the right-of-way are going to be a positive or a negative for moose. I think it could depend on the moose population and sort of what their traditions are. It could depend on the area and what kind of shrubs grow up. I mean, it's well known that moose eat shrubs but they only eat certain species. So if the wrong shrubs come up, for example, I don't know about in Manitoba, but in Alberta they seldom eat alder. So if what grows in your transmission line is alder, they probably won't show up.

MS. MAYOR: So taking that into account in terms of the type of shrubbery, so subject to that, there certainly are a number of studies. And are you familiar with the Stewart and Komar studies that have been done, the work that's been done assessing landscape relationships with habitats? Are you familiar with that work at

all that talks about moose attraction to shrub land?

MR. SKINNER: No, I'm not.

MS. MAYOR: Are you familiar with, you talk a little bit as well about habitat fragmentation. Are you familiar with the current situation in Saskatchewan and their tremendously high volumes of moose that did not appear at all to be daunted by fragmentation caused by roadways and other linear developments?

MR. SKINNER: No, I don't know of any studies in Saskatchewan that are really recent.

MS. MAYOR: And I'm sorry, I didn't say a study, I was talking about the situation in Saskatchewan. There's been much publicity over the summer in Saskatchewan about the very high volumes of moose crossing highways and seemingly undaunted by such things as cars and highways and fragmentation of that type?

MR. SKINNER: Well, we know that happens. There is also some research that was done in Ontario quite a long time ago that indicated that moose would inhabit an open area, but it would only go so far from cover. And how far they went depended on things whether they had

calves, what the season was, and those kind of things. So there are other studies that show that they, if you have an opening that's too big, they might not use all of it.

MS. MAYOR: Thank you very much, Mr. Skinner. I appreciate you answering my questions today.

MR. SKINNER: You are welcome.

THE CHAIRMAN: Thank you.

Turning to participants, do any of the participants have questions for either of these presenters? Mr. Mills, you'd be first in the line-up.

MR. MILLS: Dr. Gunn and Dr. Noble, thank you very much, I really enjoyed your presentation.

Did your review of the cumulative effects assessment include or bring you to any review of the effects on watersheds.

MS. GUNN: Would you mind introducing yourself? I'm just curious --

MR. MILLS: I'm sorry, my name is Warren Mills and this is my associate, John Stockwell, and we are assisting Pine Creek First Nation in attempting to understand Bipole III.

One of our concerns is the watershed above the First Nation that we work for. And we were wondering if your review of the cumulative effects assessment brought to light any watershed information, or research, or opinion?

MR. NOBLE: Not that I can sort of recall offhand in terms of -- certainly when you are doing cumulative effects assessment the watershed is one scale at which these things can be examined. It wasn't, I suppose, a leading criterion in our review, so we didn't really have an eye to a particular watershed based approach to this assessment.

You know, of course, in conducting our review and some other literature, you know, we have of course come across other studies and other work that might be directly relevant to the issue or question that you are concerned about in terms of watershed based cumulative effects assessment.

MR. MILLS: Thank you. I'll try and keep this moving.

One of Manitoba Hydro hydrologists indicated, and I'm attempting to quote him, I'm transcribing from an iPad. He indicated to us that he believed that 15 to 30 percent of land

cover clearing is required to create a measurable difference in water flow on a watershed.

One of the Commissioners wisely looked at that and imagined a hill in which you would remove 15 to 30 percent of the growth and experience no increase in water flow. Would your experience or expertise or knowledge agree or disagree with Manitoba Hydro's position that as much as 30 percent of clearing needs to take place before an appreciable effect or a measurable effect on water flow in a watershed would be recorded?

THE CHAIRMAN: Mr. Mills, I think you're going quite broadly off track here. They had been asked to and have done an assessment of the cumulative effects assessment, chapter 9, and then the other chapters in the technical reports that fed into that. I think you are asking them for their opinion on broad environmental assessment, or broad potential impacts.

MR. MILLS: If it's --

THE CHAIRMAN: And it doesn't really relate to cumulative effects.

MR. NOBLE: May I pass along some information?

THE CHAIRMAN: Certainly.

MR. NOBLE: I don't know the answer to the question, but if it's something you are interested in pursuing, Kelly Munkittrick, New Brunswick and Cherie Westbrook at the University of Saskatchewan may be able to answer those questions.

MR. MILLS: Okay. Thank you very much.

MR. STOCKWELL: My name is John Stockwell and I'm with Pine Creek as well, and I too enjoyed your presentation this morning, and your answers this afternoon.

As far as cumulative effects are concerned, if you were to turn around and look at that map to your left, you would see Pine Creek situated on Lake Winnipegosis right by the Bipole. Can you locate it?

THE CHAIRMAN: Get to your point please, Mr. Stockwell.

MR. STOCKWELL: I'm just --

THE CHAIRMAN: We're talking about cumulative effects, so please.

MR. STOCKWELL: Yes.

MR. NOBLE: I see it.

MR. STOCKWELL: It's on Lake Winnipegosis and it's close to the Duck Mountain. Will you just look at that?

THE CHAIRMAN: Please, Mr. Stockwell, come to a question on cumulative effects?

MR. STOCKWELL: I was just going to say, if you were to look at that, would there be a good deal of cumulative effects that would strike you, looking at the number of rivers that are flowing through Pine Creek?

MR. NOBLE: I couldn't -- really couldn't say for sure without, you know, doing any, or reading any analysis on that, so sorry.

MR. STOCKWELL: Okay, very good. I have one other question and that is, if the cumulative effects, as far as socioeconomic effects are concerned, or the socioeconomic conditions, would things like the closure of a fishery in the lake that you are adjacent to, if you are fishing in that lake, would that be part of a cumulative effect on a community, as far as socioeconomic effects are? Is that something that you should look at if you are --

MS. GUNN: Possibly. I think, unfortunately, the answer is simply possibly, but

you'd have to make those kinds of determinations when you're actually scoping the CEA, and you would think about the reasons why or why not to do that. But certainly, it's possible.

MR. STOCKWELL: It should be part of the scoping process?

MS. GUNN: That's when you would decide on something like that.

MR. STOCKWELL: And the watershed should be part of the scoping process?

MS. GUNN: Possibly. What we argue on is that focus on ecological units, ecological functioning is important. So if you do choose the watershed as the ecological unit of choice -- and that has been done, there's research that sets that precedent. And that would be appropriate if that's how you would want to focus. There are other ways you could focus as well, still taking an ecological review.

MR. STOCKWELL: Okay. I think that's all I have. Thank you.

THE CHAIRMAN: Thank you.

Mr. Meronek?

MR. MERONEK: My name is Meronek and I'm here on behalf of Bipole III Coalition, which

is a coalition of various, hundreds of landowners in agricultural Manitoba. I can't lather as much over your report as others because you didn't say much about agriculture, so...

I want to cross some T's and dot some I's. By Manitoba Hydro's own admission, come 2025, Bipole III, in terms of reliability, will not be sufficient and another transmission line or lines, whether it's called Bipole IV, or a transmission line or lines by some other name will be required. By virtue of your recommendation, is that something that should have been in a cumulative effects assessment?

MR. NOBLE: Without knowing the details of that particular project or the ability of Bipole III to meet demand and reliability into the future, I guess I would answer in a generic way and come back to, you know, the Cumulative Effects Practitioners Guide in terms of reasonably foreseeable development projects. If it is a reasonably foreseeable development project and one that's undertaken by, or largely lead by the same proponent, then I would consider it to be certainly a candidate for including it in a cumulative effects assessment study, if it's a

similar type of feature, similar types of disturbances. But, again, I'm speculating on that in terms of I don't know the long-term reliability issues per se around the Bipole III.

MR. MERONEK: Thank you for that.

By virtue of Manitoba Hydro's definition of what is to be included into a cumulative effects assessment for future projects, and let me just read its definition as found in chapter 9, page 10.

"It's those projects or activities that are approved or in a planning/approval process preparatory to be constructed or carried out and that were initially considered in the assessment as potentially having effects that overlap with the effects of the project."

Are you familiar with that definition as having been included in the chapter 9?

MS. GUNN: We would have read it several times, yes.

MR. MERONEK: Would I be correct, after listening to your presentation, that that definition is focusing the lens too narrowly as

opposed to broadly?

MS. GUNN: Perhaps we will just locate it to be sure what you're talking about. This is page 9-10, did you say?

MR. MERONEK: Chapter 9, page 10.

MS. GUNN: I think our overall conclusion, whether we look at this particular passage or a number of areas in chapter 9, the overall conclusion was that the CEA was scoped too narrowly.

MR. MERONEK: Thank you. In terms of agriculture, you would be aware that at least half the line, or at least -- sorry, about 40 percent of the line passes through agricultural land, approximately 20 to 25 percent passes through intensely worked land. You would have read that?

MR. NOBLE: Yeah, I am familiar with that part of the project.

MR. MERONEK: If I told you that no agricultural technical report or any other report has been before this Commission making a cumulative effects assessment on that VEC, would you consider that a flaw in the cumulative effects assessments?

MR. NOBLE: I don't want to say

outright yes or no on that without, I suppose, first understanding a little more about context of the project in the agricultural area. There were some documentation in terms of attached technical reports in the EIS that refer to agriculture, agricultural land use. Not because we have a, you know, we don't like agriculture practice or anything, but we didn't include -- it wasn't in the scope of our review of the technical report. So we couldn't, you know, we couldn't really comfortably say anything about the potential impacts on agriculture.

The point that we raised earlier this morning, I believe, was with reference to the wetlands and in the agricultural zone and so on as being an example of potential impacts within that southern portion of the project, and particularly for the new international transmission line project. So, you know, if it's identified as a VEC of concern through the scoping process, then if it isn't given consideration, cumulative effects, then it would potentially be a shortcoming of the analysis. But, again, I would need to really defer back to the scoping document to be able to answer that with confidence.

MR. MERONEK: Thank you. Lastly, on page 17 of your presentation you reference as a pathway, psychosocial. Can you explain what that is? It sounds like a party I used to go to when I was in university.

MS. GUNN: Yeah, it sounds pretty crazy. Yeah, I can elaborate a little bit. And where I thought there was a great elaboration of that in some of the supplemental documents that we were given -- let me just find it -- it was a submission by the Fox Lake Cree Nation. I thought they explained it really well what that meant.

Okay. Thanks for your patience.

There was a list of different psychosocial effects. And one of them that really struck me, this I hadn't actually seen before, a term called solastalgia. Solastalgia is a term coined by Albrecht, 2003, describing a form of psychic or existential distress caused by environmental damage such as that which occurs through mining, as opposed to nostalgia, which is the melancholia or home sickness experienced by individuals when separated from home. Solastalgia is the distress produced by environmental change impacting on people while they are directly

connected still to their home environment. So i.e., it is the feeling of home sickness that occurs when you are already at home. So to me that was one really great example of what that would mean. There were more, there were quite a few more.

MR. MERONEK: Thank you. Thank you, Mr. Chairman.

THE CHAIRMAN: Thank you, Mr. Meronek.

I think we'll take a short break now and come back at quarter after. Give our witnesses a chance to rest their vocal cords for a few moments.

(Proceedings recessed at 3:03 p.m. and reconvened at 3:15 p.m.)

THE CHAIRMAN: Mr. Beddome?

MR. BEDDOME: I want to thank you both, I very much did appreciate your report. I wasn't able to catch your presentation. I had to get my teeth drilled this morning. I'd much rather have seen your presentation to be quite honest.

I only have a couple quick questions. And I know you guys have already commented that you weren't here for some other parts of the

hearings, but when Manitoba Hydro brought forward Mr. Osler, who testified on cumulative effects, he made a comment that they were looking at likely effects, not catastrophic effects. The point being that a total breakdown or a leak or something that was considered catastrophic, the objective was to prevent them completely. And so instead, their cumulative effects focused on likely effects. Do you think that that is consistent with best practices for cumulative effects assessment?

MR. NOBLE: That's a really good question. Part of sort of the objective in cumulative effects assessment, particularly when we're looking in future outcomes and future conditions or scenarios, is to consider those best and worst cases. And I wasn't obviously here for Mr. Osler's presentation. However, under federal guidance and federal practice -- I'm trying to remember the exact name of this -- what's the guidance on cumulative effects assessment federally?

MR. BEDDOME: If I can interject, I think it's the same guidelines that are referred to the EIS in the scoping document; is that not

correct?

MR. NOBLE: Yeah, it's an operational policy statement for cumulative effects assessment at the federal level specifically requires catastrophic events to be considered, like major spills or risks, in good practice cumulative effects.

MR. BEDDOME: So, in your opinion then obviously those should have been included in the cumulative effects in terms of a scenario modeling situation?

MR. NOBLE: It's an important part of the consideration of cumulative effects. It's an important part to consider in cumulative effects.

MR. BEDDOME: Just one last question. If you're not able to answer it, that's fine. Just one thing from the beginning that I found difficult is that the tower placements aren't going to be located until afterwards. And to me it seems hard to assess the project when you don't know the precise locations of the towers. I guess when I asked that in cross, I was told, well, that's not, you know, that's not best practices or standard practices for building a transmission line. I was just wondering if either of you have

any comments or knowledge on that?

MS. GUNN: Tower placement, I'd have to think about. Tower type will definitely make a difference to vegetation management. If you have a tower that's guyed, in other words it's sort of held in place by wires, the footprint for vegetation removal, the total removal of vegetation is going to be a lot higher than if you have a free-standing tower, for example. So that would make a difference.

Tower placement to cumulative effects, I don't know that I can comment specifically. I do know that, for example, the spacing between towers can lead to more or less sag in the wires. If you have a lot of sag, you're going to have to keep the vegetation lower. That can affect -- if that's done a lot, if that happens a lot over space, you're going to lose more vegetation that way. If the sag is minimized as much as possible, you might be able to have more vegetation that's beneficial to wildlife, et cetera. So there definitely are some considerations around that.

MR. BEDDOME: Thank you. And I was just going to echo Mr. Bedford's comments that your report was very well written and very easy to

understand. So because of that, I don't think I have anymore questions because it's so well explained. Thank you very much.

THE CHAIRMAN: Thank you, Mr. Beddome.

I think that covers the participants. I think some of the panel members have some questions.

This whole concept of cumulative effects assessment is something that the Commission and various panels that I have been part of have wrestled with for a number of years, both how it should be done, but more particular to us, you know, how we should assess an assessment or how we should review a cumulative effects assessment.

I found your paper and your presentation certainly helped me a lot in understanding the concept. Unfortunately, I'm not sure it helped me much in making decisions, or the inevitable decisions that we're going to have to make in a few weeks or a few months time in respect of all of the issues before us, because cumulative effects in itself is very complex, this project is even more complex.

I have a few specific questions and

they probably bounce around a little bit. But I'd like to talk about the CEA or the Hegmann guidelines. We have heard from Manitoba Hydro's consultant in the Wuskwatim hearings, in these hearings. It was noted in the scoping document that Manitoba Hydro and their practitioner would be following the CEA guidelines. But I think I heard something quite different from you today, that the CEA guidelines, I think, probably widened the lens or --

MR. NOBLE: In reviewing the EIS, we also went back to Hegmann's CEA guidelines and applied, you know, the rules or the criteria from those guidelines in our review against this assessment. We're not saying it widened, the CEA guidelines widened the lens, our concern was that the cumulative effects assessment for the project did meet those guidelines and criteria identified by Hegmann.

THE CHAIRMAN: Did or did not?

MR. NOBLE: Did not, in all cases.

THE CHAIRMAN: Yes. Just sort of one case, and this is something that particularly in respect of this cumulative effects assessment I have been wondering about, and that's the trigger

which seems to be very narrow, or at least very narrowly applied in this CEA. That if there is no residual adverse effect, then nothing was done. You know, there was no cumulative effects assessment done. Is that typical? Is that common? Or do you know of other cases where that's the practice?

MS. GUNN: It is unfortunately common, and it is widely acknowledged that that is a limitation of EA practice generally in Canada, and I would probably argue around the world. I think, I just had a student, a masters student investigate, I think it was 10 or 11 different highway corridor developments, so comprehensive studies in Canada of highway developments. So linear developments like -- not unlike a transmission line. And all of those I believe relied upon residual effects analysis, you know, to do the scoping. So it's a common component, it's a common approach, but it's an incomplete approach is what we're arguing.

THE CHAIRMAN: There could be a very minor effect of this project, that in combination with a number of others, perhaps a thousand cuts or the straws on the camel's back might be a

little simplistic, but one very minor impact caused by this project added to a thousand others could become very significant. But if you use that trigger, then it seems to --

MS. GUNN: Correct.

THE CHAIRMAN: It seems to go against what I would think would be the basis of cumulative effects.

MS. GUNN: That's correct. And it's an area of practice that needs to be addressed and it needs to be improved.

THE CHAIRMAN: The baseline question. And I think it was you, Dr. Noble, talked about shifting baseline. And Manitoba Hydro's consultant uses the term evolving baseline. Is that a common practice?

MR. NOBLE: Yes, it is very common and it's one of the most significant flaws in cumulative effects assessment. We refer to some previous reviews by Baxter and others on cumulative effects in Canada. They examine a number of development projects, and they too identified this challenge of, you know, rolling up past cumulative effects into the new normal or the current condition.

THE CHAIRMAN: Now, Mr. Bedford spoke earlier about his understanding of good language. Isn't an evolving baseline an oxymoron?

MR. NOBLE: I'd really have to think about it. I mean, I have to think about it. When people do impact assessment and cumulative effects, and I think it's really important to understand, you know, when we talk about a baseline, then oftentimes it is interpreted as right now, the conditions right now. And in a sense that's accurate, it's a baseline against which you assess the effects of a project. But when we're doing a cumulative effects analysis, the objective is to identify, you know, the change over time. That's sort of the baseline. It has a temporal nature to it. So, you know, this idea of an evolving baseline, I don't want to put words in anyone's mouth in terms of how they may or may not be interpreting that, but it seems that it might be getting at this idea of, you know, today's conditions are simply a product of past changes and therefore we assess against today's conditions. So tomorrow's conditions are a product of the next, you know, few years of impacts, so we assess against those conditions.

You know, the point is that we're not assessing the true cumulative impact in taking that approach.

THE CHAIRMAN: Mr. Bedford also, between the two of you, you got into a little bit of a discussion about how long it would take to go away and do a cumulative effects assessment following the guidelines that you have set out in your paper. And it was somewhere between one month and a year. Is there enough data available, from your review of most of the documents that I think you looked at, is there enough data available to begin doing that analysis right away, or very quickly?

MR. NOBLE: I can't speak across all the VECs because we didn't review all of the technical reports. But for those that we did view, there's a starting point. And I think that the timing on this, you know, with the discussion back and forth that is a month to a year, it's definitely more than a month. I guess if there's a good consultant, they could do it in a year, I don't know. But I think the point is, you know, it may not be necessary to assess every VEC that was identified here. Maybe there is some key

driver, some primary ones, where you could look at -- and I'll go back again to the caribou and habitat as the example where you may be able to take habitat linear feature density, habitat patch edge ratios, and use that as a proxy for understanding really the potential effects on a variety of other components. So, you know caribou, moose, you know, other small mammals, birds, river and stream habitat quality. So it doesn't necessarily need to be as micro level as I think sometimes we believe. And given that this project covers such a vast area, there is a real opportunity to use those large scale landscape measures and metrics to do this. Even if it's only in a very cursory way, it's going to give us huge understanding and insight into the potential cumulative effects of this project, but also a good model and baseline for moving forward for other projects.

THE CHAIRMAN: So if there is a reasonable amount of data to do that with some key VECs, and we had a really good consultant, how quickly might it be done?

MR. NOBLE: That's tough to say. How much would you pay? I'm not sure I could answer

that question offhand. You know, a guy like I have referred to before behind the ALCES model, like Brad Stelfox and Terry Antoniuk are folks that would be able provide an answer and say, if you want this level of analysis done, these are the types of data that are available, this is the type of disturbance. They could plan out pretty darn close how much time and money that would take because they have done so many of these.

THE CHAIRMAN: So if this evolving baseline and this residual effect trigger is fairly common practice, is this CEA still fatally flawed?

MS. GUNN: Yeah, because common practice does not mean good practice. And it's very well-documented over the history of environmental assessment in Canada, and other countries around the world, the flaws with CEA. And those are two, those are two common flaws, it's been documented over and over and over. But there is guidance, there are ways to address those flaws and to do it differently.

THE CHAIRMAN: Thank you. Pat?

MS. MacKAY: Thank you. Dr. Gunn, I had been given permission by the Chair to change

the subject a little bit. I notice in your bio here that you have done things like innovative site specific vegetation management and impact of vegetation management strategies on wildlife species. And this has been an issue for us in a number of ways during this process. Obviously, there's a concern around caribou and the impact of vegetation management through that part of the province. But we also have some groups, particularly some Aboriginal groups, who are very concerned about use of herbicides in the areas where the line goes through and impacts them. I'm wondering if you do have anything you can offer us on strategies for vegetation management in relation to this line that might be useful?

MS. GUNN: That avoid the herbicides? Is that what you are --

MS. MacKAY: That would be one. Also ways to manage vegetation so that the line of sight for predators is less, for use by snowmobilers in the winter is less, and so on, those kinds of issues.

MS. GUNN: I'll just maybe summarize a few of the things that I saw BC Hydro doing. And I just want to clarify that my job, when I was

consulting to BC Hydro, in the initial stages anyway, my job was to actually track a certain Hydro employee who had been undertaking these innovative practices for over a decade on the sly, if you want to say, because he knew the land, he understood animals, he really cared about the land and he knew that in his job he could do better than what the standard vegetation maintenance policies were, which had to do a lot with just non-selective mowing or non-selective shearing. So for a decade, he did better than that for the wildlife and all these other values, and he did it cheaper. So I was brought on to document that work so that it could be shown to head office in Burnaby, you know, to make a case to do vegetation maintenance in that way. So that work lead to then a whole bunch of other studies later on.

So I'll just sort of summarize a couple of the things that I saw him doing. You had asked about avoiding the use of herbicides. I'm sure, as everybody knows, there are much better herbicides out there now that are quite selective and that can be applied only to target trees by somebody walking around with a backpack and a spray gun, so you can really target the use

of herbicides now. So that I will say. But if you want to avoid them altogether, of course, you have your biological control options. So you might cut a stump, you might treat that with some sort of a fungicide. The fellow that I was working with, he used allelopathy a lot. So he knew that if he encouraged the growth of one type of grass, it would suppress the growth of another type of grass, or tree or whatnot, so he would do those kinds of things.

Other ways to avoid herbicides would be to top certain trees. So you sort of cut them off about halfway up, and then that confuses the tree and it takes them a long time to figure out how to grow a new leader. So you buy yourself quite a few years and you haven't used any herbicide, you haven't mowed. So those are just a few in that regard.

And then you're asking about lines of sight to prevent hunting on excessive sort of access to the right-of-way in areas where you're concerned about certain ungulates. Again, there are many ways to do that. And that's one thing that's really critically important. When you are designing a vegetation maintenance prescription

for a particular site, first of all it needs to be site specific, meaning that you would need to understand what types of wildlife are in that immediate local area and that would likely use that space. And so if you understand the use, you are able to tailor the prescription better to that particular species.

So with caribou on the lines that I saw, again, the fellow I mentioned, he was extremely sensitive toward the fact that those caribou would be exposed when they came over the hill and across that plain, they would be exposed. And so he did everything that he could to leave as much cover in place as possible. And if that meant that he had to go back and treat that area a little more often because he was leaving those trees taller, and they were getting to the point where, you know, they wouldn't be in a range of contacting the line, if he had to go back more often, he would do that, and he visited the site more often.

So I won't continue any further. I probably said lots, but I hope that helps you.

MS. MacKAY: It does. Thank you.

MR. MOTHERAL: Thank you for the

presentation. And seeing that the Chairman has given Pat, my fellow Commissioner here, Ms. MacKay, some latitude, maybe he will with me too. I haven't asked what I am going to talk about. But with the farming background I have, and I know the cumulative effects on agriculture are very significant in the fact with the poles going into areas where there wasn't poles and spraying difficulties, et cetera. When you have a baseline of no poles and then you have poles, and then you have in two or three instances where there is an angle going across that too, so the cumulative effects do build up in agriculture. And I'm just hoping that somewhere along the line we can have a cumulative assessment on agriculture. That's all my comment.

I remember that when I heard Mr. Meronek say that there was nothing in agriculture in your presentation.

THE CHAIRMAN: Thank you.

MR. GIBBONS: Yes. Thank you for that presentation, for both presentations actually. And I do have a couple of questions for each of the presentations. One, though, results more from the question and answer than it does from the

presentation itself.

I was interested to hear the comment about some of the mitigation methods that might be employed. And there was a reference to the use of placing towers closer together to reduce sag. And it struck me that in certain contexts that might be a useful way to go, particularly if you're using self-supporting towers. If you're using guyed towers, maybe less so, because you then increase the number of towers and you increase the footprint. But at least as far as the self-supporting towers are concerned, and maybe even in the case of guyed towers, is there a trade-off there that is a net benefit to the environment, from your perspective? That even though there may be more towers and, therefore, more either smaller or larger footprints, that the improvement in sag allows for more regrowth to a point that it makes for a better overall environmental solution?

MS. GUNN: Yeah, there would be trade-offs, and you would have to evaluate that on a very site specific basis to decide which do you think is going to give you the bigger net positive gain. Does that answer your question?

MR. GIBBONS: It does. And I know I'm leaving aside the question of cost. There is, of course, a cost for more towers and so, and I'm aware of that. But it may well be a useful way to go in order to maintain as much of the original environment as possible.

The other question, some of my questions have already been asked by a variety of people. Apparently they weren't as unique as I thought. In regards to slide number 63, and this really, I think in some ways it's related to the question that the Chairman asked a few moments ago, but it comes at it in a slightly different way. And that is, in your review of the EIS and the CEA aspects of the EIS, when Hydro is referring to no residual adverse effects, for example, in the one example that was on that slide but also elsewhere, is it your sense that what they mean is none at all or no significant effects? And if it's the latter, significant in what sense? When you read the report, how did you grapple with that question? Or maybe you didn't, maybe it is just me, I don't know?

MS. GUNN: We had a little trouble to be honest, I don't know if we really brought it

out in the report, but we had a little trouble figuring out what was meant. Because if you look at the different assessments, there were four categories of adverse effects. And we had trouble knowing the difference between those because the definition wasn't clearly provided. They could have found that there were no adverse cumulative effects. They could have found that negligible cumulative effects were there beyond the assessment discussed in chapter eight. And then there could have been potentially non-negligible cumulative effects. So we did have some discussion around that trying to figure out what would be the difference between some of those, and we looked for some explanation of that but we didn't find it.

MR. GIBBONS: And with that notion, conceivably, it comes back to the point about triggers. If there is no effect at all, then presumably it would not be a trigger. But if there is no significant effect, a small effect, though not significant, depending on how one defines that particular term, could in fact be a trigger because it could add to the total effect that you're talking about?

MS. GUNN: Absolutely, correct.

MR. GIBBONS: So the lack of clarity then becomes an issue from that perspective?

MS. GUNN: Correct, I would agree with that.

MR. GIBBONS: Well, thank you for that.

I have a question or two for Mr. Skinner as well. And again in part, it's just clarifying some of these things for myself and my understanding of where this is going. And one of them again ties to this question of significance.

On slide 3 in the next to last bullet it makes reference to the idea of developing additional mitigation for significant impacts. And here again, it seems to me that we're back to the triggers question again and whether we are talking about those things, again, from a slightly different perspective. The significant impacts in this case that you're referring to, are they significant in the context of this particular project, or conceivably significant in terms of what they might add to the cumulative assessment? Did you have any thoughts about that?

MR. SKINNER: Sorry, you're talking

about the slide that has EIS process at the top?

MR. GIBBONS: That's correct, it's number 3 according to the numbering on my page.

MR. SKINNER: Okay. The purpose of that slide was sort of to lay out how a typical impact assessment is done I guess. The point at the bottom about develop additional mitigation for significant impacts, that's a step that usually occurs. As I said in my presentation, they will develop some mitigation measures, and then they will say, well there's residual effects, which are what's left over. And then they will apply their criteria to the mitigated project. And then they will take those leftover impacts, the residual impacts, and they will apply those criteria that I was talking about, probably more than I should have, they will apply those criteria to the residual impacts, and they will come up with -- they will then classify that impact as significant or not significant or moderately significant, or something like that.

So the point here was that usually, and not in all, you know, sometimes they will mitigate stuff that's not significant, but it's kind of common practice, if it's not significant

not to consider it any further. So they will develop then additional mitigation only for impacts that are considered significant.

MR. GIBBONS: But, again, significant in the context of that particular project rather than a cumulative element?

MR. SKINNER: Yes, exactly. It will be the way that specific project identifies that impact as significant.

MR. GIBBONS: So, in your view, that's common practice then --

MR. SKINNER: Yes.

MR. GIBBONS: -- to be project-specific in that way?

MR. SKINNER: Yes. In the case of Bipole III, I mean, caribou again were an exception, because they said there was no significant impact for caribou but they are still carrying on ongoing monitoring for them. So it's not a 100 percent rule, it's just something that commonly happens.

MR. GIBBONS: Okay. And last question. We have run into this term "no net habitat loss" before. And I do find it an interesting concept. And I believe I have at

least a layman's grasp of what that means. But what I don't know is whether or not the use of that practice is common in environmental policy elsewhere? Can you speak briefly to that? Is this something where we could draw examples from existing practice?

MR. SKINNER: I'm not a regulator, so I really can't comment on how widely it's used or how often it's applied. It's a concept that has been applied. And the concept is basically if you have, say you give a score for moose habitat and you say well you're going to lose 30 hectares in moose habitat with a score of .8, then what you want to do is you want to find some other area where you can either conserve that habitat, enhance habitat to that same overall value or something of that nature. But how widely it's used, I'm afraid I really can't say.

MR. GIBBONS: But it is used, though?

MR. SKINNER: It is used.

MR. GIBBONS: In other words, it wouldn't be novel necessarily?

MR. SKINNER: No, it wouldn't be novel. One of the things Syncrude does as part of their reclamation is they bring in, they actually

import bison and they have sort of like a bison compound there. And I'm not sure that that would really be -- in my mind, that probably isn't suitable, but it is a way that they have been dealing with it.

MR. GIBBONS: Thank you.

MR. KAPLAN: A number of folks have made reference to some comments or questions asked by Mr. Bedford in the last few hours. I'm also going to refer to Mr. Bedford because he has related comments having to do with his family. In fact, today referring to his wife briefly and to speaking to his two pussy cats. But yesterday, as I recall, he referred to his late father in giving congratulations to the President of the MMF for obtaining his honourary law degree. Having said all that, I refer as well to my late dad who used to say, it costs nothing to be nice. And because of that, I have to comment that as far as the presentation, you have heard this once or twice already, but as far as the presentation of Drs. Gunn and Noble, and I'll go so far as to say Mr. Skinner as well, that I found all the presentations very informative and quite helpful.

I have one question and I'm going to

ask that of Dr. Noble, and this is an open question to make you look very good to end the questioning by the panel. Just for a point of clarification, if I could, some five hours and 10 minutes ago, you may recall you said at about 10:20 this morning that the cumulative effects are easier to assess when the project is over a vast area like Bipole III versus, I think you used a mine site as a contrary position. Just for my benefit, and anybody else who might have asked this question before, which I don't think they have, can you explain that in simpler terms in a general way to me?

MR. NOBLE: I thought you said it was going to make me look good in concluding?

MR. KAPLAN: Hopefully it will.

MR. NOBLE: I said that because of the types of tools that we have available for these large development projects. And I'll try and remember what I was referring to this morning when it was getting at that point. When we're looking at large projects on a landscape, and we can look at the line on a landscape, the transmission line, or we can look at seismic lines or roads, those types of linear features, those are easy to

evaluate because we can visualize them and we can identify a relationship between how much of them exist in terms of, you know, the kilometres of disturbance, the density of disturbance, and how species respond, and how environmental variables respond. So we can even relate these types of linear disturbances to water quality, through water quality indices that have been developed.

And to come back to a previous question that was asked, it's in these large disturbances on a landscape where we have a greater opportunity to consider these things such as no net loss. And we can look at how an impact across a landscape, be it a transmission line, a series of road networks, will have an impact on let's say wetland or aquatic habitat as an example, where we have federal policies that insist no net loss is the goal, and several provinces as well have had no net loss policies for those types of habitat.

So in terms of cumulative effects assessment approach, they are the easier ones to model and evaluate, because the focus is at a much courser level than let's say looking at a particular mine site.

I'm working on a project right now with Teck Coal in BC for the Elk Valley cumulative effects assessment program that we're just getting off the ground. It's a much more challenging task because they are looking at very particular contaminants from a mine site, and how those contaminants may interact with the effects of other mine projects or sediment models. That's very, that's a very complex science, much more complex than looking at the footprint on a landscape. And so that's why I said that these are relatively low hanging fruit for cumulative effects assessment.

MR. KAPLAN: Thank you.

THE CHAIRMAN: Mr. Kaplan was wrong, it wasn't the last question from the panel.

I just noticed I had one more on my list that I forgot. This is to either Drs. Gunn or Noble. In your view, in an environmental assessment, how important is a cumulative effects assessment?

MS. GUNN: The importance of it perhaps couldn't be understated. There just simply is no way to truly understand the significance of any project if you don't look at

it within the context of the other developmental pressures in that area.

I think, unfortunately, over time people have understood that, you know, that does place a challenge upon proponents who, you know, quite rightly are concerned about, you know, just their project and just the immediate footprint. You know, that view has been acknowledged and, you know, what we have sort of opened our presentations with and, you know, we still stand behind, is that it is critically important but that doesn't mean that in each and every case it will be done to its full ideal. Most of the time it can't be done to its full ideal. But what we have tried to do is to set a reasonable standard, a reasonable minimal standard of practice that could be achievable by this proponent and others in this kind of a case.

THE CHAIRMAN: If a cumulative effects assessment is badly or even fatally flawed, does that make the whole environmental assessment badly or fatally flawed?

MS. GUNN: No, because they are really two different things. A project impact assessment is to assess direct affects, and you can do that

well and you should do that well. A cumulative effects assessment is not focused on the direct immediate project effects, it is focused on a different class of effects known as cumulative effects. So you could do it very well, you could do a direct impact assessment very well and still miss the CEA.

THE CHAIRMAN: And I believe earlier in response to Mr. Bedford, you, Dr. Noble, wouldn't answer whether the whole environmental assessment was good, bad or ugly?

MR. NOBLE: That's correct.

THE CHAIRMAN: Thank you.

Mr. Skinner, I have one question for you. In your assessment, you looked at the wildlife assessment in the EIS, and you noted some positives and then a number of concerns. You didn't go anywhere near as far as your colleagues to your left in saying no licence. But how good or bad, in your view, is the wildlife environmental assessment? Is it adequate? Is it not bad?

MR. SKINNER: I would classify it as fair. I think that they started off and they did a lot of work, and I think based on the work they did, there's still a potential to create a good

environmental impact assessment. I think the things that are missing, and these are the large things, I didn't go into a lot of detail, but I think the large things that an impact of that type really needs is it needs some realistic impact criteria, which I talked at length about. But I think the other thing it needs is it needs numbers and densities and scores. And what I'd like to know when I read something like that, because it's tedious enough at the best of times, but what I want to know when I read one of those things is, how did you get there? And when I read that, I didn't see that. When you read that assessment, it's basically, this impact is long-term, it's in the project footprint, it's medium duration, there is no significant impact, and just believe us. At least that's the way I read it. So I'd like to see more stuff where I can understand what they're actually talking about.

THE CHAIRMAN: Thank you.

Mr. Williams, do you have more of these witnesses?

MR. WILLIAMS: I would have three questions of redirect flowing from the panel's questions, Mr. Chair.

Mr. Gibbons posed of Mr. Skinner a question about insight into no net habitat loss and whether that concept is being practised by other regulators. And the question was restricted to Mr. Skinner. But with the panel's permission, Dr. Gunn or Dr. Noble, I don't know if you are aware of any one, perhaps one I might suggest to you is the Fisheries policy at the Federal level, but I'm not sure if you are aware of anything more but I just thought if you have any more advice to provide the panel there?

MR. NOBLE: Other than fish and fish habitat, as I said, would be the National Wetlands Policy Guidance. Nova Scotia I believe has their own provincial, Alberta as well has sort of no net habitat loss on wetlands. In terms of, you know, forest habitat, I can't recall offhand if there is, you know, anything along that line, other than what might be in the Canadian Council of Forest Minister's Guidance on Forest Habitat, but can't say for certain.

MR. SKINNER: Could I interject here for just a second? The Alberta Guideline for Wetlands, they have a set of criteria that's based on basically whether you're re-creating wetland,

enhancing wetland, or how you plan to mitigate -- you are say destroying wetland, so how are you going to mitigate it? And the other factor in there is how far away it is from the original wetland. So if you're going to create an entirely new wetland or do wetland compensation, and I'm just going off the top of my head and I'm probably wrong, but I think it begins -- you have to compensate by developing wetland the size of the original wetland, and I think it goes up to eight times the farther you get away, but I don't know the distance intervals.

MR. WILLIAMS: Thank you. Anything more, Dr. Noble? I see you leaning towards the mic.

MR. NOBLE: Can I be an out of control witness and respond to an earlier question that was asked, just to clarify something?

MR. WILLIAMS: Certainly, with the Chair's permission.

THE CHAIRMAN: Go ahead.

MR. NOBLE: It was a question by the Chair.

THE CHAIRMAN: Then you'd better answer it.

MR. NOBLE: I just want to make sure I didn't misrepresent my response earlier when it was asked of me by Mr. Bedford about whether I thought the environmental impact statement was good, or good, bad or ugly, and I said I wouldn't comment. But the context of that question was cumulative effects assessment aside, and just looking at the EIS itself. And I think my response was that we didn't review the EIS in that thing to be able to comment. But if we include the cumulative effects assessment as part of the Environmental Impact Statement, it would not be in the good category.

THE CHAIRMAN: Okay. Thank you for that.

MR. WILLIAMS: Just following up a question of the Chair to you, Mr. Skinner. In terms of your characterization of the wildlife assessment performed by Manitoba Hydro, given the shortfalls you have identified in terms of potentially inappropriate impact criteria for wildlife, can we safely conclude that there are no significant impact ratings for all wildlife species and groups?

MR. SKINNER: No, I don't think we

can. I can't look at that impact assessment based on the data that's in there and say that there are significant impacts either. But I would take the perhaps nebulous position that they conducted their assessment over 30 species or species groups, and they not only didn't find a significant impact, but they didn't even find a potentially significant impact. And I find this a little unlikely.

MR. WILLIAMS: And finally, just to follow up on a question from Ms. MacKay to you, Dr. Gunn. I'm not saying the panel has asked for this, but you had an extensive discussion with Ms. MacKay about vegetative management techniques and some of your research. And if asked, would you be prepared to assist the panel in terms of identifying literature that might assist them if they are looking for more information on this?

MS. GUNN: Of course.

MR. WILLIAMS: And I thank the witnesses and I thank the panel for their patience with this, and we're closing our redirect.

THE CHAIRMAN: Thank you very much, Mr. Williams.

I'd like to thank the three of you

very much for your presentations today, for I think in all three cases flying across the country, or at least parts of it to be here with us. As others have said, you have made a very good contribution to our deliberations, and your presentations will certainly be part of our deliberations when we get to that stage. So, again, thank you very much. You have had a long day up there, and you're excused. And now we turn over to others of Mr. Williams.

MR. WILLIAMS: Mr. Chair, if I might suggest that we stand down for about five minutes to allow Ms. Johnson to assist our witnesses. And also it's been a long day, our new witnesses probably need a bit of coffee. They have been sitting around for quite some time.

THE CHAIRMAN: Okay, five minutes.

(Proceedings recessed at 4:05 p.m. and reconvened at 4:10 p.m.)

THE CHAIRMAN: We're going to have a bit longer day than we anticipated. These two gentlemen are from out of town, so we would like to have their presentations as well as the cross-examination, and hopefully it won't take us till midnight.

Mr. Williams?

MR. WILLIAMS: Yes. Hello again, panel.

Before starting with these witnesses, I had forgotten to acknowledge that Ms. Desorcey has been here all day. And also waiting patiently, and I think they will be waiting patiently now until next Tuesday, Drs. Fitzpatrick and Diduck. They are very interested, but I do want to acknowledge their patience as well as in making themselves available and also agreeing to return on a different date.

Dr. Brown and Dr. Lee, I'm just going to ask you to introduce yourselves, not go into your qualifications yet. And Ms. Johnson will do what she needs to do. So just start by introducing yourself.

DR. BROWN: I'm Dr. Gordon Brown, environmental toxicologist.

DR. LEE: Murray Lee.

Dr. Gordon Brown: Sworn

Dr. Murray Lee: Sworn

MR. WILLIAMS: Just for the panel's awareness, Dr. Brown's PowerPoint was previously handed out last Thursday, so it would be at tab 3

of your binder. And Dr. Lee and Ms. Orenstein's reports are at, for habitat are at tab 4. Everything should be in your bound version.

Having said all that, Dr. Brown, I'm just going to ask you to turn to your biography, which for the panel is at tab 8 of your bound materials.

Dr. Brown, I wonder if you could outline key elements of your experience and training as they have informed your participation in this project.

DR. BROWN: Yes. My background is an undergraduate degree in zoology and ecology. I was fortunate enough, when I graduated, to get a job with a company in Alberta, out of Calgary, that was undertaking -- it was an environmental engineering firm way back in 1974 -- it was undertaking the first environmental impact assessment ever done in Alberta. That environmental impact assessment was done by myself and one of their engineers. It took three weeks and it was 26 pages long. That resulted in an approval by the Environmental Council of Alberta, but we all knew we had to do better than that.

Shortly thereafter, I went back for a

Masters degree in natural resources management. And my thesis for practicum, as they called it, was a case study of an environmental impact assessment of a natural gas plant in Alberta with pipelines and point sources. So I became somewhat of an educated EIA person. I went back with the same firm. I worked there for four or five years and was quite unhappy with the qualitative nature of the environmental impact assessment.

So once again, I went back to graduate school, and to UBC. And I got involved in the resource ecology program there, which was just starting into the area of what we called integrated impact assessment, which today is called health risk assessment, ecological risk assessment. It was quantitative analysis.

And as a result of my Ph.D., which studied the effects of ozone in the Lower Mainland on horticulture and forestry, we predicted impacts and monetary losses using a quantitative approach.

That set me up very well to get back into Alberta working for a company named Cantox, who was the first human health and ecological risk assessment company in Canada, out of Toronto. They hired me for their Calgary office based on my

experience. And since 1993, when I joined that company, my only consulting experience has been in the areas of health, human health and ecological risk assessment.

In terms of the number of projects, I actually counted, I've got a detailed CV as well. This isn't on the biography, but I was quite surprised yesterday when I took a look and it's close to 90 health risk assessments that I have been involved with since 1993.

MR. WILLIAMS: So that beats Mr. Skinner's total.

DR. BROWN: Yes, that beat Mr. Skinner, although he's about 40 years older than me. So I'm quick and efficient.

MR. WILLIAMS: Dr. Brown, I wonder if you could describe the mix of clients that you have performed work for over the course of those 90 some assessments?

DR. BROWN: By far, most of my consulting work has been for industrial clients. Probably 90, 95 percent of those projects has been for large industrial clients. I have also done some work for governments, for Alberta Environment, for Alberta Health and Wellness in

the areas of human health risk assessment, and for the Federal Government, Health Canada, in terms of risk assessment.

Our company again is sort of the first environmental consulting firm in Canada to do human health risk assessment, which really is still a relatively new science, has done a lot of presentations and workshops to regulators, to professional biologist societies, to the Environmental Service Association of Alberta, to companies like Imperial Oil. At the University of Calgary, we have had one and two day workshops dealing with risk assessment, risk communication risk management, and more recently with Dr. Lee, have added the component of health impact assessment to those presentations that we have made.

MR. WILLIAMS: Just one last point in terms of your biography, Dr. Brown. I just wonder if you can talk briefly about your work in terms of, directing your attention to the last paragraph of your biography, in terms of the environmental toxicologist in terms of the hazardous waste treatment centre, and your work in terms of consumption of wildlife as well as dealing with

the Slave Lake First Nation?

DR. BROWN: That was a very important project, in my mind, to highlight in my biography. Because at the time our company, Cantox, was working for the operator of the, it was called Chem-Security Bow Valley, the operator of Swan Hills Hazardous Waste Treatment Centre, Swan Hills, Alberta. And that treatment centre, hazardous waste was dealing with the disposal of things like PCBs, all kinds of hazardous waste, both organic and inorganic waste, based on a fully-integrated facility. Unfortunately, a few years after start-up, due to what I understand was a contractor's maintenance problem, the incorrect welding job was done, refractory or whatever they call it, on one of the pipes that lead to the secondary combustion unit. Apparently there's two combustion chambers. The first combustion chamber heats things up to the point where you get 90 percent removal, and the second one removes the other 9.99 percent, something like that.

In any event, there is PCB transformers being processed at the time.

I'm sorry, I don't mean to be so long-winded but this is a story that I think is

worth telling you folks. It really is an important outcome in terms of health risk assessment.

To make a long story short, there was a release of PCBs, dioxins and furans to the environment, quite a substantial release. And there just happened to be at the time some air quality monitoring done in the stack. So we had very good quantitative data about three weeks later about, you know, what had happened at that facility and what was in the environment. There was a lot of public concern by the staff themselves, the employees, by the, you know, the residents of Swan Hills, by the mayor of Swan Hills, but more importantly I believe by the local First Nation communities.

There was this fear, you know, this overwhelming fear that their food in the environment was badly contaminated with one of the most toxic chemicals in the world, which is dioxin.

So we started, back in 1998, to do human health risk assessment on fish and wildlife, basically using a modeling approach, and since about the year 2000, a monitoring approach. And

the modeling approach predicted that, yes, there would be an increased hazard to people eating fish and deer and moose within a few kilometres of the facility. But beyond about 10 kilometres, things were fine.

Alberta Health, in their wisdom, said, okay, let's put a 30 kilometre radius around the facility and say, basically don't eat the meat, don't eat the fish.

So, again, there is this stigma, and there is a very large impact on the Town of Swan Hills, and this fear by First Nation and other hunters.

Well, since about the year 2000, and again I'm sorry for being long-winded, we have worked very hard on bio-monitoring and risk communication with the stakeholders with the First Nation. And it's only in the last few years that I believe that we have the trust and the credibility of the First Nation that they now don't feel that they have to go to Grand Prairie to do their hunting for deer and moose. They seem quite confident that the area around Swan Hills is now safe for hunting and for food consumption.

THE CHAIRMAN: Can I just interrupt.

Dr. Brown, what year was that release of --

DR. BROWN: That release was in 1997.

THE CHAIRMAN: Thank you.

DR. BROWN: It's taken a long time.

MR. WILLIAMS: Dr. Brown, thank you. It's an important story and that's why I asked you it.

Dr. Lee, I'm going to ask you to turn to written evidence. And for the panel that's at tab 4. And I know, Dr. Lee, you were complaining last night I didn't give you tabs. I know you don't have tabs, I apologize, but if you can turn to your written evidence, page 1, and just briefly outline your qualifications as they relate to the report.

DR. LEE: I'm first and foremost a clinician and a practising physician. I've got an unusual specialty. My focus has always been in rural and remote practice throughout Western Canada and in the north. I've been practising for 15 years. Now I'm a regular visiting physician to a town called Repulse Bay in Nunavut. In that sort of practice over time I began to sort of, being in Western Canada, seeing the impact between resource extraction and particular resource

development, and particularly rural and Aboriginal populations. I began to get curious about the impacts of the built environment on health. I went back to do the masters of public health at the University of California at Berkley.

Since that time, although I maintain a clinical practice, I am now on faculty at the Department of Community Health Science at the University of Calgary and teach at the university.

But I think the main reason why I'm here, the main thing that informs my work here is about six years ago, I started with my partner a company called Habitat Health Impact Consulting, to look at the health impacts of any type of policy or program or project, and again particularly focused on resource-based projects.

We have done 12. Now I know that doesn't compare at all to Gord, but if you do the math and look at my age and look how long HIA has been around, I think we're on track to beat you, Gord. But the HIA is a relatively new firm. While we have been doing these health impact assessments, we have also been instrumental, I think, I hope, in developing the field of health impact assessment.

Both Marla are I are founding members of the Society of Practitioners for Health Impact Assessment, which is the only international organization of health impact assessment professionals. Currently I'm the vice chair of that organization. And we have been involved in practice standards. I'm the co-author on the North American Practice Standards for Health Impact Assessment, and we have been involved in teaching and disseminating techniques in health impact assessment. Particularly for WHO, we did a course in Brazil for the Department of Environment and Department of Health on how to incorporate health impact assessment. And there in particular, they are interested in hydroelectricity as one of the main places where they are looking at using health impact assessment.

We have also done similar projects for the International Association of Impact Assessment in terms of teaching and training in the national collaborating centres for healthy public policy and for environmental health.

MR. WILLIAMS: Thank you for that.

When you use the initials WHO, just

for the court reporter --

DR. LEE: That is the World Health Organization.

I should probably also speak to Marla Orenstein's qualifications. She is a co-author on the report and she is my partner at Habitat. Marla is an epidemiologist whose training is particularly focused on environmental and social precursors and determinants of chronic disease and cancer. She has been completely dedicated to the world of health impact assessment for the last six years, and is actually widely considered to be one of the foremost experts in it, and has been doing a lot of teaching, a lot of training, a fair bit of writing, a lot of technical assistance for new people to the field, and currently is writing a textbook which will be one of only three textbooks in the field.

Our company, Habitat, like I say we have done 12 so far. We have also been technical advisers to a number of others for the Robert Wood Johnson Foundation in the States. Our projects have included a lot of mines, a lot of oil and gas work. We have done some work in Northern Alaska, Northeastern British Columbia, some stuff in the

oil sands in Alberta, wind farms in Southern Alberta, a gold mine in Africa, and a uranium mine in New Mexico, amongst others.

Our clients are fairly diverse. A lot of our clients are actually multinational corporations such as Shell. We also do work for local governments and departments of health and social services. There is a lot of different types of people who request this kind of work.

MR. WILLIAMS: Thank you very much both Dr. Lee and Dr. Brown.

Dr. Brown, we are ready for your presentation. For the panel, that's at tab 3 of your bound version. And Dr. Brown, just please take us through it.

DR. BROWN: Okay.

MR. WILLIAMS: Dr. Brown, if I can just make sure, and as well Dr. Lee, we're getting tired at the end of the day so if you can just make sure you're speaking into the mics so that all can hear you.

DR. BROWN: Not too many more long stories, but I might have a couple.

I should have mentioned actually earlier that I did resign from Cantox Intrinsik 14

months ago and I've been doing private consulting on my own. I'm still an associate with the former company, but for the most part I'm on my own now, so I'm president.

So in terms of my role in this team here, I had a couple of issues, primary issues. I had issues in terms of the air quality and the health related issues were not adequately addressed, in my opinion, in the EIS of the Bipole III project. So I will be discussing those two items in that, the brief that I prepared, and it was submitted September 14th. I don't know if you need a number for that, Byron, or not, but there were a couple of other issues, one being community health assessment or health impact assessment. That was co-authored by Dr. Lee and Marla Orenstein. I'm not going to be discussing those, I'll leave that up to Dr. Lee to do that.

And also there was some preliminary cumulative assessment CEA stuff that was covered in that. That was before you hired the other experts, so I'm not going to address that either. It's been very well covered today. Just I will just be focusing on human health risk assessment and air quality issues.

In terms of where we're going here. When large resource development projects such as the Bipole III are announced, typically, in my opinion, having been through about 90 applications, there typically are legitimate public concerns, local stakeholders, about the impacts on their health and well-being. We see this all the time, especially in green field sites where there hasn't been prior development.

I think there's a problem with the presentation, I'm missing a couple of bullets there. I don't know what to do about that.

MR. WILLIAMS: We have a --

THE CHAIRMAN: Hit the down button.

DR. BROWN: That's not the way I set it up, but it works.

So, again, there's sort of a widespread belief in local residents that do not have familiarity with these types of developments, in particular people that live out in the country for a reason, they want to get away from development and that type of thing. There's a widespread belief that these projects can substantially degrade the environment, in particular water and country food quality.

So as a result, these large projects are assessed through the environmental impact assessment process, or in this case the environmental impact statement process. And human health risk assessments or HHRAs, are now required for many projects in Alberta. Many EIAs -- sorry, in Canada, including Alberta, British Columbia, the Northwest Territories and Ontario. There's a lot of risk assessment work being done for these types of projects, as well as for contaminated site projects, by the way.

So regulators are starting to require HHRAs. But in addition to that, human health risk assessments have been conducted by many of our clients on a voluntary basis. And the reason for that, I've got another slide that addresses that, the reason for that is so the proponents themselves have a good understanding of the risk of their projects in terms of due diligence, but also in terms of their desire to calm the fears of the community that's being impacted.

So I have a few examples of voluntary projects. I guess in terms of Manitoba Hydro, recent work has been done by myself for ENMAX, a big electrical generation company in Alberta in

two cases.

Now, HHRAs, human health risk assessments, are not required for EIA for power generation projects in Alberta, they are not required by the Alberta utility board for an application. But ENMAX decided that they would like to do a voluntary one, because these two power plants, one is Shepard, the other one is Bonnybrook, were being built within city limits. They are both natural gas-fired turbines. And there was a lot of public concern at the open houses about air quality and about human health, so I was contacted and asked to complete a human health risk assessment as part of the overall EIA process.

In terms of the Shepard project, which is a big, I think a thousand megawatt gas-fired project, it was surprising even to myself how little risk and impact was associated with that project. Natural gas-fired generators do not result in a lot of air contamination. They are very clean, natural gas is clean. So I was surprised. We had never seen, for a large industrial project, risk quotients as low as they were.

When I presented this data at open houses and at the public hearing at the Alberta Utility Commission, I think there was a lot of very positive feeling by residents and by the board and by Alberta Environment that this project will not have a significant impact. It was done voluntarily, but it really paid off in terms of the value of that assessment for the proponent and for the local community.

I've got other examples, maybe I can come back to them later if we have time, Byron.

So just continuing along. Overall community health is determined by many socioeconomic, genetic and lifestyle factors that are independent of what I'm talking about, environmental quality. What I'm talking about is, again, contamination, chemicals in the environment.

Dr. Lee will be talking about health impact assessment. He has recommended, as he said, by his company Habitat Health Consultants, to address the overall community health concerns not addressed by chemical health risk assessment.

So what is human health risk assessment? The scientific study focuses on

potential human health risks from exposure to chemicals. This diagram shows that when chemicals -- when people are exposed to chemicals, there is risk. The little segment in the middle could have the word risk in it. The risk can vary from very low to quite significant. It's really the risk assessment that does address how significant those risks may be.

So health risk is dependent on two things; number one, the toxicity of the chemicals that are being released, and secondly, the degree of exposure. You can have a very toxic chemical like dioxin, for example. If there is a no exposure to dioxin, there is no risk. You can have a relatively, I'll call it a non-toxic, let's use alcohol, beer, relatively non-toxic chemical, beer. A little bit might be a little bit good for you, but too much can be very bad for you, too too much can kill you, it's a poison. So the dose is the poison. It's very important to determine risk as a function of both exposure and toxicity of these chemicals. It is all about the dose response relationship.

This is the health risk assessment model or paradigm. I doubt if you people can all

see it very well, but this is a pretty standard approach. This is modified from the original 1983 National Academy of Sciences Red Book, they call it, when health risk assessment was first initiated in the United States. It involves four major steps, problem formulation, exposure assessment, toxicity assessment, risk characterization. And you can see through the side bars that throughout this process data, it is very important that we collect the right data to do the assessment. That can be either monitored data or it can be modelled data.

And of course, it's very important to communicate with the public to determine what their concerns are and to provide them with the information that they have concerns about. Basically, the problem formulation involves chemical screening. And the chemical screening is the first step where we determine the sources of chemicals to the environment, and what chemicals specifically would be coming from those sources.

We identify the human receptors that can be impacted by the project, and we identify the potential exposure pathways. I will have a little bit more to say about that as we go along

here.

The exposure assessment, just like it sounds, is to predict what the potential exposure might be of humans that either inhale or ingest or have dermal contact with the chemicals being released from the project.

In terms of exposure assessment, we look at different types of pathways. As I said, the inhalation is basically looking at things like SO2 and NOx, and particulate matter PM2.5 inhalable, where we look at the mass of pollutant per cubic metre of air that's inhaled.

On the other hand, when we're looking at ingestion of things like country foods, we look at a dose that is a mass of chemical per kilogram body weight of the individual per day. So we call it a tolerable daily intake. And that goes well beyond typical environmental impact assessment that just looks at air quality objectives.

The toxicity classification, the toxicity assessment, as I said, it's all about dose response analysis. It is determining the degree of exposure that will not result, the maximum degree of exposure will not result in adverse effects. A safety factor is built in and

I will say a little bit more about that later. What we come up with there to compare to the exposures is what we call an exposure limit or a tolerable daily intake.

Risks are estimated by comparing the predicted exposures with the exposure limits, and that's how we estimate risk. I've got another slide on that one coming up.

Why do a risk assessment? This is obvious. To determine whether existing or future environmental conditions could result in adverse human health risks. To determine whether specific mitigation measures are needed as well as follow-up monitoring to protect human health. I do have some examples of mitigation measures that I believe are relevant to this project. I will try to remember to mention those towards the end of the presentation. And to provide scientific information to the public regarding their concerns about potential health effects.

So, again, to calm the community. I think that that's probably one of the most satisfying aspects of my job, is going into a community and seeing a lot of very concerned people. These people ultimately, I think their

calms are allayed to a large extent. We have had everything from mothers with babies in their arms that are absolutely, you know, very, very, very concerned, crying at open houses, that type of thing. We spent time with them, we did some more work with them. By the time we went to the hearing, that woman who lived 80 kilometres away from the facility, by the way, was very, very confident that she was safe and her children were safe. This type of thing, I've got many many examples of that. Again, that's very, very satisfying about risk assessment and voluntary risk assessment that result in a lot of the same types of things.

Main features are very comprehensive, we consider all contaminants. In this particular project, there's not only things like air quality criteria, the air quality objectives of Environment Canada, but there's also a lot of things like VLCs, PAHs, and there is no air quality objectives for those, so how do you assess the risks?

Highly conservative, because we don't underestimate risks. Public consultation input is essential in the scoping. This is based on

current toxicology information. We are constantly looking at the literature to determine the toxicity science related to the chemicals of concern.

For example, just in the last couple of weeks, I noticed a paper in the chemistry literature showing that they have measured 57, I believe it was 57 volatile organic compounds being emitted from forest fires. This is the first time that type of data has been made available.

Sources of uncertainty are identified and addressed. And these projects are totally transparent, scientifically defensible, or quantitative. All the data is there for review. And not only what I've said about the ability to assess chemicals that don't have environmental quality objectives, but risk assessments, unlike environmental impact assessments, can assess potential health effects related to chemical mixtures. I said there was 57 VOCs in forest fires. Well, we can take a look at the combined effect of those 57 VOCs because they have similar toxicology associated with them.

Now, COPC is chemical of potential concern, assessed in many of the projects that we

have looked at. This isn't very different from the Bipole III. Criteria or contaminants include nitrogen dioxide, carbon monoxide, and particulate matter, particularly the PM2.5 inhalable particulate matter. I could add sulfur dioxide to this list for Bipole III, but I am not particularly concerned about sulfur dioxide because the source is low sulfur diesel fuel and I just don't believe it's going to be an issue.

MR. WILLIAMS: Dr. Brown, could I just stop you? This is labelled typical COPCs assessed in project, and then you said something about Bipole III. I didn't know if you said that these --

DR. BROWN: Bipole III, the sources would, yes, nitrogen dioxide will be emitted, CO will be emitted, PM2.5 will be emitted, VOCs, yes, from Bipole III are primarily related to the burning of slash and debris, forest debris. Polycyclic aromatic hydrocarbons, this was not mentioned in the EIS for Bipole III, but these are very significant result of diesel combustion. There's quite -- we all have seen diesels with the black smoke coming out. Well the black smoke is this stuff, polycyclic aromatic hydrocarbons.

Some of these chemicals are quite toxic, benzopyrene, carcinogenic. Some of the VOCs are carcinogenic, some of the PAHs are carcinogenic, heavy metals associated with the combustion of wood.

I also mentioned in my brief that dioxins can and have been shown, documented to be emitted by forest fire emissions, quite surprisingly high levels of dioxins. In nanograms per cubic metre, nanograms is a pretty small unit, it's parts per billion, but the toxicity of these chemicals is so high it's important that we compare the small amount being emitted to the toxicity of that chemical.

In terms of the human receptors, obviously there is some, probably some local communities. So there would be urban community residents, rural non-farming residents. So people that like living in the country but don't farm. They may work in the community.

I heard today that there's a lot of issues associated with agriculture, a lot of impact, 40 percent or something like that, the land is an agricultural land, so rural farming residents would be a local receptor to be

assessed. Potentially highly exposed groups such as First Nation peoples, a lot of country food, and Hutterite communities. These people would be more highly exposed as a result of their diet and the other receptors we're looking at.

And we do look at all age groups in risk assessment, we look at everything from your infants, adolescents, adult to the elderly. And in many cases, it turns out that the infants have a higher risk than the adults because the infants have a greater exposure per body weight size, so that results in a greater risk. So typically infants can be the most sensitive or the most susceptible, and we do include those in the assessment for that reason.

Now here's a generic diagram of potential exposure pathways. Our source of emissions has been acknowledged by Manitoba Hydro to be related primarily to construction. I will certainly acknowledge that. The operational chemical emissions are not nearly as significant in my mind as the construction emissions. Construction emissions are quite significant based on the overall area of land that will be impacted, in terms of clearing, dust generation, diesel

exhaust, burning of debris.

A risk assessment looks at two temporal exposure outcomes. One is short-term acute effects, which means the effects related to inhalation on a daily basis, or few day basis. And we look at chronic effects. Chronic effects, when we look at the exposure on average over months to years.

So it could very well be that the primary health risk associated with the project are going to be the acute effects, not the chronic effects. But that remains to be determined by the risk assessment.

Emissions from the projects, the ones I have mentioned in the previous slide, get into the air. They are deposited into the environment, deposited into soils. From soils, chemicals get into plant life, they get into environments in the soils. Game eats the plants, and -- sorry, this is kind of a confusing slide.

Ultimately what we're trying to do here is we are trying to show the various exposure pathways to humans from air emissions. So air, again, is deposited into the environment, into soil, into plants, into wildlife, into water and

into fish. Humans eat wild game and they eat fish and they drink water. So there is both direct exposure pathways of the chemicals I referred to, that is through air inhalation. And there's indirect exposure pathways, that would be ingestion of these country foods.

In addition, you'd be surprised to learn how much dirt kids eat. So ingestion of dirt by kids is important, and also kids playing in dirt is important. There's dermal contact. We look at all of those exposure pathways.

And I had an issue with the EIS, the Manitoba Hydro EIS, because they said that human health risk assessment is only justified under conditions of real risk of emissions or contaminants of exposure in direct pathways. Now that's stated as part of their EIS, and it's also in their follow-up IR responses.

Well, there is definitely real emissions here, and there's definitely direct and indirect exposure pathways.

So I believe, based on that, I believe that based on the quite significant emissions coming from construction, that risk assessment using this approach is justified.

Very quickly in terms of the exposure assessment, we look at the predicted maximum concentrations, short-term. These are the acute effects, one hour, eight hours, 24 hour, we will look at the maximum concentrations. These can be predicted by models or they can be -- well, actually these types of concentrations for background can be determined through air monitoring. There hasn't been a lot of air monitoring in Manitoba, as I said in my brief, so the baseline or the background conditions can be determined quite readily by air dispersion modeling experts. And then the predicted maximum concentrations can be added to the background concentrations to get your total cumulative concentration, which is important in the risk assessment.

Annual average contaminant concentrations again, the background can be monitored, if not, it can be modelled. But these contaminant concentrations are important for the long term of the chronic effects assessment, primarily related to food consumption.

We looked at four assessment cases, and this goes right through the baseline case

right up through the cumulative effects. So the baseline case, pretty obvious, existing environmental emissions based on monitored, or as I said, modelled results. The project alone case is very important because it shows you the incremental impact of the project on top of baseline. This is the way we do it in our risk assessments, and this is the way Alberta Environment and Environment Canada require it to be done.

This is what we call the application case that is basically a summary of the baseline environmental quality, in combination with the project alone. So the maximum impacts of the project are added to the baseline.

And then we have a final, the cumulative affects assessment case. This is the application case plus all other announced or projects, existing projects in the local or the regional study area.

Now, I've got some examples of how we deal with the risks, risk assessment for these cases coming up.

So that was the exposure assessment. The toxicity assessment, we use exposure limits

that have been developed and established by reputable scientific health agencies like Health Canada and the U.S. EPA. And these exposure limits do include safety factors to protect the general public and sensitive individuals.

So, for example, for exposure limits for country food ingestion, laboratory studies done with rodents or with monkeys or rabbits to come up with what's called a NOAEL, a no observed adverse effect level. And that means that with given doses, there would be adverse effects noted, but you go down to a dose that does not result in any adverse effects, that's the NOAEL. Safety factors are added to -- these NOAELs are divided by safety factors, I'll put it that way. So that when you extrapolate from mouse to man, shall we say, you ensure that you are not underestimating risk.

So typically there is three levels of extrapolation. One, the first level is for interspecies, mouse to man. The second would be for sensitive individuals, to make sure we are protecting sensitive individuals within the population. And the third just based on scientific uncertainty.

At the minimum, the exposure limit will be 100 times, because each of these safety factor extrapolations is 10 times. So you go 10 times for interspecies, 10 times for uncertainty, 10 times for sensitive individuals.

Typically 100 to 1,000 times below the no observed effect level is where our exposure limits exist. Lots of safety built into those limits.

THE CHAIRMAN: Go ahead, Dr. Brown.

DR. BROWN: I mentioned earlier that in risk assessment, we can assess the risks associated with chemical mixtures such as VOCs and PAHs and dioxins and that type of thing. So we look at chemicals that are structurally, chemically structurally similar, act toxicologically via similar mechanisms, or affect the same target tissue in the body. And in this way, as opposed to chemicals like SO -- well, that's not very good example. Chemicals like SO2 we look at individually in terms of its health effect, both acute and chronic effects. We look at NO2 individually. But both SO2 and NO2 have potential respiratory effects associated with them. So we will add together the risks of SO2

and NO2 and come up with a hazard quotient that represents potential risk to the respiratory system. I think you get the point there, I hope.

In terms of the risk assessment model, I indicated that we are comparing exposures to exposure limits. The exposures and the exposure limits are both in the same units. They are either micrograms per cubic metre or they are micrograms per kilogram body weight per day. Because both the numerator and the denominator have the same units, they cancel. And what we get is a hazard quotient that is unitless, it's a number of sum value, okay. When that value is less than one hazard quotient, this means that our exposures, predicted exposures are less than our exposure limits, and we say that no health risks are predicted. And when you are greater than one, it's possible that there may be health risks.

And the next slide I'm going to show is an example of these hazard quotients. Again, these are unitless numbers. In the top line there, the blue line, you saw one. So the hazard quotient one is the threshold potential health risks.

Don't be too concerned about the

chemicals here, with the exception of CO, all of these chemicals are VOCs. So they could be emitted from this project. This is just an example, and it's an alphabetical example. You could see for each of the chemicals here that we have lines, colours associated with the baseline case, the project alone case, the application case and the CEA case.

If we take a look at the first one, the acetaldehyde, for example, we see the hazard quotient for the baseline case is something less than .01. You might take a look quickly at the acetaldehyde and say, well, it doesn't look like you have added the project alone case to the baseline case, but in fact we have. And the reason that you're probably not taking this -- you're probably thinking this doesn't look right because you have a logarithmic scale here. Okay, because this is a logarithmic scale, what we have got for acetaldehyde for the project alone is a hazard quotient of close to .00001, which is one in 10,000. We're adding that to the baseline case which has got a much higher hazard quotient, but it's still well below one. And therefore, the application case looks to be in the same order of

magnitude, and it is, to the baseline case.

Then we look at other projects in the region, the cumulative effects case. And again, the contribution of other projects are not much different than for our application case.

Now this is typical of the types of results that we see for these risk assessments. In some cases we see -- well, we see formaldehyde here, for example, we're getting pretty close to a risk quotient of one. The risk alone from the project is about .01, so it adds .01 to about .1. So we haven't gone over the threshold of one.

For the final example, or the n-Hexane, we can see that we're definitely seeing an increase because of the project's contribution relative to baseline for the application case, and again for the CEA case.

Just one more thing I'm going to say about this slide is that we look at both non-carcinogens, like SO2 and NOx, PM2.5, as well as we look at carcinogens, cancer causing chemicals. Some of the PAHs are carcinogens, some of the VOCs are carcinogens. For the carcinogens, we look at them in a different manner than we do the non-carcinogens. The non-carcinogens is what

I've described so far. For the carcinogens, the hazard quotient of one is equal to a health risk of 1 in 100,000. Okay, if we go over 1 in 100,000, a carcinogenic health risk, we flag it as above the threshold. That human health risk, carcinogenic health risk of 1 in 100,000 is very small compared to the incidence of cancer in society. Maybe I should ask Dr. Lee about that. The incidence of cancer in society is about one in three people who get cancer in their life, it doesn't mean they will die from it, but it's something in that range.

So our threshold for cancer, 1 in 100,000, is being compared to baseline of 1 in 3. That's how, I guess that's how safe our hazard quotients are. That is the way I'll put it, how much safety is built into our hazard quotients.

Many conservative assumptions, maximum predicted contaminant concentrations, upper chemical concentrations in country foods, upper food consumption rates we assume for First Nation, for example, and for farming communities and Hutterites, very high consumption rates in comparison to other residents. Exposure limits with safety factors, as I was telling you

previously. And the intention here is to make sure that we overpredict the risks.

So that's basically it in terms of the risk assessment model. I did, as I said earlier, have issues with the air quality assessment and with the human health risk assessment. The human health risk assessment is justified on the basis of the sources of emissions of this project, of the chemicals that are being emitted from this project, and of the large impacted zone.

We would be looking primarily at construction risks and acute effects, but there is going to be a lot of chemicals in the environment as a result of this project.

The air quality assessment, I'm not satisfied with that. I know there is not very much data, monitored data in the province. But doing this air dispersion modeling is pretty straightforward. It can be done very efficiently. And again, it will overpredict air quality impact, so it's conservative.

The time to do this risk assessment, the time to do the air quality assessment is not substantial. I heard a lot of issues about how long this is going to take? No, this is not an

issue here, this could be done. This type of work can be done in three months at not real high cost.

So if we go beyond what I have talked about, the chemicals in the environment. Byron?

MR. WILLIAMS: Dr. Brown, if I can just stop you before you move kind of on the segue to Dr. Lee, there's a couple of questions I do want to follow up on.

A while ago in terms of the construction risks, one of them that you flagged was the burning of debris?

DR. BROWN: Yes, correct.

MR. WILLIAMS: I guess I'm going to ask you to comment a little bit more on that in terms of its relative significance, and also what, if anything, you know about the time of year that they are proposing to burn and if you have any concerns with regard to that?

DR. BROWN: Yes, thanks. I had intended to say something about that. I think I said that earlier and then I forgot. I am trying to go so quickly.

An example of the type of mitigation that may result from a human health risk assessment such as this would be risk, we see risk

quotients associated with the burning of debris. We may see some elevated VOC concentrations, we may see some elevated dioxin concentrations in the local study area for relatively short periods of time. But as a result of that, the type of mitigation that may come out of that is related to -- I saw somewhere in the EIS a comment that most of the debris would be burned during winter months, and I have a problem with that. I don't think that's a very good idea because of the fact that typically in the winter months, that's when you get very stable atmospheric conditions that do not result in very good dispersion. You get a lot of inversions occurring in the winter time. So the EIS does state during reasonable weather conditions, but I don't think they are taking into account, when they say they are going to burn in the winter, the likelihood of inversions or stable atmospheres. So I would suggest that's an issue in terms of winter burning.

I'm going on in terms of the mitigation associated with that. You might want to have relatively remote locations where the burning takes place, so that local residents are not impacted by the smoke and the dust and the

fumes, or of course you can do relatively small burns over a period of time. But that's the type of mitigation that I don't think would be obvious until the risk assessment is done and we identify a true risk that has to be mitigated.

MR. WILLIAMS: I may have one question for you a bit later, Dr. Brown, but I'm just going to hold that. Please continue in your segue to Dr. Lee.

DR. BROWN: So the beyond health risk assessment, I talked about human health risk associated with chemical exposure. There are broader issues of community health and well-being that may be addressed through health impact assessment, and Dr. Lee is beside me to tell us about that.

That's several other determinants of health to individuals within a community. I talked about number 6 on this list, the physical environment, the environmental quality. Dr. Lee is here to address the other determinants of health in this very complicated circle diagram.

MR. WILLIAMS: Thank you, Dr. Brown.

And Dr. Lee, if we can get you to turn to page 2 of your report. And for the panel, the

report is at tab 4 of the materials.

Dr. Lee, at a fairly brief level, if you can just start out by describing what you mean by health impact assessment, please, sir?

DR. LEE: Health impact assessment, it's a natural analog or a cousin to environmental impact assessment or social impact assessment, in that it's a systematic approach to predicting and managing the impacts of any proposal on a community that might have on the health of that community or on surrounding communities. It's similar to EIA in the sense of its overarching values and its methodology, a similar sort of staged approach to screening and scoping and analysing.

It's different in a couple of ways. One, it's explicitly focused on human health and the human health outcomes. So often it will take things that you might see in a social impact assessment but will extent them out to the actual health outcomes that you can see in the community.

It also looks at positive and negative impacts. It's not just looking at protecting against certain risks, but possibly looking to promote positive health impacts.

And then as Dr. Brown has mentioned, one of the key things is it is rooted in the determinants of health framework, which is really what all population health research and public health work is now rooted in as well, the realization that the things that actually drive health in our communities are quite broad and encompass things, both in the social and physical environment.

MR. WILLIAMS: Thank you for that. And again, who out there is requiring it or recommending it in terms of regulatory bodies or learned organizations?

DR. LEE: It's been very widely recommended now, starting quite high. The World Health Organization has been promoting it for a number of years, both through guidances and courses and trying to disseminate it, putting on courses like the one we taught in Brazil.

On a state-by-state level or nation-by-nation level, organizations like Health Canada have been trying to promote it. And Health Canada actually lead the charge for it back in the 1990s.

In the United States, the National

Academies of Science are trying to promote it. International finance bodies such as the International Finance Corporation, the IFC, have not only promoted it and tried to put together guidelines to recommend it, but they often will make it a requirement of lending. So if you wanted to borrow money to build a dam or a mine or something in Sub Saharan Africa, it would actually be a requirement of the lending. So IFC, the European Reconstruction Bank, the InterAmerican Development Bank, and the African Development Bank all have internal requirements for health impact assessment.

And then outside of those areas, there's actually a lot of other people that then push for it as well. So departments of health and social services often will request one. If they see something going on and they want more specific health information, they'll ask for a health impact assessment on the side of the regulatory process.

Certain corporations are actually using it as a voluntary process, despite the lack of regulatory requirement. And that's often the way that it's been done, particularly in North

America right now, is the corporations are asking for it in addition to what's happening.

MR. WILLIAMS: Just in terms of corporations, can you give us a couple of examples of those who have voluntarily chose to incorporate health impact assessment in terms of natural resources development?

DR. LEE: The one we have the most experience with is Shell. Royal Dutch Shell has been doing some incredible work. In fact, probably the gold standard health impact assessments that I have seen done have been done by Shell. Actually not done by Shell but have been contracted by Shell on an entirely voluntary basis. And they do that for pretty well any of their projects anywhere in the world they are working.

Chevron is doing is a similar sort of thing with oil and gas work. Some mining companies, Rio Tinto and Barrick are both heavily promoting it and developing their own internal standards for it.

MR. WILLIAMS: And if you can't answer this, that's fine. But to your understanding, why would a proponent or a large organization,

corporation like Shell or Chevron, why would they be adopting that voluntarily?

DR. LEE: Well, it's been interesting working with a company like Shell and being somewhat privy to some of the business reasons for it. There is a strong business case to be made, and I have heard it being made by people within Shell. Often you'll get to people in a meeting and some people will be entirely in favour of it, and others will be coming from a perspective of why are we doing this? It's not required. And actually hearing some of the debate between people from inside a multinational is quite interesting. I'm not sure how much of the details of that I can share, because some of it actually has to do with trying to be more competitive. A lot of it actually really does come down to the fact that a lot of people see it as a glaring gap. Whether you are in Shell or whether you are in the WHO, people do sort of realize that there is a hole in the usual regulatory process where valued components that people in their communities are concerned about aren't being addressed, and there is a lot of stress and a lot of issues around that. And not just stress, but the actual

physical health outcomes.

So part of it is just knowing that it needs to be done, and that will lead into corporate social responsibility, wanting to maintain a positive image, trying to make the regulatory process and permits go a little bit more smoothly.

Also for a corporation, say in a oil sands kind of development where you might move into a community and being there for 40 or 50 years or longer, trying to make sure that you keep that community healthy, and have healthy workers, and also have a healthy environment to draw new families and new workers to. Those are all reasons that I have heard for promoting health impact assessment.

MR. WILLIAMS: Turning you to page 3 of your report, can you describe at a general level the health-related issues that tend to be associated with large development projects?

DR. LEE: Yeah. Actually, I'll talk primarily about the ones that tend to be missed in the current framework.

MR. WILLIAMS: Fair enough.

DR. LEE: As Gord mentioned, there are

a lot of things within the physical environmental contaminant framework are addressed if a health risk assessment is done. Still there's a number of things that typically we see with large infrastructure projects or resource development that are often missed. And those are, on page 3 we go through them, and I'll just take you through a few of them. I'll try not to be too in-depth.

The first one will probably be health effects associated with social and economic change. This is often a complicated one because it's both a positive and a negative impact. You get employment and you get jobs. Often if you're working in a rural or remote area, jobs and employment are desired and it will have a strong positive impact. Even in remote or Aboriginal communities, sometimes the jobs and wages will bring the ability to hunt and to fish and to partake in subsistence activities. But there's also a lot of negative things that come with economic changes, particularly if you're importing a lot of workers. You will see social dysfunction, alcohol, drugs, sexually transmitted infections, a lot of things that come from the interaction. And that's a pretty standard and

common pattern that we see, both in camp type settings, in small communities, or in boom town type settings in more established communities. So that would be one that tends not to be fully assessed from a health perspective typically.

Infectious disease is another one. As I mentioned, sexually transmitted diseases are expected. Any time you have a large number of usually young, often well-paid workers entering into a small community, you will see a rise in, typically chlamydia would be number one and then sometimes gonorrhea. With those two around, you will see -- you won't necessarily see them because they are rare, but if those are there, you can easily end up seeing syphilis and HIV and hepatitis, and some of the more rare and more severe STIs.

In addition, particularly in a camp setting, gastrointestinal diseases and respiratory diseases, just from the proximity of people, and the migration in of a large number of people from different areas and then mixing in a close environment before departing the community. So you do see a lot of infectious disease in the camp settings.

In Northeastern British Columbia, the medical officers of health are talking about it being a norovirus outbreak waiting to happen. Despite the best practice standards in the camps, you still see these outbreaks, which can be an occupational health issue if it is contained within the camp, but if there are connections between the camp and the community, then you can see these infections entering into the community as well. So definitely with STIs, you see that. With respiratory disease and gastrointestinal disease, you can see that as well. In the community, sometimes you have more vulnerable individuals, older, sicker people in which these diseases can be more severe.

Moving on, diet and nutrition is something -- again, Gord, talked about the usual way that diet and nutrition is assessed in a health risk assessment is through contamination, and that's a very important potential impact. There are invariably a lot of other potential impacts on diet and nutrition. Some of it is through the perception of contamination. So whether or not food is contaminated, if you have a traditional economy and a lot of harvesting of

traditional foods, the perception that the food is contaminated will actually often drive people away from traditional patterns of subsistence.

A lot of the communities where we have been working in the past already have issues with food insecurity. And if you start to lose certain access to certain types of food, it can worsen the food insecurity. At the same time, sometimes you see transitions in diet just due to food availability, income, roads, stores, what have you as well.

And from a health perspective, it's interesting, because a lot of transitions in health, particularly in Aboriginal communities, seem to be tied to diet and nutrition. So I don't want to get too pedantic, but there are increases in cardiovascular disease and diabetes and obesity and other things that are happening throughout Aboriginal populations in Canada. Some of that is tied to a transition from a traditional diet to a southern diet. And even when there's not contamination in traditional foods, you will start to see -- sometimes you can see projects exacerbating that transition.

Injury and public safety is an issue.

Whenever there's people, roads, trucks, new roads for sure, you can model actually traffic injuries just based on how many vehicles are on the road. If you increase vehicles, you will increase accidents and injuries. Trucks will actually change behaviour. So trucks by themselves will actually increase accidents, not just from the volume of trucks, but the way people drive in the presence of trucks. A lot of what we're seeing in Alberta obviously on the highway to Fort McMurray, which is very popular -- well, not popular, it is in the press a lot -- it is not just volume, but it is actually the behaviours it induces in other drivers on the road. So you do see that particularly around construction.

And then stress and mental being, mental health are big impacts as well. And sometimes it's passed off as just being, well, change happens, people don't want change to happen. And sometimes there is an element where it is just that. You can be in a community and some people are highly stressed, some people aren't. And it becomes a very hard thing to unpack as to who is affected and how badly they are affected.

In other settings, it is more than just that stress of change. Particularly, again, in areas where you have a gradual transition in livelihood, in culture and in economy, you can get the culturative stress, whereas the culture starts to change, that can be linked to a lot of health outcomes as well. So it's not just the mental health outcomes, there are other physical health outcomes that can be associated with it.

The last two things I want to talk about that sometimes aren't addressed fully are impacts on emergency health services and on the healthcare system in general.

Emergency health services, particularly in rural and remote areas often are not -- speaking as a physician who works in rural remote areas -- often they are not -- it's not that they are stressed at all times, but it doesn't take much to stress them. Because you can have the ability to respond to an injury or to trauma or to something once in a while. But if you get a major trauma or a major injury or major accident, you can really strain local resources quite easily.

And then healthcare service provision

as well, you see that a lot. And again, Northeastern British Columbia, they are seeing that right now with the gas boom that's going on. And it both strains on local hospitals and local physicians. Often in rural areas we don't have many hospitals or physicians. And then allied health services, sometimes the workers that are in these kinds of places don't actually need a family doctor, but what they may end up needing is mental health counselling, addictions counselling, sexually transmitted disease testing and counselling with that as well. And sometimes those things, we actually don't have much resources at all in rural areas. So those types of healthcare resources are often highly strained.

MR. WILLIAMS: Thank you, Dr. Lee. I'd ask you to turn to page 8 of your and Ms. Orenstein's report, and specifically under gaps and community health issues, a short question first of all. You see the heading "Health effects associated with social and economic change." I just want to ask, among those working in the field, is there any real controversy about the suggestion that the resource development process can bring changes to social and cultural

well-being?

DR. LEE: No, there's absolutely no controversy. Beyond there being no controversy, that's a lot of what health impact assessment is based on, is acknowledgement of the change that can occur. Health Canada was the pioneer in writing a handbook in 1999. Roy Kwiakowski developed a handbook on health impact assessment which stood as the main resource for probably about five or six years as the field was first starting to develop, and it's entirely rooted in that whole premise.

MR. WILLIAMS: Do regulators like the National Energy Board recognize this knowledge?

DR. LEE: Definitely. The National Energy Board, we have referenced the filing manual of the National Energy Board. And it's right in there that you need to address any adverse social or emotional stressors resulting, or potentially resulting from a project, which includes disruption of normal daily activities, normal daily living activities. So it's in there that you do need to address these things.

A lot of the growth of the HIA in the United States has actually been from the

realization or reinterpretation of the long-standing existing NEPA requirements, National Environmental Protection Agency rules and regulations. And sort of a rereading of what's been in there from the start has required a more thorough discussion of health. The restricted view of health in the EIS and EIA processes doesn't actually fit with how things were initially intended to be.

MR. WILLIAMS: Thank you. In terms of your opinion and Ms. Orenstein's, I guess your joint opinion, do you feel that health-related issues have been adequately addressed in the current EIS of Manitoba Hydro?

DR. LEE: No. It's not unusual for reports like this that we read, but there are two problems with it. One is, there is a lot of health information but there is no cohesive health story, which is something in a health impact assessment we try to do, is you try to get a lot of this information in one place. So you can find information in the supplemental socioeconomic filing that has to do with Gillam and the camp and what that will do there. So you can go in there and you can find some stuff that relates to

health. You can find information about transportation and roads elsewhere, but there's no one cohesive way to sort of look at it and say, what is this going to do to the health of the communities that are affected? That is problem number one.

Problem number two is that when you do go through it, which we did, and try to pull out the information that pertains to health, you find that there are very large holes. There are some things that aren't addressed in the least.

Stress and mental health are more or less just passed off as being non-significant. Infectious disease gets pretty well no mention. These are things that in the field of health impact assessment you would always scope into a report.

MR. WILLIAMS: Anything else in terms of the gaps, Dr. Lee, that you want to highlight there?

DR. LEE: Yeah. We go through the gaps in our on pages 8, 9, and into page 10. I can go through them in the same sort of order that I did before if you want me to.

MR. WILLIAMS: Why don't you just pick

two or three, Dr. Lee, just to highlight for the panel ones that are of particular concern. You have talked about stress and also infectious disease, so maybe those, and then maybe perhaps one other one if you'd like?

DR. LEE: Sure, okay. In terms of -- I'll talk about, well, I'll talk about infectious disease first. Again, there is, as far as we can tell, really no mention about infectious disease in the report, and it is something that we do see. Again, recent work in Northeastern British Columbia around the oil and gas boom camp settings, and a lot of talk, a lot of work amongst the medical officers of health there has really been focused a lot, particularly on gastrointestinal disease and sexually transmitted infections. So the lack of discussion as to the camp in this project and the impacts on nearby communities is definitely a major gap.

MR. WILLIAMS: Let me just stop you there. How, if at all, can we look at the pathways of infectious disease spread, you know, within the context of the camp, for example, or as it may affect the community as well?

DR. LEE: Well, there's two ways to do

that. One would be to look at the operating structure of the camp when workers are going to be there, the employment projections and what have you. And then also look at the camp management practices. Despite the known links of these illnesses, the best standards practices often don't address these things at all. So you could actually try to deal with the camp operators, often using the medical officer of health to get in there as well to try to intervene in the camp itself. Beyond that, then looking in the local community, working with particularly sexually transmitted infection, a counsellor or a nurse, the STI clinic, to see what resources they have, what they are planning on having in the community to treat disease once it starts to show up. Because a big part of infectious disease management is recognition of cases and early treatment of cases. So those would be two places where you could work, on either the primary prevention in the camp or the immediate response in the local community and making sure the resources are there.

MR. WILLIAMS: And in terms of stress and mental well-being, is there anything more you

want to say on that, sir?

DR. LEE: Yeah. It is a difficult one, and we actually were involved in writing a handbook for mental health impact assessment tools. We did this for, it's for the Public Health Agency of Canada.

So there's an approach. If you're in a community that you feel has significant mental health and stress issues, there is actually an approach to do a health, a mental health impact assessment. Which goes a little bit further than the health impact assessment, to look at actually what are the strains in the community and what could possibly be done? So we haven't done that here but there is a process that you could use for that.

MR. WILLIAMS: In terms of what, and you've got a lengthy list of gaps that you have identified, what, if any, options in your view are there to address the inadequacies that you have identified in the current submission?

DR. LEE: Well, I mean the health impact assessment could still be done. One of the benefits of health impact assessment, being outside the regulatory framework and being still a

relatively new and flexible tool, is that you can actually apply it in different sort of forms.

Ideally what you would want to do is have the health impact assessment be part of a larger integrated assessment from the get-go. If that's not the case, at this point what you could do is you could do a review in a gaps analysis, similar to what we have done, scope out what's missing, and then try to figure out what to do from that point on. There will be a little bit more data collection probably, probably some stakeholder consultations in terms of nurses and on the ground people in the region, and then a mitigation plan that will go with it. So it could be done at this point if it needed to be done.

As I say, a lot of the data that you need for health impact assessment is already collected by the people that are doing the environmental side and by the people that doing the socioeconomic analyses as well. So from a health perspective, there is baseline data you need, some epidemiology. There is often existing data, you just have to know where to get it. And then leaning on the people that are doing the other parts of the assessment, and that can be

done here.

MR. WILLIAMS: I'm going to ask you to turn to page 12 of your report, which is essentially your conclusions. Hopefully it's page 12 of your report. Do you have conclusions under there, sir?

DR. LEE: Yes.

MR. WILLIAMS: And you said "if it's needed." Have you reached a conclusion in terms of whether it's needed in this case, and if you have, perhaps you can detail the basis for that conclusion?

DR. LEE: I'm not sure it's my job to say whether or not it's needed. If you look at any of the screening tools that health impact assessment practitioners use, any of the stuff that's been put out by people like Health Canada or the World Health Organization, and you are to screen this project and decide, does it need a health impact assessment, then all those tools would say yes. There's enough evidence just on the project description that there would be a suspicion of health impacts and it would warrant further investigation. So if you came to me and asked me to do the usual health impact assessment

process, step one would be asking the question, do you need to do it or not? And definitely I would say at that point, yes. I think every health impact assessment practitioner in the world would screen this and say yes. That is just the size of the camp. A camp of 500 men outside a town of 1,200 next to a couple of smaller towns, that's kind of a no-brainer, that would be an automatic health impact assessment.

MR. WILLIAMS: Okay. Dr. Lee, moving away from your report. Just in terms of last week, Dr. Petch, a witness of Manitoba Hydro, had some comments regarding the perception of contamination was causing some First Nations and Metis people to avoid gathering plants in close proximity to power lines. Can you speak about this observation in a health context and how, if at all, the HIA would look at that?

DR. LEE: Yes. We have been involved in, again, some of the work we have done on the north slope of Alaska with oil and gas leasing plans, which is largely our land use framework, both onshore and offshore. Which is interesting because the Inupiat people of the north slope of Alaska are dependent primarily on caribou and then

on marine mammals as well. So we did two separate HIAs there. And perception of contamination came up routinely just talking to local hunters, elders, just community members. The fear that food may become contaminated will easily drive people away from that particular food source. And if it's a minor food source in an area that actually has a fairly robust traditional food source system, then it can tolerate that sort of change perhaps.

In the case of Northern Alaska, a lot of it was around fish in one particular river, the people had just stopped eating. But if there's enough caribou and there is enough bowhead whales and there is enough seals, then you can still maintain a traditional economy, you can maintain the distribution systems, you don't have to worry so much about food insecurity. But if you start to lose other foods, or if there is a number of foods that are gone, or you already have a place that has got significant problems with food and security, then losing one resource can actually be quite huge.

I work in Nunavut, like I said, and this isn't a chemical contaminant but there is

biological contaminant, a parasite in walrus. And some poor public health messaging and some poor planning as to how to screen for this parasite has actually completely undercut the traditional system of harvesting walrus. In a town of a thousand people, you lose -- you might have 12 hunters that go out and harvest a few thousand pounds of meat. They stopped doing it out of fear of contaminating the community. And that is a major health impact, both in terms of food insecurity, a transition to southern diet, and then also the cultural impacts of losing that part of the traditional culture. And you don't get it back.

So perception of contamination is a really important pathway. And what we would typically do is, in conversations with local hunters and just local people, find out a little bit more about the food distribution systems. A lot of this has been done. So sometimes we'd do it or we just lean on the people that are doing the traditional economy work. And then try to figure out how to prevent perception as being something that will undercut food sources, and doing it, in our mind, with health outcomes as a

primary focus.

So some of that comes down to testing, monitoring, messaging around contaminant levels, or trying to find out approaches to traditional food banks and just supporting distribution of food, just knowing that from a health perspective, maintenance of those food systems is crucial. In fact in my mind, where I work, that's actually probably my primary public health concern.

MR. WILLIAMS: Thank you for that. Both Dr. Lee and Dr. Brown, I've got about a thousand other questions I'd like to ask you. But mindful of the time, I think we'll close our direct, Mr, Chairman, and make the witnesses available for cross. I wonder if I might ask the board's indulgence to stand down for two minutes for a personal refreshment?

THE CHAIRMAN: Certainly.

(Brief recess)

MR. WILLIAMS: I thank the Commission for their indulgence. And the witnesses are ready for cross-examination.

THE CHAIRMAN: Okay, Ms. Mayor.

MS. MAYOR: Good afternoon -- good evening, I have lost track of the time. You have

an advantage over us, Chris, because you're out west, so it's actually earlier for you than it is for the rest of us.

Dr. Lee, in support of your recommendation for a health impact assessment, you indicated in your report that there are a number of precedents in projects of the type and scale of Bipole III. So I just wanted to review a couple of the examples that you had put in your report, so we can better understand what those projects are and the comparison.

You gave as an example of a linear project Shell Canada's quest carbon capture and storage pipeline project. That's correct?

DR. LEE: Yes.

MS. MAYOR: And that was the human health risk assessment that assessed the enviromental effects of carbon capture infrastructure on air emissions; is that correct?

DR. LEE: We did a health impact assessment component combined with that.

MS. MAYOR: The risk assessment did not relate to the linear element of the project at all, though, it related to the actual carbon capture infrastructure?

DR. LEE: The carbon capture infrastructure includes a pipeline, and that pipeline is the linear component of that project.

MS. MAYOR: Okay. Now, you had included in your report a Chad and Cameroon petroleum development and pipeline project in Africa. Now, in that one, I am given to understand that the focus on that particular risk assessment or impact assessment was a focus on the occupational health of workers and contractors.

DR. LEE: That's always a focus of these things, but it went beyond that into the community health impacts as well.

MS. MAYOR: And one of the reasons why the health effects were looked at was because in both of those countries, there are very bleak health characteristics. Some of the figures that were given to me, the life expectancy in those areas are less than 50 years, one of the highest infant and child mortality rates, and there were significant concerns in the community with HIV and malaria. Would those be some of the concerns of that community?

DR. LEE: Yes.

MS. MAYOR: You provided an aluminum

smelter project in Greenland, also involving a hydroelectric project. Now, the human health risk assessment conducted there was to assess the risks associated with the proposed smelter and the port; would that be correct?

DR. LEE: I believe so, yes.

MS. MAYOR: And you also provided an example of -- I apologize if my pronunciation in not correct -- the Trung Son hydro power project in Vietnam?

DR. LEE: Yes.

MS. MAYOR: And in that particular project, it involved 2,500 relocations of residents, not for the transmission line but for the actual project itself?

DR. LEE: Yes.

MS. MAYOR: Dr. Brown, you provided us in, and it may be both of you so I apologize if I'm directing this to the wrong person, in the appendix B, and Dr. Lee, I apologize, I know you don't have tabs, but the one found at tab 7, and we can blame Mr. Williams all night for that, but appendix B that's found at tab 7 --

MR. WILLIAMS: Ms. Mayor, I just want to make the witnesses find it. So you're

referring to the September 16th document which was filed as appendix B.

DR. BROWN: Province of Manitoba Hydro, et cetera, appendix B?

MR. WILLIAMS: Comments on Manitoba Hydro Bipole III application.

DR. BROWN: My report, yes.

MR. WILLIAMS: Sorry, Ms. Mayor.

MS. MAYOR: No worries.

Dr. Brown, you had included some terms of reference for the Parsons Creek resources project?

DR. BROWN: Yes.

MS. MAYOR: And that was a quarry project where the drilling, blasting, excavating, crushing, which causes noise and emissions, last the life of the project, which was about 40 years.

DR. BROWN: That sounds correct, yes.

MS. MAYOR: So it wasn't simply during construction, it was the entire life of the project?

DR. BROWN: Yes.

MS. MAYOR: Now, you also, and again I apologize if I have got the wrong individual to be referring this to, but I believe there was also a

reference to the Northern Gateway pipeline project?

DR. BROWN: Correct.

MS. MAYOR: And in that case, that was a long-term chronic health effects associated with terminal operations in coastal BC, where they found there to be the greatest emissions?

DR. BROWN: Construction and operation were evaluated.

MS. MAYOR: This is an oil and gas operation?

DR. BROWN: Yeah.

MS. MAYOR: And one of the major concerns were the 65 chemical carcinogens found in the liquid hydrocarbons?

DR. BROWN: Yes.

MS. MAYOR: Dr. Brown, you also, and maybe I missed it, I didn't see it in your report, but you also referenced ENMAX?

DR. BROWN: Yes.

MS. MAYOR: Is it in your report?

DR. BROWN: No, it is not. It is just an example I used of a voluntary risk assessment.

MS. MAYOR: Okay, thank you. So, as you indicated, that was voluntary and wasn't

required by law in Alberta?

DR. BROWN: Correct.

MS. MAYOR: And you indicated that was within the city limits where the number of human receptors would be extraordinarily large as compared to a hydro project covering 1,400 kilometres?

DR. BROWN: Well, I guess I couldn't answer that because the impact from a point source such as ENMAX would be focused on an area of one to two kilometres, okay, beyond the facility, one to two kilometre radius. Comparing that to the pipeline where there's going to be construction all along these 1,400 kilometres and the associated emissions, I would think there would be more impact of a short-term acute concern nature than there would be with continuous operation, and probably more receptors impacted than there would be by the ENMAX operation.

MS. MAYOR: Now, you have talked about, in your list of concerns, you talked about that your concern then is primarily from the construction emissions?

DR. BROWN: Yes.

MS. MAYOR: And those would be from

the vehicles and the machinery that are used?

DR. BROWN: Yes, in part.

MS. MAYOR: And you would agree that in all of the communities that are adjacent to the construction, there already exists vehicles and other such emitters of --

DR. BROWN: Vehicles is only one of the sources. There's many other sources, as stated by Manitoba Hydro in the application.

MS. MAYOR: You would agree with me, though, that the number of vehicles and machines that are going to be added to the environments are pretty modest compared to what is already there?

DR. BROWN: Absolutely.

MS. MAYOR: Back to Dr. Lee. You had talked about some gaps on the community health issues and the data that's missing. You talked about some information that you would like to see on alcohol and drug dependence, alcohol-related injuries, traffic accidents where drugs or alcohol have been involved.

We heard earlier today by Dr. Noble, and it was during cross-examination, but he acknowledged it's often easier to recommend than to actually do. So when you make that

recommendation that such information is gathered, you would agree that gathering that type of information is somewhat challenging, based on personal health information legislation, privacy concerns, and generally a reluctance on those with alcohol and drug problems to produce that information?

DR. LEE: In some cases, it is difficult to collect. But, actually, it is more difficult to collect data that are uncommon outcomes, like cancer and what have you, in small communities because often it's suppressed out of confidentiality. For things like traffic accidents and assaults and emergency room visits, that's often common enough that you can actually get that just through hospital admission data.

MS. MAYOR: By subpoena?

DR. LEE: No. A lot of this data is publicly available through the health regions.

MS. MAYOR: Collected at a high level?

DR. LEE: Yeah, anonymous data collected at a high level. But the problem comes when you are trying to collect data that cannot be anonymized, usually because it is a rare outcome. So if you are in a town of 300 people and you want

to find out about a certain type of cancer that's a rare cancer, then you can't get that number because everyone will know who it is. If you're in a town of 300 people and you're looking for the number of DUIs in the last five years, then you can get that because that's a common enough thing. Sometimes you just do that where you go over five years as opposed to over one year in order to make it more anonymous.

MS. MAYOR: Some of the data with respect to traffic accidents, for example, was included in the transportation technical report. Would you have had an opportunity to review that?

DR. LEE: I know that it's there, yes.

MS. MAYOR: You're looking for even more detailed information, and I think you referenced from the RCMP?

DR. LEE: In some cases, yes.

MS. MAYOR: And have you yourself accessed information from the RCMP?

DR. LEE: Not on this project but in other projects, yes.

MS. MAYOR: And are you aware of the relatively new policy that that type of information, accident reports, detailed

information has to be sought through a subpoena or through a court order?

DR. LEE: If that's case, then I am unaware. I would be surprised, and I could be wrong, if aggregate data in terms of number of accidents over the course of a year would have that kind of condition. If I wanted to find out the details of a single accident, then clearly that would require a subpoena. I don't believe, and I could be wrong, that aggregate data for a region over a period of time would need to be subpoenaed.

MS. MAYOR: So you believe that aggregate data across the 1,400 kilometres would be available, focused on that 1,400 kilometre route?

DR. LEE: No. That would be kind of useless data to go for a 1,400 kilometre route. You'd be looking at segments, often based on stakeholder consultation, local RCMP officers looking for hot points where there are likely to be accidents, and then going for information in those areas. I wouldn't look for aggregate data for motor vehicle accidents over the entire province.

MS. MAYOR: So in terms of the efforts by Manitoba Hydro, you are aware that there were interviews done with key persons such as staff at the Gillam Hospital?

DR. LEE: Yes.

MS. MAYOR: And you are aware that they are, in fact, taking steps to ensure that they have emergency preparedness plans in place?

DR. LEE: Yeah.

MS. MAYOR: And similarly, there have been discussions with the RCMP to ensure that they are prepared should there be increases in incidents or accidents?

DR. LEE: Yes.

MS. MAYOR: And those would be positive steps to address some of the potential health concerns?

DR. LEE: Those are definitely positive steps, and they would be outcomes we'd be looking for in any health impact assessment.

MS. MAYOR: You also talked about getting information on sexually transmitted illnesses. And again, you would be talking about aggregate data as opposed to more site-specific data, because that wouldn't be available in

smaller communities?

DR. LEE: Right. That's often available on a health region type basis.

MS. MAYOR: A broader area covering one of the few health regions in Manitoba is what you would be looking at?

DR. LEE: You go for the smallest grain you can get. I haven't done a project like this in Manitoba so I don't know what that grain is, but often a health region would be it.

MS. MAYOR: So potentially the availability of helpful information may not be there because, as you said, you haven't looked yet in Manitoba. So we're not sure what the status is of that sort of information availability in Manitoba?

DR. LEE: Yes and no. I mean, there's always limits to what data can tell you. Data by itself isn't information. So you need to get the data you need. And sometimes you can't get a good baseline and can't use that for quantitative modeling or for projections but you need to have it to inform your mitigations and your suggestions. So there is always some data. For the type of, for the side of health environmental

assessment I do compared to what Gord does, we don't get the kind of numbers that we can plug into a model and punch out. Okay, if you put in 1,000 male workers, you'll get five more cases of syphilis, we can't do that. But we still get data that helps in forming the assessment.

MS. MAYOR: You talked a lot about practising in rural areas, which is clearly one of your specialities. Is it fair to say that some of the concerns that you raise in your report, such as lack of counselling services, physicians, and other resources, are really part of broad concerns over health services in rural areas, concerns really that the provincial health authorities are grappling with?

DR. LEE: Yes. I mean, there are concerns. Mental health is a concern even in cities across Canada. The addictions counselling is a concern everywhere. I think the issue with this sort of project is you have a place that already has concerns and you increase the strain upon something that's already not necessarily the best served.

MS. MAYOR: Just one last question. In terms of your concerns with the spread of

disease from camps, you are aware that the camp in question here is located outside of the Town of Gillam and the Fox Lake Reserve?

DR. LEE: Yes.

MS. MAYOR: And there have been a number of camp rules and restrictions that have been put in place to ensure that there is less frequent travel between the camp and the Gillam community or the Bird Lake community?

DR. LEE: Yeah. Except if a camp -- I agree with that. If you don't mind my answer?

MS. MAYOR: I was going to say, those are positive steps that have been taken to try and reduce --

DR. LEE: Short of entirely enclosing the camp and doing sort of an offshore style development, there will always be interactions. And completely closing the camp off sometimes is not desirable for a community anyways, if you want employment. So local workers who go to that camp will still be exposed and then will come home. So unless there's no interaction, no travel off shift or no local employees in a camp, then there is the potential for transmission of disease between community and between camp.

MS. MAYOR: And those will be similar concerns that would be found within school settings? Going with Mr. Bedford always citing his family, I'm sick all of the time because I have two school-aged children. So it's similar to those in schools, recreational centres, office complexes?

DR. LEE: No. It's actually different in that here we have people coming from outside the community to the camp, and then people in the camp going there. So if we had a school or an office in your community, but people came to that from somewhere else with a different burden of disease, and then when they were there, they shared the same cafeteria, and they played volleyball with you and what have you and then they flew back to their own communities, that would be a similar sort of thing. But your child going to the school in your neighbourhood is different, because then you are dealing with the endemic disease in your community at that time.

MS. MAYOR: Okay. Thank you very much.

DR. LEE: Thanks.

THE CHAIRMAN: Thank you, Ms. Mayor.

Participants, Mr. Stockwell or Mr. Mills?

MR. STOCKWELL: No.

THE CHAIRMAN: Mr. Meronek?

MR. MERONEK: Just a couple of questions, Mr. Chairman.

Good evening. My name is Meronek and I'm here on behalf of a coalition which represents several hundred landowners in agricultural Manitoba. And I was interested, Dr. Brown, in your identification as a human receptor, rural farming residents. And I want to couple that with Dr. Lee's discussion about stress and mental health. I don't see anything in a discussion about concerns relating to rural farmers. And the Commission has heard lots of discussion in the communities about anxiety associated with economic impacts, accidents associated with collisions with these towers, issues with respect to stray voltage and EMF and things of that nature, and we have heard a lot about it. But can you offer some advice or comments as to whether or not there should be some risk assessment dealing with these kinds of anxieties and stresses that the farmers are feeling?

DR. BROWN: We're both looking at each

other. I guess I'll go first. I tried to make a point of indicating in my presentation on the value of health risk assessment that, in my experience, if it's done right and if it's done early and often and frequent throughout the process, and if you engage, you know, the truly concerned citizens that really don't understand these projects or their impacts, you know, through working with them and through working through the risk assessment and showing them that these projects will not be approved if there is a risk, or the risk will have to be managed in some way before the project application is approved. I've been asked before, don't you people ever predict health risks from these major projects? And I said, well, yes. As we conduct a human health risk assessment, we do determine or identify a potential health risk and, therefore, we flag it and go back to the proponent. And in terms of the design of the project, reduction of emissions or what have you, the mitigation, we ensure that the risks are acceptable before the HHRA is submitted as part of the application. So it's an iterative process that you go through to ensure that the risks are acceptable.

When you present the type of information I did today, showing what the risks are background, what the risks are from the project, what the incremental risks are from the project, what the baseline is and the cumulative effects, and when you stress the safety factors and the conservatism that's built into the risk assessment, people are smart, people are knowledgeable, people understand. We try, to the extent possible, to speak in layperson terms when we're dealing with the public.

I did indicate one example where there is a tremendous concern about stress of contamination by First Nation. It took a very long time before they believed in the results of the risk assessments saying the meat is safe, you can eat the meat. And they are now coming back into the project area and finding that the hunting is very good because there hasn't been hunting there for 10 years, that type of thing.

So one way of not assessing the stress but mitigating the stress that does occur when projects are announced is by completing human health risk assessment and presenting the results of that risk assessment to the stakeholders that

are concerned.

MR. MERONEK: Anything else?

DR. LEE: No, I agree with all that. I mean, it is actually, a large part of it is a process that will help allay fears.

In some cases, and we worked on a large wind farm in Southern Alberta where one of our concerns going into it is that in other areas where there are wind farms, a lot of people are concerned about wind turbine syndrome. But from a medical and epidemiological perspective, there's not a whole lot to go on that there actually is anything in terms of health outcomes.

So it's always interesting when you are working in a community where there's a fear that might not be well-founded in health, real health risks, but the process alone will help deal with that fear usually. So you can't address the fear that just comes from not wanting change. That type of fear is really hard to assess and really hard to change or to do much about. But the process is actually fairly useful.

MR. MERONEK: Thank you.

I'd like to challenge you, Dr. Brown, on your assessment that beer is harmful, as an

expert.

DR. LEE: He said in low doses beer is actually healthy.

MR. MERONEK: You obviously aren't aware of the Cliff and Norm theory on Cheers that beer kills the weak brain cells and makes you smarter.

DR. BROWN: Thank you for educating me.

THE CHAIRMAN: Thank you, Mr. Meronek, especially for that last bit of information.

MR. GIBBONS: Two questions, but they will be quick. Before I do go to the questions, one really quick comment, it's in deference to Mr. Meronek, in fact. And I thought perhaps in the case of slide number 10 for Dr. Brown, the plants that are shown seem to be arranged in rows, implying perhaps farm-based produce. But the only animals mentioned are fish and wild game, and I thought perhaps farm animals might be included in that graphic, especially if they are free range, but not only if they are free range. But that's just an aside.

DR. BROWN: Thank you for that.

MR. GIBBONS: The question, perhaps

therefore I'll start with Dr. Brown. On slide 7, you mention that toxicology, you can actually read the bullet, it's about the middle of slide 7, it says:

"Based on current scientific...",

and then in parenthesis, parenthetically,

"...(toxicology knowledge)."

And this thought crossed my mind in terms of an earlier discussion. I'm counting the title pages as slide number 1.

DR. BROWN: What is the title?

MR. GIBBONS: It is slide number 7, Main features of a health risk assessment. Sorry, I numbered these myself.

DR. BROWN: There we go.

MR. GIBBONS: That's the one.

And in part, my thinking of this question relates not only to this but to an earlier presentation. And that is that the risk level, as I understand it in my notion of risk analysis, is something which can be determined through a scientific method, through scientific knowledge, but the acceptability of a risk is a social or political issue. Could you perhaps just speak to that very briefly?

DR. BROWN: Yes, that's a very good point. And when I was going through the risk assessment approach, I mentioned the fact that we look at what we call threshold chemicals. I probably didn't use that word, but non-carcinogens and carcinogens. For threshold chemicals, which are non-carcinogens, in other words there is a dose response relationship. If you're below the NOAEL, if you're below the exposure limit, we assume that there won't be risk, so the hazard quotient is less than one. There's no sort of acceptability value associated with that, it's a scientific conclusion, you know, based on scientific information.

When we do look at carcinogens in the environment, the approach that's used in risk assessment is highly conservative in that it assumes there is no threshold. In other words, any dose of a carcinogen will result in some level of risk. Okay, if you can envision the dose response relationship, it starts right at zero, and any increase in exposure will result in some risk.

So based on that approach, what we have to do is we have to calculate, in the risk

assessment, what the hazard quotient is, and that will give us a number of either 1, which is 1 in 100,000, or less than 1 which is less than 1 in 100,000, or greater than 1, which is greater than 1 in 100,000. That number 1 in 100,000 is not a decision that we made. It's a societal or a political or a government or a regulatory number that's been assigned, in this case by Health Canada, not by ourselves. So we base that acceptability of a cancer risk on that number, 1 in 100,000. If we are above it, the hazard quotient is above that.

Does that answer your question?

MR. GIBBONS: Yes, it does. I'm reminded, living in Winnipeg, we think of the risk of flood. And the question is, what is acceptable, a 1 in 100 year flood or a 1 in 500 year flood or whatever. I hope I'm not getting ahead of myself there on that particular point.

Second question for Dr. Lee, and I'm not sure if it is a question or an observation, but we have heard reports from Fox Lake Cree Nation about the impact of existing projects on country food, particularly fish, sturgeon, trout, et cetera. And while one might expect, and there

was impact perhaps on quantity of food, there is also an impact, as far as they are concerned, on the quality of food. Some of the fish, for example, as a result of some of the projects there, no long tastes the way it used to taste. And I was thinking of that in the context of your comments about impacts on diet and nutrition, that if in fact projects lead to that kind of result, we could see changes in diet as a result. Could you speak to that briefly?

DR. LEE: Yeah, definitely. I mean, that was news to me. But certainly there's a lot of different impacts and changes in diet. When I'm working in Nunavut, I hear a lot of stories around that too, changes in the taste of caribou, changes in the taste of different animals as well. So that's the kind of information you can only get by going out and talking to the harvesters.

From a biological perspective, I'm not a biologist, but I have worked with them on their impact assessments in Alaska in particular, there's often not a lot of knowledge as to what that means. I mean, you can test the meat and see if there's any changes in terms of toxins and actual health risk. And a lot of times there's

not when it is associated with that. But if it is associated with a change in perception as to the quality of the food, and it changes the behaviour and the harvesting, then for sure it will be a potential impact.

MR. GIBBONS: Thank you.

THE CHAIRMAN: I just have one question.

Dr. Lee, are there any jurisdictions that require health impact assessments as part of an environmental assessment?

DR. LEE: Alaska now has state guidance based on the re-interpretation of the NEPA requirements. So I can't quite exactly remember what sorts of projects in Alaska are now required, but I think anything that is on state land at this point. So they have done a number of mines and they are working on a dam right now as well. That's the main place in North America that would have requirements for resource-based projects.

Quebec has a uniform policy across the board for health impact assessment, a lot of which ends up being health and public policy, so within the ministries and when decisions are being made,

health impact assessment is being done there. And project based HIA is also being required for a lot of their work. It's a different sort of world there. Those would be the two main places in North America.

THE CHAIRMAN: Thank you.

Mr. Williams?

MR. WILLIAMS: No redirect. I definitely want to thank Dr. Lee and Dr. Brown for their tremendous patience today, and also the panel for their attentiveness on a long day, but we certainly hope on behalf of our clients, a helpful day.

THE CHAIRMAN: Thank you, Mr. Williams.

Thank you, Dr. Lee and Dr. Brown, thank you for coming here today. You're also from part way across the country, so safe journey home. Thank you.

Ms. Johnson, do we have some documents to register?

MS. JOHNSON: Yes, just a sort list today. CAC number 6 is the CV package provided on September 17th; number 7 is the CAC expert reports; number 8 is the review of the cumulative

effects assessment by Dr. Gunn and Dr. Noble; number 9 is Mr. Skinner's presentation.

(EXHIBIT CAC 6: CV package of September 17th)

(EXHIBIT CAC 7: CAC expert reports)

(EXHIBIT CAC 8: Cumulative effects assessment review by Dr. Gunn and Dr. Noble)

(EXHIBIT CAC 9: Mr. Skinner's presentation)

THE CHAIRMAN: Thank you. No other business to take care of, so we are adjourned until Monday morning at 9:00 a.m. when Mr. Meronek and the Coalition will have the floor. Have a good weekend everybody.

We are in the same building but we are downstairs, meeting room 3.

(Proceedings adjourned at 6:10 p.m.)

OFFICIAL EXAMINER'S CERTIFICATE

I, DEBRA KOT, a duly appointed Official Examiner in the Province of Manitoba, do hereby certify the foregoing pages are a true and correct transcript of my Stenotype notes as taken by me at the time and place hereinbefore stated.

Debra Kot

Official Examiner, Q.B.