COMMISSION OF INQUIRY
RESPECTING THE MUSKRAT FALLS PROJECT

Transcript | Phase 2 Volume 57

Commissioner: Honourable Justice Richard LeBlanc

Wednesday 19 June 2019

CLERK (Mulrooney): All rise.

This Commission of Inquiry is now open.

The Honourable Justice Richard LeBlanc presiding as Commissioner.

Please be seated.

THE COMMISSIONER: Okay. All right. Good morning.

DR. JERGEAS: Morning.

THE COMMISSIONER: Mr. Jergeas, you remain under oath at this time. And Mr. Learmonth, when you're ready.

MR. LEARMONTH: Yes. I just had one question for you, Dr. Jergeas. At page 36 and 37 of your presentation you refer to Black Swan events. And on page 36 you say, "**Black Swans** are risks that are considered to be outliers and thus ignored until they occur with great impact."

Just – this may be an obvious answer but I just want to make sure I understand this. If a risk is entered in the risk register of a company, is it possible that it could still be a Black Swan, having been identified?

DR. JERGEAS: But if it's entered –

MR. LEARMONTH: Yes.

DR. JERGEAS: – it should be also estimated.

MR. LEARMONTH: Yes.

DR. JERGEAS: So, when you enter a risk, what you going to do about it? What is you mitigation action? All of that should appear in the budget as well.

MR. LEARMONTH: Okay, very good.

DR. JERGEAS: Black Swan things like unknown, they might not know about it, it's not entered; that's another one.

MR. LEARMONTH: Yeah.

DR. JERGEAS: So –

MR. LEARMONTH: I know but –

DR. JERGEAS: – the unknowns –

MR. LEARMONTH: – if they don't know about it, then obviously it's not entered but if they do know about it and they actually enter it.

DR. JERGEAS: Then it should be in the estimate.

MR. LEARMONTH: It should be in the estimate.

DR. JERGEAS: But the unknown of the Black Swans should be part of management's reserve.

MR. LEARMONTH: Okay. Thank you.

Okay. That's the end of my questioning of Dr. Jergeas.

THE COMMISSIONER: All right, thank you.

All right. Province of Newfoundland and Labrador.

MR. RALPH: Good morning, Dr. Jergeas.

DR. JERGEAS: Good morning.

MR. RALPH: Am I pronouncing your name correctly?

DR. JERGEAS: Yes, I –

MR. RALPH: Okay.

DR. JERGEAS: You can call me Dr. George if you want.

MR. RALPH: Okay. My name is Peter Ralph and I represent the Province of Newfoundland and Labrador. And my questions are going to – largely focusing on government oversight of a megaproject.

DR. JERGEAS: Yes.

MR. RALPH: And I want to start by bring up an exhibit. You won't be familiar with it. And I'm not going to ask you about the substance of it. It's Exhibit 02217.

THE COMMISSIONER: So it'll be on your screen.

MR. RALPH: And so the exhibits –

DR. JERGEAS: I cannot see it. Oh. Okay. Sorry.

MR. RALPH: If you go to page 2 –

DR. JERGEAS: Yeah.

MR. RALPH: And I bring up this document just to provide context to the questions I'm going to ask you. I'm not going to ask you about the substance of the numbers.

DR. JERGEAS: Thank you.

MR. RALPH: And on page 2 –

CLERK: One second, please? Thanks.

MR. RALPH: It's taking a while to load. What this page does –

DR. JERGEAS: Yeah.

MR. RALPH: – it's summarizes a change in the cost estimates –

DR. JERGEAS: Yes.

MR. RALPH: – from DG3 both at the time of sanction and at the time of financing or just before the time of financing.

DR. JERGEAS: Yeah.

MR. RALPH: Now at page 159 of your presentation in which is Exhibit 04102, page 159. And you state that: "Oversight is the watchful care and supervision. You can be watchful by overseeing issues in the project such as risks, estimates, stakeholders and external concerns."

DR. JERGEAS: Yeah.

MR. RALPH: And then you have, Oversight On Issues and you have Risks and you say: "You ask: was our risk management process followed; were risks categorized; were contingency and reserve amounts adequate; were particular risk assigned to parties best suited to address them?" And then secondly of Budget and Schedule Estimates.

And: "You ask: did we evaluate various probabilities; are our budget and schedule estimates optimistic or conservative; does our project have an equal chance of meeting or exceeding these estimates; are the assumptions that support these estimates clearly detailed and understood; have we identified the risks associated with these assumptions?"

So, I guess it's fair to say that oversight of risks and budget and schedule estimates is an essential aspect of oversight generally.

DR. JERGEAS: Yes. And –

MR. RALPH: And I guess there's several places where this oversight must take place?

DR. JERGEAS: Yes.

MR. RALPH: It's not just the board of directors, it's also governments. For example, the Government of Newfoundland is the sole shareholder of Nalcor –

DR. JERGEAS: Yeah.

MR. RALPH: – with regard to this project.

DR. JERGEAS: Yeah.

MR. RALPH: The Government of Canada was the guarantor of the financing.

DR. JERGEAS: Yeah.

MR. RALPH: And we have the board of directors. We have the CEO and the vice-presidents. They have a role in oversight.

DR. JERGEAS: Correct.

MR. RALPH: As does the project team.

DR. JERGEAS: Yes.

MR. RALPH: Is that correct?

DR. JERGEAS: Yeah.

MR. RALPH: Now, my questions are going to address oversight by government. Now, you've described the characteristics of megaprojects as being extremely complex – both technologically and in size.

DR. JERGEAS: Yes.

MR. RALPH: And they are delivered by a network of public entities and stakeholders?

DR. JERGEAS: Correct.

MR. RALPH: And because of the complexity of the project, you've suggested each project should have what's called a project execution plan.

DR. JERGEAS: Project execution plan.

MR. RALPH: And at page 28 of your presentation, you state that purpose of that document. If we can go there?

DR. JERGEAS: Yes.

MR. RALPH: So, the bottom here it defines the – what that means – it clearly defines the components of project implementation, including scope and deliverables, methodology, roles and responsibilities – I think I want to focus on that later, but schedule, budget, project background and the internal and external resources required.

DR. JERGEAS: Correct. Among many other things.

MR. RALPH: Yes.

So, I suspect this would be a very large document.

DR. JERGEAS: It is.

MR. RALPH: How big is it? Is it volumes?

DR. JERGEAS: It could be. I have seen it in volumes and sections and I have seen the Muskrat Falls Project execution plan.

MR. RALPH: Yes.

DR. JERGEAS: And it is a good document.

MR. RALPH: Right.

And, I guess – this plan, I guess, in part addresses the challenge that there are so many moving parts in a megaproject.

DR. JERGEAS: Absolutely. Yes.

MR. RALPH: And it's because of that size and the complexity of megaprojects, delineation and articulation of roles, tasks and responsibilities is essential to the execution –

DR. JERGEAS: Yes.

MR. RALPH: – of a megaproject.

DR. JERGEAS: But must be led by somebody.

MR. RALPH: Right.

But is it possible for any one person to know, I guess, what is happening in all components of a megaproject?

DR. JERGEAS: This is a question?

MR. RALPH: Yes.

DR. JERGEAS: Yeah. Okay. I agree. It's lots of moving parts. Lots of stakeholders on these big project and yesterday I described the complexity a little bit and I'm happy to re-describe it again but we – I – in my book, I suggested we have two benevolent dictators.

MR. RALPH: Yes.

DR. JERGEAS: And I called them deliberately dictators but –

MR. RALPH: Yes.

DR. JERGEAS: – benevolent. And somebody from the organization head office, like the owner organization, the corporate, somebody called sponsor, needs to see the big picture – that sponsor. And then on the project side, somebody I call the PEO – project executive officer – they focus on the big picture. If they are in the detail, they will miss the big picture.

And I can describe a game when I teach project management classes. And in the first minutes I

come to the class, they don't know me at all – who is George – yet – and I bring a Lego set with me. And this is true and you will probably a have a laugh at it, a little bit. And I bring a Lego set and I say, build a bridge made out of Lego. Time is of the essence. And I give them very little information – really vague information.

And I pick people – volunteers – and ask them to – volunteers, four or five people – and they start building the bridge without asking about the detail, because they go quickly into the detail without asking about the scope – what colour I want, how many minutes we have. They – we tend to jump into execution before we do proper planning. They don't –

MR. RALPH: Yes.

DR. JERGEAS: – pick a project leader, project manager. They don't ask the client.

So I hover around them and I say, I am the client and I start talking and commenting and sometimes with a mic on me. And the people working around the table there and so focused in this tunnel vision, they can't even hear me talk. They – trust me on this one. I almost brought this Lego set with me and to show it to you – prove it to you – bring ordinary project management people, and I will trap them like this.

And I am literally one foot behind them and start talking and I say, I don't like this situation, I'm not happy with it. And they can't hear. And I say more – other things as well and they can't hear it.

The reason they cannot hear it: because they are immersed in the detail. Once they are immersed in the detail, nobody sees the big picture. When we don't see the big picture, this black swan could happen, risk could happen, we are slow in reacting and everything else will be outside of our control.

So that's – so we need the sponsor as one to see the big picture –

MR. RALPH: Yes.

DR. JERGEAS: – and then we need the project executive officer to see – or a project director to focus on the big picture, empower the team underneath this area manager, project manager, to do the detail.

MR. RALPH: So in terms of oversight of cost estimates –

UNIDENTIFIED MALE SPEAKER: Thank you.

MR. RALPH: In terms of oversight of cost estimates, particularly within government, I would suggest it's important, also, to delineate and articulate the roles, responsibilities and tasks of individuals in that process. Would you agree with that?

DR. JERGEAS: Individual, you mean, in – on the project?

This is –

MR. RALPH: Yeah.

DR. JERGEAS: – what you are referring to. In my book, I say that oversight – I started with talking about the leader, the CEO and their – and the sponsor and the project manager, and I specify their role. This one you refer to earlier about the oversight, I am asking the leader, ask the following questions – two types of question. Question number one on topics, and you refer to risk, budget, stakeholder.

As a leader, you need to ask your team: What did we do about risk? Did we do a proper analysis? Did we consider all the risks? Just ask the question. And in my book also I say expect the following answer – I didn't put it here in this document, but it's in the book – and it's basically I am saying ask this question, expect this answer, then I take them to another topic; ask this question, expect this answer. That's the oversight; just ask question.

Then, I also tell them to provide oversight on – of – at each gate. So Gate 1, ask the following question –

MR. RALPH: Yes.

DR. JERGEAS: – expect this answer; Gate 2, ask the following question. So, that's the oversight I am talking about. Start with the

leader, the sponsor and the project executive officer and the project manager. Basically I want to say that we all have a role to play: the leaders lead, provide oversight; the project managers do the job.

MR. RALPH: Yes.

If we go to page 49 of your presentation, in this you define different risks, and I don't need to go into it. You spent a lot of time yesterday –

DR. JERGEAS: Yeah.

MR. RALPH: – explaining this.

But it's fair to say that part of oversight that is the watchful care –

DR. JERGEAS: Yeah.

MR. RALPH: – and supervision of the management of the risks you've identified within a cost estimate.

DR. JERGEAS: It should've been identified, these three types of risk, and accounted for in the budget, in the estimate, in the AFE, whatever AFE version. So –

MR. RALPH: So if government is engaging in oversight of cost estimates –

DR. JERGEAS: Then they should ask, did you include these?

MR. RALPH: Yes, and they have to, I guess, assign that task to someone. That should be delineated and articulated. Who is responsible for that task?

DR. JERGEAS: I would say the organization delivering the project is responsible for delivering – developing and delivering the budget.

MR. RALPH: Yes.

DR. JERGEAS: And then the budget – somebody need to ask them, what did you include, and what we include: contingency and – that's one, and the – so then I said contingency is for the unknowns within the original scope of work –

MR. RALPH: Yes.

DR. JERGEAS: – the unknowns, because the known, they are in the risk register, should have been included in the budget. Now what about the unknowns? That's a contingency – number one. That's not enough. If we're gonna get stuck with only contingency, what about the scope changes that's gonna happen? Like, government could change the scope as well.

Then what about these wild things, like economic conditions. Those are – also should've been included, or somebody asks: Where are they? How did you account for them? What if they happen? Are they above to budget line or below the budget line? Somebody should include that. Because what happened, the project team, they exclude everything above or below the contingency. So they say this is the contingency and anything else is outside the scope.

Right.

Somebody else would say, what if they do happen? I hope I am clear.

MR. RALPH: Yes, yes.

So I guess I'm trying to ask you to address the issue with regard to government and the government's role. So the government sanctions the project and then it finances the project, or participates in that process.

DR. JERGEAS: Mm-hmm.

MR. RALPH: So during that process, you know, I would suggest it's important for government, similar to a project, they need to delineate task and responsibilities with regard to oversight of cost estimates and risk.

DR. JERGEAS: Yeah.

MR. RALPH: Do you have an opinion on that?

DR. JERGEAS: Yeah, I'm clear on that. I think that government will rely on the organization that will deliver the project. The government could ask these questions: Did you include for all the risk? Is that everything we anticipate on this project? But our government people, are

they qualified to ask these questions? Or, out of their education and background, maybe not. Maybe not. I'm saying whoever we are, we need to include in the next project anything could go wrong.

MR. RALPH: Yes.

DR. JERGEAS: Many types of things could go wrong. One of them would put them under contingency, another one and their scope allowance or contingency, the other one management reserve. And the government can ask this question. The organization that will deliver the project should explain that to say, yes, we accounted for and this is how much we think is gonna happen.

MR. RALPH: So do you believe it's the role of government to ask those questions about risk? Have you taken into account operational risks? Have you taken into account strategic risks? Have you taken into account contextual risks in your budget? Whether it's at sanction or whether at financing.

DR. JERGEAS: I don't think they are doing that. They can do that based on their experience and their role. I think we, the project management team and the executive of the organization, we need to provide these numbers.

MR. RALPH: So, the government is operating as – acting on behalf of ratepayers – electrical ratepayers and also taxpayers – so how do you envision their role in the –

DR. JERGEAS: Now, after –

MR. RALPH: – oversight –?

DR. JERGEAS: – the fact – sorry – after the fact, now, if I'm the government, next time a new project comes in, I'd say: Okay guys, we had this story before. Have we accounted for? Now I can say that somebody in the government should ask for these (inaudible) questions. Not only just the risk, but other issues. Stakeholders – how did we deal with the stakeholders? Have we satisfied all the concerns and issues of Aboriginal issues, community issues? How we gonna comply with regulatory? All of these issues applicable now. Somebody in the government should ask – I agree – are they equipped? Do they know that this is their role? I think there is confusion here.

MR. RALPH: Yes.

So, if we can go back to Exhibit 02217?

DR. JERGEAS: Yeah.

MR. RALPH: So, page 2 is this, I guess, a table summarizing the change –

DR. JERGEAS: Yeah.

MR. RALPH: – in the budget? And we go to the next page. Page 3.

So – and this is a spreadsheet reviewing 17 of the contracts or scopes.

DR. JERGEAS: 17 contracts?

MR. RALPH: Yes, and then there's also – the balance of the scopes is in this. And, I guess, it's an explanation, in part, of why you're seeing a change in the cost estimate from 6.2 to 6.5.

DR. JERGEAS: Fine.

MR. RALPH: And part of this spreadsheet includes escalation and contingency.

DR. JERGEAS: Fine. That's good.

MR. RALPH: So, even though it's just one document, clearly, you know, there's a huge amount of data –

DR. JERGEAS: Correct.

MR. RALPH: – goes into this document.

DR. JERGEAS: Correct.

MR. RALPH: And this calculation of the cost estimate.

DR. JERGEAS: Yeah. Just numbers.

MR. RALPH: And, I guess, in future, you know, any government that's engaging in a megaproject, it's important for them to have a plan, in terms of what roles officials have in the

oversight of a cost estimate, especially with regard to risk.

DR. JERGEAS: Yes.

MR. RALPH: Is that fair to say?

DR. JERGEAS: Fair to say, and I think they need probably an education program on this next time government get involved in a megaproject. Like, how would you make sense out of this? I just see, now, numbers. If I'm the government, I say okay, I rely on expert in their field, I trust them. Okay, yeah, 6.5, 6.5. Okay? So, what do you think they should do in this case? Are they, again, equipped to do that, to understand these numbers, to verify these numbers? They need to ask questions, did we account for all the risk? I wouldn't – if I'm the government I would not look at these numbers.

MR. RALPH: Yes.

DR. JERGEAS: I would not. I would say okay guys, you are the expert; did you account for all types of risk?

MR. RALPH: Right.

DR. JERGEAS: Did you consider all the stakeholders and consider their needs and requirement? I don't want to have a big problem a few months from now, and so on. Many other issues. They ask the question and send it back. They are not in a position to check numbers at all. Like, I saw a number called contingency. That contingency, I will ask: what's included in the contingency, what's excluded? I will ask these questions. Don't come back to me and then say oh we forgot that.

They – my answer – yes, we all have a role to play. We all have a role. But it goes from high level, a little bit lower, a little bit lower, detailed level at the project management level.

MR. RALPH: I guess it's fair to say that if, you know, if you don't assign duties, roles, tasks to individuals within the government, for example, it's difficult to assess whether they've accomplished what they're supposed to do. That's a fairly obvious point I suppose.

DR. JERGEAS: Yeah.

MR. RALPH: That's true of labour as well I guess, but I think it's particularly true of government officials.

DR. JERGEAS: Yeah. But based on my experience, is – I rarely see a clarity on what is the role of the government, especially in this case. Mainly a role – like, I see organization building major project and I call them the owner organization, and they have a CEO, they have vice-president and leaders in the business unit and then they have project management team on the jobsite and typically the roles and responsibilities are defined, written and people trying their best to comply with it but sometimes they are overwhelmed by too many moving parts and they get sucked into the detail, maybe sometimes slower to make quick decisions. That's what I have seen.

The role of government if you are focusing on that, I guess we all have a role to play, as in their case is to ask questions; they are not the doers. They cannot do the job.

MR. RALPH: Yes.

DR. JERGEAS: If you are heading in that direction they are not doing the job, they cannot do the job and it's not their role to do the job.

MR. RALPH: Yes.

DR. JERGEAS: And they have other duties like stakeholder management, environmental issues, regulatory. The very big picture and the budget itself. Because they are committed, especially in this case.

MR. RALPH: I'm just gonna ask you some questions about one particular person who's testified in this Inquiry. He was the chartered accountant from the Department of Finance, whose job was debt management, and he was involved with negotiations with respect to financing the project.

DR. JERGEAS: Good.

MR. RALPH: And he was questioned regarding his role in supervising cost estimates, and he said he didn't believe that was his role.

DR. JERGEAS: Yeah.

MR. RALPH: To supervise cost estimates. And he didn't seem to have the skill set, I would suggest either, to do the job. And that role, I don't think was ever assigned to him in writing.

DR. JERGEAS: Yeah.

MR. RALPH: It should come as no surprise, I would suggest, that he didn't actually –

DR. JERGEAS: It doesn't –

MR. RALPH: – provide oversight of cost estimates.

DR. JERGEAS: And I agree with him. I agree with him, this is not his role.

MR. RALPH: Yeah. Thank you very much.

DR. JERGEAS: Yeah.

THE COMMISSIONER: Right. Nalcor Energy.

MR. SIMMONS: Thank you, Commissioner. Good morning Dr. Jergeas, my name is Dan Simmons, I'm here for Nalcor Energy. And a number of things that I want to discuss with you a little bit this morning. And I'm going to start with just some questions to clarify the mandate that you had –

DR. JERGEAS: Thank you.

MR. SIMMONS: – in preparing for your evidence today in your presentation. And maybe we can start, please, with the exhibit that – I think it's 04102, Dr. Jergeas' presentation. And I'm going to go to slide 8, please.

So this is a slide earlier in your presentation, where you've – I think you've made very clear what your mandate is, and it has been, and it is, to provide an analysis of industry best practices, and you've made a point of putting in red that the presentation is not an analysis of the performance of the Muskrat Falls Project.

DR. JERGEAS: Absolutely.

MR. SIMMONS: I think you emphasized that when you went through –

DR. JERGEAS: Yeah, thank you.

MR. SIMMONS: – and I think one of the reasons that you gave us for that – two reasons, one was that there was limited time available to you –

DR. JERGEAS: And limited documents.

MR. SIMMONS: – and limited documents, exactly. So let's go to page 114, please, where you do describe documents that you had available to you.

DR. JERGEAS: Yes.

MR. SIMMONS: So this side says –

DR. JERGEAS: Yeah.

MR. SIMMONS: – okay, Project Documents Reviewed, and there's only 10 items here. So was this the extent of the actual project documentation that you had available?

DR. JERGEAS: Yes. This is the list that – of documents I looked at and reviewed.

MR. SIMMONS: Yes.

DR. JERGEAS: I have two more documents, and I have them with me here, I brought them today as well. I did not review them.

MR. SIMMONS: Okay. So, right – right – so to the extent that you know – that you have any ability to compare –

DR. JERGEAS: Yeah.

MR. SIMMONS: – what you say are best practices to what happened, it's limited to this set of information that we have here.

DR. JERGEAS: Absolutely.

And I picked – they picked a good document, actually –

MR. SIMMONS: Yes.

DR. JERGEAS: – like project charter, project execution plan. I can make comments on those.

MR. SIMMONS: And have you reviewed any transcripts from the evidence from any other witnesses or watched any of the testimony online?

DR. JERGEAS: Yes. I did watch few videos myself on the webcast.

MR. SIMMONS: Yes.

DR. JERGEAS: The reason I watched: to see what is the protocol and the process –

MR. SIMMONS: Yes.

DR. JERGEAS: – to – just to educate myself –

MR. SIMMONS: Yes.

DR. JERGEAS: – and specifically I remember I watched – I went to random at first. The very beginning, the first one. I said, who is the first one, and Professor Flyvbjerg was there.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: And I watched the CEO of Nalcor, Ed …

MR. SIMMONS: Martin.

DR. JERGEAS: Ed Martin.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Yes. And somebody last name Marshall.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: And that's it.

MR. SIMMONS: And that – did you use the information you gathered when you watched those videos –

DR. JERGEAS: No.

MR. SIMMONS: – in informing your opinions or that –

DR. JERGEAS: No, no.

MR. SIMMONS: – no, that was just to see what the set up was and what to expect when you arrived here.

DR. JERGEAS: I watched after submission of my presentation –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – when I have time to prepare myself to come here. So I watched the videos. I did not watch any video at all or see any transcript when I prepared my material.

MR. SIMMONS: Certainly, thank you.

And on this list of documents that you did review here – these 10 documents – in some academic disciplines, these could be divided into primary documents and secondary documents –

DR. JERGEAS: Okay.

MR. SIMMONS: – in that things like a risk management plan or the contracting strategy would be primary documents because they're direct evidence of things that were used on the project –

DR. JERGEAS: Yeah.

MR. SIMMONS: – correct?

And secondary documents are things like analysis done by others, such as the Grant Thornton reports –

DR. JERGEAS: (Inaudible.)

MR. SIMMONS: – here. Right. Okay. Good.

So you have said, for example, that the – that you did read the execution plan and that you said it was a good plan. So –

DR. JERGEAS: Yes.

MR. SIMMONS: – I take it that when you're doing that, you're – are just looking at that document by itself and comparing it to your expectation of what you would find in an execution plan.

DR. JERGEAS: Yes.

MR. SIMMONS: (Inaudible) – yes?

DR. JERGEAS: Yeah. The project execution plan is a great example of good execution plan.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: I said this, and many times: If I'm gonna write a book on project document and plans, I will say this is a good example.

MR. SIMMONS: Okay. Good.

And that is a situation where you had all the information you needed to be able to reach that conclusion because you were only evaluating the plan as written. So that's kind of an exception to when you say in your mandate that you weren't looking at the project –

DR. JERGEAS: No, my –

MR. SIMMONS: – it's a limited exception where you (inaudible).

DR. JERGEAS: Sorry, no, my mandate changed.

MR. SIMMONS: Yes.

DR. JERGEAS: At the very beginning –

MR. SIMMONS: Yes.

DR. JERGEAS: – I received a different mandate – basically to review the document –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – and analysis. I received these limited documentation. We started doing it, but then the mandate changed –

MR. SIMMONS: Ah, yes.

DR. JERGEAS: – and yesterday we explained this –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – changed to do only analysis of industry best practices, and – but still, I reviewed the document –

MR. SIMMONS: Yes.

DR. JERGEAS: – so I still have – you're welcome to ask me about them.

MR. SIMMONS: Good. Thank you. I just wanted to make sure –

DR. JERGEAS: Yeah.

MR. SIMMONS: – where the limits were about what you came here prepared to comment on and what you weren't prepared to comment on –

DR. JERGEAS: I – yeah, I came prepared to talk about this presentation. This is my mandate. But if you ask me what do I remember from reviewing the document –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – this list, yes, they have project execution plan – good project execution plan, a good example and it fits within industry best practices. They use lots of consultants, lots of good quality people to support the development of the plan. Lots of people involved, lots of expert involved, all of that done, I think, is a good way.

MR. SIMMONS: Thank you.

Now, the next thing I observed in – going through your presentation is that there are some references to reports or articles or research work that's been done in relatively recent years. So I presume, then, that you weren't asked to describe what best practices were that were recognized in 2012 or 2013. Because we know the project was sanctioned in 2012 –

DR. JERGEAS: Yeah.

MR. SIMMONS: – and financial close was in 2013.

DR. JERGEAS: Yup.

MR. SIMMONS: Am I correct that you're commenting on, more generally, what you regard as being best practice today? Is that fair?

DR. JERGEAS: No, no. Is – the question – sorry, the question is clear, but the best practice

in this industry – project execution plan, project charter – were there in 2012 –

MR. SIMMONS: Yes. Yes.

DR. JERGEAS: So, there is no –

MR. SIMMONS: I'm not limiting my question to those documents, now; I'm saying more generally throughout –

DR. JERGEAS: Yeah.

MR. SIMMONS: – your report.

DR. JERGEAS: No big change, because this project –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – followed industry best practice that was there a few years ago in 2012, for example. So, project charter project, project execution plan, cost estimate, all of that 2012. And it's still done now.

MR. SIMMONS: Some questions for you regarding best practices, and I've asked this of a number of other witnesses who have appeared here at the Inquiry to give us some opinions. And it's really around the origin of how we determine what to apply this best practice label to. So maybe I can ask you, first, just to give me your conception of what kind of standard has to be met? Or what process of consideration has to be applied before we can put that label, best practice label, on something?

DR. JERGEAS: This is an area, probably a little bit vague as well. This is not exact science area we are talking about. Estimating is not exact science. It's guesstimating. People are guessing. No matter what we do at any phase –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – of the project, it's still guesstimating. It's still, what is best practice? We can rely on association – professional associations –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – even those associations are developing new practices and adding and sometimes I see confusion between different associations. But in general, do we have – have we applied the gated process on this project? That's a best practice.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: They did.

MR. SIMMONS: Mm-hmm.

So about how you decide, though, whether something is a best practice. And sometimes these questions get very specific. There can be general ones: you've just said is a gated process applied? It's best practice to do it. But then we can make the very specific questions about what value of contingency to use or something like that.

So when we're – when you're deciding what to label as a best practice, do you consider is it commonly employed? Is it what most people do? Or do you say, for example, is it – is there an industry consensus? Or is it something for which there's an academic consensus? Because there's different ways to think about –

DR. JERGEAS: Yeah.

MR. SIMMONS: – what you determine –

DR. JERGEAS: I think –

MR. SIMMONS: – and –

DR. JERGEAS: – I think –

MR. SIMMONS: – and so the other one, of course, is to look to industry – formalized industry standards such as, AACE, I think, or PMI. So when you tackle your mandate, here, of identifying best practices, what do you draw on from those sources in order to reach your conclusions?

DR. JERGEAS: I think all of what you said makes sense. All of the above.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: I looked at the AACE. I looked at PMI –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – what they say.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: I also challenged industry best practice.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: And I said it's not working.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: So the best practice is really – it's not the best.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: If it's the best practice, we would've managed megaprojects successfully in anywhere – anywhere in other project as well. So best practice I, yesterday, challenged it.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: I'll give you an example of –

MR. SIMMONS: You did.

DR. JERGEAS: – what I challenged.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: I said the FEED, which is the engineering level in phase 3, is insufficient to give you the accuracy at the end.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: At every industrial org – industrial; i.e., oil and gas, power. Those guys, they follow what I showed you an example, which is the best practice.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: And I said: It doesn't work.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: And probably I am alone saying this and – but I said it –

MR. SIMMONS: Well, you may have company when this Commission concludes (inaudible).

DR. JERGEAS: I hope so. I hope so. And this is why I'm excited about this one.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: So best practice to – in my opinion needs to be challenged, and in many areas. This is one of them. This is one of them. I – we need to challenge the mindset. We need to look at communication and governance and leadership. There are many issues – and team, and team relationship.

MR. SIMMONS: Yeah.

So before you get to challenging the best practice, you have to conclude yourself what to recognize as being a best practice. So if we look at some of the different sources I've described, do you find conflict between them?

DR. JERGEAS: Absolutely.

MR. SIMMONS: Yeah.

DR. JERGEAS: Absolutely. I'll give you a few examples, but let's go back to the gated process.

MR. SIMMONS: Okay.

DR. JERGEAS: And best practice. It's best practice.

MR. SIMMONS: Sure.

DR. JERGEAS: I showed you example of Chevron.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Which is widely published, known and copied by other organizations and used. So other named companies, they have gated process similar to that.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Minor change here, minor change there.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: In my first version, I didn't want to bore you – I will get you. Version one, Chevron; and then another company and another, the same thing. They follow the same thing.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Whoever developed the first one, everybody else followed.

MR. SIMMONS: Yes.

DR. JERGEAS: And genetically is wrong.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: That one I just described, but everybody followed it.

MR. SIMMONS: So are you a voice –

DR. JERGEAS: (Inaudible) common.

MR. SIMMONS: Mm-hmm.

So are you a voice in the wilderness challenging the gated process –

DR. JERGEAS: Yeah.

MR. SIMMONS: – or is there some academic consensus that the gated process is wrong?

DR. JERGEAS: Let's put academic on one side –

MR. SIMMONS: Okay.

DR. JERGEAS: – for one side because I'm a little bit different academic. I'm practicing; I practiced and practicing academic.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: So I can see this, I can discuss it comfortably. I can go with you now in any detail you want about the gated process – any detail, any level.

MR. SIMMONS: Well, we aren't going to do that, so …

DR. JERGEAS: Yes, but academically, this is an area not touched very well.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Not touched very well. In 2008, I published a paper at PMI journal cautioning all of this – 2008 – and it was published. I wrote books about it, and everywhere I go and present, yet to be somebody to challenge me back. So I go to an audience, like, presentation sometimes in the hundreds and sometimes in-house –

MR. SIMMONS: Mmm.

DR. JERGEAS: – and in-house I challenge this for them. You know what explanation they gave me? George, we can't do detailed engineering because – before we approve the project because we're going to spend lots of money and then we might cancel the project. That's the only explanation industry has, only explanation.

I said, so be it. You're going to do detailed engineering almost anyway, you're going to do it anyway. You're going to do it later. And pick the project in phase 1 and say: This is important for the country, for the province, we need to generate electricity, environmental consideration. Is that feasible? Do we need the project? Then go. And that's the only obstacle they have, not to do more engineering. So best practice is not best practice.

MR. SIMMONS: Okay.

It's interesting, so you say best – what is recognized as best practice –

DR. JERGEAS: Is not working.

MR. SIMMONS: – you do not consider best practice because your observation is that it doesn't work.

DR. JERGEAS: Because this is the only observation.

MR. SIMMONS: Okay.

DR. JERGEAS: I'll give you an example.

MR. SIMMONS: I'm not challenging you now, I'm –

DR. JERGEAS: Yeah.

MR. SIMMONS: – just trying to summarize what you've – what you –

DR. JERGEAS: Yeah.

MR. SIMMONS: – just said there.

DR. JERGEAS: Thank you.

MR. SIMMONS: Okay.

Now, so I have some questions for you about some specific things, and some of these are – well, let's go to slide 5 then, page 5 of your presentation, please.

This was very early yesterday. This is the Acknowledgement page and you – where you state things that you've found in your previous work. And I wanted to ask you a little more about the third bullet, which I understand to mean that in your previous work you found projects making profits, and I wasn't sure what you meant by that. I wasn't –

DR. JERGEAS: Oh.

MR. SIMMONS: – sure whether your observation was that even though you found megaprojects with chronic problems, with cost overruns and schedule delays, nevertheless they turned out to make profit. Is that –?

DR. JERGEAS: Absolutely.

MR. SIMMONS: Yes.

DR. JERGEAS: Absolutely. I give you example –

MR. SIMMONS: Okay.

DR. JERGEAS: – and without naming the project.

In Fort McMurray we build big, mega oil sand project and I'm proud of them, they did a great job, thousands of people worked, good for the economy, overrun by more than hundred per cent.

MR. SIMMONS: Mmm.

DR. JERGEAS: And guess what? Go and look at them once they finish on time, they're producing oil above capacity. They were a bit lucky. Oil prices went up as soon as they finished. In a few years they recovered everything.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: They recovered all their cost. So they are – they delivered the project within the quality, the required – specification required, production, so that's what I meant. They made money and recovered all the cost overrun.

MR. SIMMONS: Mmm.

DR. JERGEAS: And, by the way, cost overrun, not all of it is incompetence. Please –

MR. SIMMONS: Yes.

DR. JERGEAS: – this was my message.

MR. SIMMONS: You made that point yesterday, yes.

DR. JERGEAS: Yeah.

MR. SIMMONS: So coming out of this observation that even though projects – megaprojects chronically have cost and schedule overruns, which I suspect are criticized and are points of concern, your observation has been that they can turn out to be – and many turn out to be – profitable. So that raises the question, which you've raised in your presentation, about how you measure success –

DR. JERGEAS: Thank you.

MR. SIMMONS: – of a megaproject.

DR. JERGEAS: Absolutely.

MR. SIMMONS: And I wonder if you could tell us a little more about what your thoughts are

on how we should measure the success of a megaproject?

DR. JERGEAS: I'm glad you asked this question and thank you.

Everyone in the room knowns Sydney Opera House; is it – if I say Australia or Sydney –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – what do you think? The picture, two thing – two pictures you will have: Sydney Opera House and kangaroo.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Okay? Sydney Opera House, overrun by 1,000 per cent when they built it.

MR. SIMMONS: Hmm.

DR. JERGEAS: It was a major disaster from construction point of view.

MR. SIMMONS: Hmm.

DR. JERGEAS: Look at it – I am one of the people visited that place to see it. And so, what is success?

The project management team and the corporation in the project charter should have defined the criteria for success. And that's a mistake people in project – they don't – they have. So –

MR. SIMMONS: How should it be defined differently? What should have been done differently?

DR. JERGEAS: Meeting the business objective is one of them.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: What's the business objective? Please read the project charter. I read it; beautiful document.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: And eloquently described sustainability and environmental and the future energy for the province and all needs of the province, and we going to export energy to the United States and many other things.

Did we achieve that by the end of this project? Did we achieve that? Did we produce electricity and that satisfy that objective – business objective. That's one item. If you leave that out and satisfy the stakeholders, how did we deal with the community issues? So there are many other factors, not – if you leave it on time, on budget – not this project, every project – we will fail every single time.

MR. SIMMONS: So if we take your Sydney Opera House example, I'm presuming that at the point when that was completed – I don't know, 1960s maybe, 1970s – at a thousand per cent over budget, one would think it would have been regarded as a failed project.

DR. JERGEAS: It was regarded as failed project; now it's regarded as successful project.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: That's what I'm saying.

MR. SIMMONS: Yeah. Okay.

So sometimes time –

DR. JERGEAS: Time –

MR. SIMMONS: – is necessary.

DR. JERGEAS: – and I hope this project is – time will prove that it was successful, despite all the challenges and incompetencies.

MR. SIMMONS: Good. Thank you.

Can we flip to slide 11, please, page 11. This is where you're describing some of the characteristics of megaprojects.

DR. JERGEAS: Yeah.

MR. SIMMONS: And I have a question on the last bullet where you've used the term, high visibility. So this – I take it from here that you're somehow distinguishing megaprojects from other projects –

DR. JERGEAS: Yes.

MR. SIMMONS: – to the degree of visibility. And I don't know if you mean public visibility.

DR. JERGEAS: Yes.

MR. SIMMONS: So maybe you can tell me more about what this observation is.

DR. JERGEAS: Oh, public is one of them.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: And the community, politicians, it's visible – the cost overrun is visible. We have cost overrun on the smaller project, nobody hears about them.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Small – they don't have impact. This one has impact on the company. One example I gave you in Alberta, almost shaken the foundation of that company, could – the company could go bankrupt –

MR. SIMMONS: Mmm.

DR. JERGEAS: – and because of this, so high visibility, its impact on geography, on community. Look at the pipeline discussion we have in this country now and the impact of visibility of it, demonstration, people pro, people against. So that's what I'm talking about on this project. Smaller project, insignificant in this area, but they still experience cost overrun and sometimes similar percentages or more.

MR. SIMMONS: Mmm.

DR. JERGEAS: But the impact of a hundred per cent on $1 million is another million, no big deal. The impact on a hundred per cent on a billion dollar is another billion. That's high visibility.

MR. SIMMONS: Yes.

So in a megaproject with high visibility we know, of course, that they tend to take time to complete. You don't do a hydroelectric project or an oil sands project in six months or even a year, they go on over a period of several years. And there are teams of people charged with the execution of the project and getting it done – getting it started and getting it to the finish line.

Do you have any observations on the impact on that process and their work of the high visibility of megaprojects? Does it have no effect on the pressures that they find themselves under? Does it heighten them? Is it helpful?

DR. JERGEAS: If I understand the question –

MR. SIMMONS: Mmm.

DR. JERGEAS: – yes, it does and I'll give you an example. People will lose their job through the process; the people who started the job, not the same people who finish the project. So, lots of pressure, lots of stress –

MR. SIMMONS: Hmm.

DR. JERGEAS: – lots of miscommunication –

MR. SIMMONS: Hmm.

DR. JERGEAS: – misunderstanding, slow decision, fast decision, a lot of scenarios – dynamic scenarios were played. All of that – this is why, in my teaching, I say to the project manager: The best definition of a project manager is a person who does absolutely nothing – nothing.

They laugh and then I deliver the message. It's all about leadership. Stay above, look at these connections, areas, make decision –

MR. SIMMONS: Mmm.

DR. JERGEAS: – coordination, facilitation. Well, as soon as you immerse yourself in the detail, you are sucked in and stress and pressure and usually blame culture associated with all of this; we fire people. So – and another place I say attrition project management, they will be fired. The first project manager, second project manager, maybe the third as well, will be fired.

MR. SIMMONS: So my question, though, is: Does the heightened public visibility of a megaproject have any influence on everything that you're talking about here?

DR. JERGEAS: Maybe, maybe. Now, I don't –

MR. SIMMONS: It's not something you've studied or observed, is it?

DR. JERGEAS: No.

MR. SIMMONS: No. Okay.

DR. JERGEAS: But I know I observed people lose their job. They quit, they leave for a cumulative effect of many factors.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: I cannot isolate one factor by visibility.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: But if we do a proper governance, somebody else will deal with the stakeholder management issues and let the project manager deal with the detailed issues: Excavation and concrete and weather and labour.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: And then somebody else will deal with those bigger issues. Where are the director? Where are the VP? Where is the sponsor? These are the issues that if it's pushed down to the project manager, yes, it will affect that.

MR. SIMMONS: Okay.

You've commented already on some of this, but I had planned to bring you, just briefly, to the Chevron process on slide 23. So, maybe we'll just go there for a moment, please?

DR. JERGEAS: Yeah.

MR. SIMMONS: And I think you've already identified that this is something that could be considered an accepted best practice, but it's one that you challenge –

DR. JERGEAS: It is accepted.

MR. SIMMONS: – and disagree with.

DR. JERGEAS: All the major oil and gas companies across the globe use this one or a variation of it.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: And I'm happy to show you that.

MR. SIMMONS: Yes.

DR. JERGEAS: And I am saying it's not working.

MR. SIMMONS: We'll go to the next slide, 24, then. You spoke of this yesterday.

This is the AACE, and that's the – and I always forget what the acronym AA –

DR. JERGEAS: Association for Advancement of Cost Engineering International, if you add –

MR. SIMMONS: Yes.

DR. JERGEAS: – an I to it.

MR. SIMMONS: Yes. Okay.

And this – and that's an organization that's not strictly confined to the oil and gas industry.

DR. JERGEAS: No.

MR. SIMMONS: There's broader application.

DR. JERGEAS: It is mainly estimating cost control people –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – risk analysis people.

MR. SIMMONS: Yeah, so it has broader application than just the oil sands work that you've done, for example.

DR. JERGEAS: Correct.

MR. SIMMONS: Yeah. Okay.

So – and if I understand what you said earlier, there would probably be fairly broad acceptance

that these sorts of publications from AACE would inform best practices, as we call them.

DR. JERGEAS: Right.

MR. SIMMONS: Yes.

But that you, again, challenge some of the things that come out of AACE, and perhaps on this page here, as being best practice –

DR. JERGEAS: It –

MR. SIMMONS: – whether it should be best practice.

DR. JERGEAS: It should be.

MR. SIMMONS: Yeah.

DR. JERGEAS: But, again, it's a bunch of estimators sat together –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – and used their best experience and practice.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: And I know some of them. They are really good quality people and professionals –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – and they suggested this.

MR. SIMMONS: Yeah.

So if we look at this – and I have a couple of questions for you about this, about how this would be applied in practice because I assume you're familiar with it. And I note that there are different classes of estimates, starting at five and going down to one at the bottom. And I think that in very general terms, we'd say the estimate gets more reliable as it moves from a Class 5 down to a Class 1.

DR. JERGEAS: Right, correct.

MR. SIMMONS: Okay.

And the next column has a level of project definition –

DR. JERGEAS: Yes.

MR. SIMMONS: – expressed as per cent of complete project definition. Now, we've talked a bit about the extent of engineering that's done. Is project definition a bit of a broader term –

DR. JERGEAS: Yeah.

MR. SIMMONS: – than engineering alone?

DR. JERGEAS: Yeah.

MR. SIMMONS: Yeah. Would you tell –?

DR. JERGEAS: Yeah, but –

MR. SIMMONS: Yeah, okay.

DR. JERGEAS: Yeah, like what is the scope? What do we need?

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: The component of it –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – the functions. And, gradually, this is how the engineering started from a thinking process, from an idea process, generating alternatives, selecting the best alternatives. Now, we develop the scope of the selected alternative –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – with a little bit of engineering. Every time I sit at one of these, there is more engineering done, more engineering done. But I think the focus should be on phase 3, or Class estimate 3, the percentage between 10 to 40 per cent –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – that I want you to look at this. And Chevron fits into 25 per cent there.

MR. SIMMONS: Yes.

DR. JERGEAS: And I have checked with companies. I say all the time: What is it, the percentage? They say 30, 35. Rarely, people will say 80 per cent.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: They can do that.

MR. SIMMONS: So this ties into the Gated process then.

DR. JERGEAS: It is.

MR. SIMMONS: These classes – this really fits with the Gated process, doesn't it?

DR. JERGEAS: If I can just emphasize this –

MR. SIMMONS: Yeah.

DR. JERGEAS: – Class estimate 5 is phase 1.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Class estimate 4 is phase 2.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Class estimate 3 is phase 3.

MR. SIMMONS: Okay.

Now, I do note that in Class 3 and Class 2, the percentages – the percentage range of project definition that would fit in, that there's some overlap, in that Class 3 goes up to 40 per cent and Class 2 starts at 30. So it suggests there's still elements of judgment that are going to be –

DR. JERGEAS: Yeah.

MR. SIMMONS: – applied as to whether you consider the project definition work that's been done to fit within the Class 3 or the –

DR. JERGEAS: Yeah.

MR. SIMMONS: – Class 2 estimate.

DR. JERGEAS: Yeah. The overlap is explained by the Chevron. Remember it's 25 per cent –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – and in Class 3 –

MR. SIMMONS: Mm-hmm

DR. JERGEAS: – so Class 2 there – Class 2 started from 25 to whatever.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: So that's why some companies, some people, will stick to up to 3, 30, not 40.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: But, again, guesses, not exact science.

MR. SIMMONS: So it's not strictly prescribed then by AACE which percentage of project definition has to meet to move from a 3 to a 2. There's a little bit of overlap –

DR. JERGEAS: Oh, yes.

MR. SIMMONS: – there. So there will be variation from –

DR. JERGEAS: Yeah.

MR. SIMMONS: – case to case?

DR. JERGEAS: I want to emphasize the following – and on the next project I would say our project are unpredictable. You can't anticipate the future with accuracy no matter who we are.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: We need to live and accept and embrace uncertainty –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – as part of our lives starting with politicians, government, owner organization, contractors, subcontractors, community, especially on megaprojects. Because it's a mega, the impact is huge with this lack of accuracy that –

MR. SIMMONS: Mmm.

DR. JERGEAS: – you are illustrating –

MR. SIMMONS: Mmm.

DR. JERGEAS: – and discussing with me now. So we need to be more comfortable with – like our life, it's uncertain.

MR. SIMMONS: So how then, does anyone ever make a decision about whether to proceed with a megaproject or not, if they have to embrace the inherent uncertainty of what the outcome is going to be?

DR. JERGEAS: (Inaudible.)

MR. SIMMONS: And maybe that's beyond your scope, but it comes out of what you just said.

DR. JERGEAS: That's leadership. That's leadership. If it's good for the country, we'll do it; it's good for the province, we'll do it.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: It's good for business; we'll do it and take risk. And this is why we have very successful business people and very – and, unfortunately, some of them failed. Have guesses, the best guesses, operational project risk, contingency, scope contingency for enterprise risk and management reserve for the other risk. And live with it; explain it, go open honest with everything. Don't pretend you know. If I don't know, I would tell you I don't know. I will get back to you with a range, start with a range.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: I'm going to – almost under virtue of repeating my example of the SUV.

MR. SIMMONS: Right. Okay.

Yeah. Thank you.

And on this chart, the last column over which says, "TYPICAL CONTINGENCY" –

DR. JERGEAS: Yeah.

MR. SIMMONS: – and it does identify that as being to – at the top of the column "To Achieve 50% Probability of Overrun/Underrun." That's the P50 that we've heard about, I think –

DR. JERGEAS: Yeah.

MR. SIMMONS: – and discussed. And at both class estimate 3 and 2, the range seems to me to be fairly broad, from 5 per cent to 15 per cent. So this seems to be kind of a general guidance about how much contingency you have. Can you give us any insight into how you would actually then determine where in that range a particular project should be?

DR. JERGEAS: Yeah, just one comment. If you look at that class estimate 2 –

MR. SIMMONS: Yeah.

DR. JERGEAS: – it says "5% to 15% of unexpended funds."

MR. SIMMONS: Yes.

DR. JERGEAS: The remainder, because we are doing work now.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: We are in the execution.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: So that's five to 15, although it's the same percentage, but for the remainder of the work. That's one.

I'm going to say this: any number divisible by five is fake. Watch these –

MR. SIMMONS: Well, it doesn't say that here.

DR. JERGEAS: Yeah, I'm saying it.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: And this is why I start looking to the mic, because how did they get the number? No accuracy, again. This is based on their experience, their judgment, and I respect their judgment and experience. I respect it, but sometime it doesn't work.

We just finished a study in – between a project in the US and Canada, more than 1,000 project, just recent, and you are welcome to download it from Construction Owners Association of Alberta website. It's called *Alberta Report III*, and if somebody desperate for it, it's in my bag. I'll give it to you. And we looked at many aspect of real numbers – now, real numbers – in Alberta and the US – 1,000 project.

The percentage of the average of all these projects, what is it, 9.3 contingency.

MR. SIMMONS: Okay.

DR. JERGEAS: The percentage.

MR. SIMMONS: Average of 1,000 projects.

DR. JERGEAS: Yes.

MR. SIMMONS: Are these in the megaproject category?

DR. JERGEAS: Some of them are mega.

MR. SIMMONS: Yes.

DR. JERGEAS: Yeah, and we could isolate the mega. We can isolate which – between $1 million, a million and ten, and 100. We have all these numbers now, and we can tell you the cost overrun and each phase.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Each phase of the project, phase 1, the budget for phase 1 was this. I can show you the average.

MR. SIMMONS: These all followed the gated process, pretty much?

DR. JERGEAS: All gated process.

MR. SIMMONS: Yes.

DR. JERGEAS: All gated process.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: The gated process is the standard. It's the –

MR. SIMMONS: So –

DR. JERGEAS: – industry standard.

MR. SIMMONS: – so to come back to this contingency range, then, you're saying the average that's being used is, I think you said, nine point –

DR. JERGEAS: Three.

MR. SIMMONS: – 9.3 and you say that any number divisible by five is –

DR. JERGEAS: (Inaudible) somebody –

MR. SIMMONS: – just picked out –

DR. JERGEAS: – picked a number.

MR. SIMMONS: – picked that out of the air.

So what's someone to do if they're looking at this AACE process and they've got an estimate that falls into a particular category and there's a statement here of what the typical contingency is. How do you get to –

DR. JERGEAS: I will –

MR. SIMMONS: – the number?

DR. JERGEAS: – I will answer it. I will ask all those professional, AACE and PMI and say, do your best, guys. Go do your best –

MR. SIMMONS: Mmm.

DR. JERGEAS: – and say, what do you think contingency is? They will get me 15 per cent. Great.

Now, I will ask the following question: What did you exclude? What is included in the contingency? Please have a look at the reports submitted to you – and there are many reports by estimators, by risk analysts –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – all of – all the time, they say, my number include and exclude the following.

MR. SIMMONS: Mm-hmm.

So you need to know those things –

DR. JERGEAS: I need to know.

MR. SIMMONS: – you nee to have them identified. Yeah.

DR. JERGEAS: Because they excluded it –

MR. SIMMONS: Yes.

DR. JERGEAS: – fine. They excluded it.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: I say, I am now the owner –

MR. SIMMONS: Yes.

DR. JERGEAS: – I will include them. I will use my judgment and best practice. And if you don't have any judgment, put a number. Put – and I will add another billion.

MR. SIMMONS: Mm-hmm.

And that's the owner's prerogative at that point.

DR. JERGEAS: Absolutely. Absolutely.

Like, I give you example. If I am a contractor bidding on a job, I will not include half of my – what I just said. I will include only contingency and contractor. This is the scope. You give me a scope – this is my phone, build this. I will think it's iPhone only. I don't think about it as Huawei or you change your mind on other feature.

That extra, we have a change order mechanism –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – to solve that issue between the owner and the contractor.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: But the owner owns everything. Owners owns the scope, owns the changes, owns the risk, owns the communication, all of it. Somebody should have the estimate given by all those good-quality experts and then I will add contingency 1, contingency 2, contingency 3, add them together and, since everybody is applying the numbers divisible by five, I add another number myself and I say because why? We've been burned many times, we don't know what's gonna happen. And if the project will not be approved, so be it.

But somebody needs to defend it with logic.

MR. SIMMONS: And the owner, you said earlier, needs to ask the questions in order for them to be able to exercise that higher level –

DR. JERGEAS: And make decisions.

MR. SIMMONS: – top-level decision-making about a project.

DR. JERGEAS: So ask questions –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – and make judgment and decisions.

MR. SIMMONS: Right.

DR. JERGEAS: So not only asking question – what's the impact of my question on the budget.

MR. SIMMONS: Okay.

Slide 29, please, and I think I have – we have the answer to this one already, but…

DR. JERGEAS: Yeah.

MR. SIMMONS: Here at the bottom –

DR. JERGEAS: Yeah.

MR. SIMMONS: – this – I think I understand more clearly now that this is where you say: "To achieve a level of accuracy of the estimate of" plus or minus 10 per cent "at the end of the project, industry needs **more than AACE's 10% to 40% or Chevron's 25%.**"

So this is where you're stating that current best practice is insufficient and needs to change.

DR. JERGEAS: Absolutely, yeah.

MR. SIMMONS: Okay.

DR. JERGEAS: Again, I want to say this, they used, on this project and other project, lots –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – of good expert, good quality people, they have done a great job, so how –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – come we can't get it right?

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Ask the – this – if you ask the question, you reach this conclusion.

MR. SIMMONS: Okay.

The next slide, please, page 30.

DR. JERGEAS: Mm-hmm.

MR. SIMMONS: And you headed this "**My Recommendation**," so we understand what this is, and you say: "Strive to have ~80% engineering design completed before mobilizing to site and 100% engineering design completed after site clearing and mobilization is completed but before the start of construction."

So these goals you've set out for engineering completion, they sound to me like they are occurring after the decision has been made to sanction the project and proceed.

Do I understand that correctly?

DR. JERGEAS: Not necessarily, no. I am – here I am talking about when you – if when you – if you go to construction prematurely –

MR. SIMMONS: Mm-hmm, mmm.

DR. JERGEAS: – at half engineering, 40 per cent engineering, something – because it's not IFC, not issued for construction drawings –

MR. SIMMONS: Mmm.

DR. JERGEAS: – and people cannot implement, it's not enough, not sufficient, and there will be changes and extras and – because it's not correct, and we're gonna correct it during construction.

So I'm trying to send a message that when you start construction –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – I don't care when you approve the project –

MR. SIMMONS: Okay.

DR. JERGEAS: – but –

MR. SIMMONS: Yeah.

DR. JERGEAS: – I said approve it at 80 to 90, I said that. But now, what happens on these major project, because we want to show construction, we want to start construction, we prematurely go to construction – that is disastrous.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: That will contribute to cost overrun. On this megaproject, the construction is the biggest phase of expenditure.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: The biggest portion of our project expenditure is during construction. We need to be careful about it; when we go to construction, when we start construction. So if we start the foundation today, there must be IFC issued for construction. If somebody is working up there, mechanical works, fine. Eighty per cent, still, no big deal; it will be completed. But once we touch something, should be IFC drawing.

MR. SIMMONS: Right so, and – so what you're – I gather you to be talking about now is that the point at which commitments are made to contractors and they've committed themselves to the price they want to be paid for the work, that's the stage where there should be issued for construction drawings, so that scope does not change after those contractual arrangements are put in place.

DR. JERGEAS: Two points: The scope will change, even if I – you do everything I said.

MR. SIMMONS: Okay I – yes, I take your point on that.

DR. JERGEAS: Yeah.

MR. SIMMONS: Yeah.

DR. JERGEAS: Thank you.

So – but when we ask the contractor to give you a lump sum –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – any contractor, anywhere –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – you don't give them half-baked engineering and say: Give me lump sum for something I haven't finished. Fifty per cent finished, but I will finish after we award the contract, which is lump sum, fixed price.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: It doesn't make even logical sense.

MR. SIMMONS: Sure –

DR. JERGEAS: So –

MR. SIMMONS: – yeah.

DR. JERGEAS: – so if you really want to protect construction and the contractor, give them as much as you can, accurate engineering, if I can say accurate –

MR. SIMMONS: Yeah.

DR. JERGEAS: – the completion, the 80 per cent is a good range, but expect change. In every organization, expect change.

MR. SIMMONS: Right. Okay. Yeah, I think I understand that.

And slide 31, please.

DR. JERGEAS: Yeah.

MR. SIMMONS: You – this is where you talked about the relationship between cost growth and percentage of engineering and design, this is really the same point. On the bottom there, it says: percentage of engineering design completed, and it says: before construction start. So that's not necessarily when the sanction decision is made, that is ensuring that before construction begins, that the engineering is – the more complete the engineering is –

DR. JERGEAS: Absolutely.

MR. SIMMONS: – the less chance there is of cost growth afterwards.

DR. JERGEAS: Yes.

MR. SIMMONS: Yeah.

DR. JERGEAS: And this is why, for AFE, if you make this AFE condition, your budget will be more accurate. If you make your AFE based on 25 per cent engineering, you're already stuck with a smaller budget, or –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – wrong budget –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – but I'm saying regardless what you do with your budget, now just leave the budget alone now.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Go to construction, I want you to be at 80 per cent, if you didn't listen to me earlier, is what I'm saying.

MR. SIMMONS: Right. And I think you've made the point as well that if – when you're in the process, and if you achieve a greater level of project definition, that then the budget should be adjusted in order to account for that, and that's something that's, I presume, to be expected during the course of a megaproject like this.

DR. JERGEAS: Absolutely. And – so what I was saying, in phase 3, if your engineering is 25 per cent, fine.

MR. SIMMONS: Hmm.

DR. JERGEAS: You're going to do detail engineering after that. So if you – actually, if you look at it, Gate 3, put a line, imagine a line, Gate 3. Before it, before Gate 3 is called FEED, front-end engineering design, conceptual design, 25 per cent engineering. So put 25 before this line. Then after we do detailed engineering, after we approve the project, doesn't make sense, but now I am saying either move this AFE after detailed engineering – move the line.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Move it after detailed – or, if you can't, then please go back and adjust the number at – after detailed engineering. Go back and say – but when you do the AFE, you need to inform everybody: This is a number based on 25 per cent. We considered this, this, this, and we have this range – bigger range. Once you give a (inaudible) number, we're going to get stuck.

MR. SIMMONS: And I take it when you say AFE, we're really talking about budget – that point about fixing budget amounts.

DR. JERGEAS: Absolutely.

MR. SIMMONS: Yeah. Okay. All right.

DR. JERGEAS: Gate 3 –

MR. SIMMONS: So –

DR. JERGEAS: – Decision Gate 3.

MR. SIMMONS: Yeah.

So let me move on a little bit to the different types of risks and the contingency buckets. So I don't have too much for you on this, but let's go to slide 49 – page 49, please.

You've explained this, I think, fairly well already. This is the slide where you gave us your terminology for different types of risks –

DR. JERGEAS: Correct.

MR. SIMMONS: – operational, strategic and contextual. And I think your use of terminology is a little bit different than what we've heard from some of the other people who have spoken to us along the way.

So the first question, then, is: Is there any kind of best practice, accepted, contingent – or – around the terminology and definitions that we use to categorize risks?

DR. JERGEAS: Thank you very much.

The best practice, always, they talk about contingency. Look – talk about – look at AACE documentation.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: They say contingency. And they assume that included everything else in the escalation. So maybe there is overlap.

PMI just now starting talking about management reserve.

MR. SIMMONS: Just now?

DR. JERGEAS: Just recent, so recent. And –

MR. SIMMONS: How recently is that? Is that, like, in the last 10 years or –?

DR. JERGEAS: The latest version of – yeah, after your project.

MR. SIMMONS: Okay, after this one.

DR. JERGEAS: Yeah.

MR. SIMMONS: Yeah.

DR. JERGEAS: And even that definition, I have an issue with it.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: I can explain it.

MR. SIMMONS: Sure.

DR. JERGEAS: Because they think management reserve – the unknowns within the

scope of work; I am saying unknowns outside scope of work.

MR. SIMMONS: Okay.

DR. JERGEAS: So if I have – if you want me to – quick reminder.

MR. SIMMONS: Sure.

DR. JERGEAS: The first one, project risk – in red, project risk. Unknowns within the scope of work and within the control of the project management team.

MR. SIMMONS: So these are things the project management team can manage.

DR. JERGEAS: Absolutely. And I gave you example yesterday –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – like, weather condition, labour productivity, that should have been part of that contingency.

MR. SIMMONS: And, if you can jump ahead a little bit, on a later slide where you break down the types of contingencies –

DR. JERGEAS: Yeah.

MR. SIMMONS: – or reserves, you say the contingency –

DR. JERGEAS: (Inaudible.)

MR. SIMMONS: – the first level of contingency is for this.

DR. JERGEAS: Absolutely.

MR. SIMMONS: And am I correct that I understand the way that tends to be managed is that it's an amount in the budget that the project team has authority to draw on and use if they need to spend it in other areas where it's not specifically included in the line item in the budget for doing excavation or doing steel erection or whatever but –

DR. JERGEAS: In that scope of work.

MR. SIMMONS: – (inaudible) pot of money within the scope of work that they can draw on?

DR. JERGEAS: Yes, I agree with you.

MR. SIMMONS: So if there's a quantity variation within the scope of work –

DR. JERGEAS: If it's minor quantity variation, yes.

MR. SIMMONS: Yes.

DR. JERGEAS: But if it's a major quantity variation it's not, it's different.

MR. SIMMONS: Okay.

DR. JERGEAS: So look at your project – this is – I don't know.

MR. SIMMONS: All right.

DR. JERGEAS: Yeah. Oh, please, one second.

MR. SIMMONS: Carry on.

DR. JERGEAS: Yeah, so the first one is the contingency unknowns because if they were known they would have included that in the budget.

MR. SIMMONS: Okay –

DR. JERGEAS: One more thing, please. What I noticed, whether this number should have been given to the project manager and the team, sometimes scope changes occur and they take that money for scope change from the contingency. No discipline in using it. That's wrong.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Scope changes should not be taken out of the contingency.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: You are removing the flexibility from the project management team. For scope changes, we need another bucket which is the strategic risk or enterprise risk.

MR. SIMMONS: Okay. So let me – just stay with the operational risk and the –

DR. JERGEAS: Please (inaudible).

MR. SIMMONS: – contingency for a moment. I just want to check off a few things here.

So you say this is for things that occur within the scope of work that's defined for the project and they are for unknown things that occur within the scope of work –

DR. JERGEAS: Unknowns.

MR. SIMMONS: – unknowns within the scope of the work. And the amount of contingency is known to the project management team.

DR. JERGEAS: Yes.

MR. SIMMONS: Not to the contractors?

DR. JERGEAS: No, the contractor doesn't need to.

MR. SIMMONS: Okay. And –

DR. JERGEAS: The contractor, they have their own bid –

MR. SIMMONS: Yeah, and –

DR. JERGEAS: – and they have their own contingency in their bid.

MR. SIMMONS: Yeah. And it is under the control of the project management team, they all – they're given the authority to determine what they do and when draw on that contingency.

DR. JERGEAS: Correct.

MR. SIMMONS: Okay. So that's the contingency amount.

How do you quantify it? How do you figure out how much to put in that bucket?

DR. JERGEAS: Guess, guesstimate.

MR. SIMMONS: Mmm.

DR. JERGEAS: That's a guessing exercise, AACE is one of them. We just talked about it.

MR. SIMMONS: Hmm.

DR. JERGEAS: Fifteen to 25 per cent, divisible by five.

MR. SIMMONS: Hmm.

DR. JERGEAS: If you want me to look at – I have no numbers – the previous studies that I just referred to, May 2019, Construction Owners Association of Alberta, CII and the University of Calgary looked at a thousand projects. I can show you the average, 9.3.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: I can show you the maximum, I can show you the minimum on lots of project, between different sizes of projects. So I would use that in the future. I would say: Hmm, it could go 9.3 on average but some people went lower, some people went upper. Okay, what about this project? Oh God, this is unique, this is remote, this is cold weather conditions. I'm going to pick 17.9, not divisible by 5.

Judgment, experience, but we need to encourage our professional not to be afraid to make decision. That, I hope this Commission will have in the recommendation and conclusion, a positive message as well.

MR. SIMMONS: So there are consultants out there who do risk assessment work and help with the assessment of contingencies.

DR. JERGEAS: Yes.

MR. SIMMONS: Is there any value to that?

DR. JERGEAS: There is a value. They show you simulation and S-curve –

MR. SIMMONS: Mmm.

DR. JERGEAS: – and then the judgment is still the decision belongs to the owner organization.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: You agree with that, you don't agree with them, what did they exclude? And then you make the decision.

MR. SIMMONS: Well –

DR. JERGEAS: So all these are useful tools to be used by leaders to make a decision.

MR. SIMMONS: Right.

So one of the co-authors with you on one of your papers was Mr. Richard Westney, I think he's in that business. Is there value in using consultants like that and in placing some reliance or some weight on the advice that comes from them about issues like contingency?

DR. JERGEAS: Absolutely. There is a value for those consultant because they prepare the work for you, they identify issues, they interview people in the process and they raise issues and they recommend –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – and they exclude and they say this is included, this is not included, you should include that. That's their recommendation. Again, yes, there is a value, to answer your question, but the judgment belongs to the leaders of the organization.

MR. SIMMONS: Right. Yes, who may accept or reject different pieces of advice –

DR. JERGEAS: Absolutely.

MR. SIMMONS: – apply different weight to different pieces of advice, and ultimately they have to, you know – ultimately they're the dictator, benevolent or not, who's going to make the decision.

DR. JERGEAS: I'm going to say this: If the judgment is wrong, tough, that's it. This is life. We make decision. I don't want them to be afraid –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – of making decision going forward. If the decision is wrong, deal with it and correct it and keep going.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: That's my approach. Those consultants are giving you advice, like estimators as well.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: They give you lots of advice and they – and account for this and account for that. And by the way, the estimating, it also depends on – the quality of estimating depends on the quality of engineering.

MR. SIMMONS: Sure. Yeah. They're closely tied.

DR. JERGEAS: And, so – so, the judgment – the final decision is why the benevolent dictator –

MR. SIMMONS: Hmm.

DR. JERGEAS: – you get me a good dictator –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – a good leader –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – with a good experience in this business, have done megaproject before – they will make the right decision overall. They will make the right decision.

MR. SIMMONS: Okay. I'm – it's – so that's taking us on a sidetrack but I'll go there for a moment. The benevolent dictator – you don't present or suggest any other governance model other than the one that has the benevolent dictator who has – is a single point of decision-making for some of these difficult decisions.

Why don't you present other, I don't know, more democratic alternatives or other analogies other than the benevolent dictator, or is it your view that that is the most effective way to approach decision-making in a project like this?

DR. JERGEAS: Yeah. The more democratic in a megaproject when we have too many moving parts –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – is slow. It's very slow.

MR. SIMMONS: Hmm.

DR. JERGEAS: It's very slow. And you can't consult on many issues. You are driving the bus.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Come on, drive it. You don't need to ask.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: You have the dashboard. You have the steering wheel. Drive. Honey – should I stop or not? Bang! You killed someone.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: You don't need to ask. You keep driving.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: And that is what I am saying. It's not – I'm not promoting dictatorship.

MR. SIMMONS: Right.

DR. JERGEAS: I am promoting leadership.

MR. SIMMONS: Yes.

DR. JERGEAS: And a good leader, who consult, who complies with law, ethics, a moral obligation and then make decision, support the team. He or she is accountable for the decision –

MR. SIMMONS: Hmm.

DR. JERGEAS: – protecting the team, encouraging them – there is a study, a British study – it's on fast tracking. It's called *Fast Track Manual* by an organization called ECI. Please Google that one.

And one of their recommendation is empower the people at all level – at the lowest managerial level – to make decision without fear –without referring.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: And if the decision is wrong – correct it and keep going – no blame culture. Simple sentence. Simple sentence. Leadership. So that's one about governance. So, first you put the right people in the right position. Right people means – and I have the roles described very well – what they need to do regarding accountability, responsibility and oversight.

So, for that and then the leader for the project which is, I think, it's called director on this one. I call project executive officer – equivalent to the CEO of the organization. We have a CEO for the project, another one – and the CEO – PEO, or director, report to the sponsor – that's one, relationship. And everybody below that level report to the director. No functional activities or managers report to another VP.

MR. SIMMONS: Okay.

DR. JERGEAS: So – because you asked me is that the only thing. No.

MR. SIMMONS: Okay.

DR. JERGEAS: Change the mindset.

MR. SIMMONS: Yeah. I was think more about the decision-making by the senior person in the organization and it being – 'cause when I hear dictator, what – an attribute that I think can apply to that, is that it is a person who gets to make the decision without having to create a consensus with other people. The buck stops with that person and they get to decide on important or controversial issues.

DR. JERGEAS: I think they could reach this level, I didn't say without consensus. You try –

MR. SIMMONS: Mmm.

DR. JERGEAS: – the team comes to you –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – and with two option, three option – this is option 1; these are the problem, option 2; these are the problem and issue – and the leader should be able to make a decision –

MR. SIMMONS: Yes.

DR. JERGEAS: – and somebody may not be happy.

MR. SIMMONS: Right.

DR. JERGEAS: You can't make everybody happy on this megaproject in –

MR. SIMMONS: And there are times decisions have to be made in order –

DR. JERGEAS: Absolutely.

MR. SIMMONS: – to keep the project moving.

DR. JERGEAS: Absolutely. And we need to trust that, trust those leader and this – we – this is why we pick them, this is their job. And, they should be encouraged to make tough decision. Sometimes, unfortunately, they do not work. That's fine, that's our life. We all make decision in our life, every day.

MR. SIMMONS: Okay. Let's – I am gonna bring you back to the risks (inaudible); we sidetracked a little bit, we talked about operational; and then we have what you call strategic risks or enterprise –

DR. JERGEAS: Yeah.

MR. SIMMONS: – risks, and –

DR. JERGEAS: And I explained it yesterday

MR. SIMMONS: – and you'd better refresh my understanding of it.

DR. JERGEAS: Yes. And I said: The unknowns outside the scope of work –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – are outside the control of the PM, but within the control of the enterprise.

MR. SIMMONS: The enterprise.

DR. JERGEAS: The company.

MR. SIMMONS: Yes.

DR. JERGEAS: I.e., scope changes. The company itself, for whatever reason, could come and increase the scope, change the scope; add capacities, reduce capacity. They are entitled.

MR. SIMMONS: So these are risks, these are unknown risks outside of scope –

DR. JERGEAS: Yes.

MR. SIMMONS: – and when they – if they – when the contingency amount – and this is the one you call the scope contingency – you recommend setting up a separate bucket called –

DR. JERGEAS: (Inaudible.)

MR. SIMMONS: – scope contingency for this one. So how do you quantify that one?

DR. JERGEAS: Another –

MR. SIMMONS: How do you how much to put in that one?

DR. JERGEAS: – another number divisible by five.

MR. SIMMONS: But it's an estimate. Or a guesstimate?

DR. JERGEAS: A guesstimate.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: And, honestly, I wanted to study this. No organization will allow me to look at their previous project. I was a claim consultant.

MR. SIMMONS: Yes.

DR. JERGEAS: So, we –

MR. SIMMONS: I understand that.

DR. JERGEAS: So we have document – they have document; I can look at it – like, show me the budget, show me all the changes and change order. And I could have done a study to say what percentage you want change – scope change, what per cent. So nobody will give me access (inaudible) –

MR. SIMMONS: So can you say how you should quantify the amount to put in a scope change?

DR. JERGEAS: Look at previous project.

MR. SIMMONS: Regardless of how they do it, but (inaudible) –

DR. JERGEAS: Do a proper analysis of previous project.

MR. SIMMONS: Mm-hmm. Okay. Simple as that?

DR. JERGEAS: Simple as that.

MR. SIMMONS: Yup.

DR. JERGEAS: I can give you, from our study, now, we just finished, what happened to original scope, what happened to the final budget. I have that on a thousand projects.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Now recent. So I can use that. Now, if somebody ask me, I say this is the only numbers I have.

MR. SIMMONS: So, when you say –

DR. JERGEAS: I don't have a formula. Nobody has a formula.

MR. SIMMONS: So let's say we have a project that adopts your three-bucket approach, and the second bucket here is the scope contingency, we figured out how much to put in it, or to allocate to that, who knows how much is in that?

DR. JERGEAS: Above the project director –

MR. SIMMONS: Above the project director. The project director does not know how much is in the scope –

DR. JERGEAS: I should tell them, no problem, but under the sponsor's control and authority.

MR. SIMMONS: Yes. So it's the sponsor's, whoever – and this is your suggested hierarchy with the executive officer for the project and then the sponsor and then reporting on up. So, it's at the sponsor level that the sponsor has the authority and the control to draw on the scope contingency. Is that your suggestion?

DR. JERGEAS: It could be we give the project manager level the contingency.

MR. SIMMONS: Yes.

DR. JERGEAS: Okay? Say your contingency, go ahead with it. If there is a change –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – in the scope, come to me, now I am the director. So I can keep this with the director –

MR. SIMMONS: Yeah.

DR. JERGEAS: – just this little budget, only for scope changes.

MR. SIMMONS: Yes.

DR. JERGEAS: So if the project manager, there is a scope change, he/she should come back to the director and say this is scope change; it's not contingency.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: I need it from this bucket –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – so to protect the contingency. And yesterday I showed you a curve –

MR. SIMMONS: (Inaudible.)

DR. JERGEAS: – this is why I wanted to protect the curve. The other bucket goes to the sponsor, the final one – the management reserve. If you combine both of them, okay, leave them to the sponsor, all of them.

MR. SIMMONS: Okay, so I think I understand that.

So the approach – if I could (inaudible), the team executing the project know that if they have a change that is out of scope, they have to

go to the project director or whatever the assigned role is to say: We have a change. We need some more money. And they don't necessarily know how much that person has in the second bucket, but that's the process.

DR. JERGEAS: Even if they know, but that's not –

MR. SIMMONS: Yeah.

DR. JERGEAS: – an issue.

MR. SIMMONS: Yeah.

DR. JERGEAS: Why –

MR. SIMMONS: The contractors don't know.

DR. JERGEAS: No, no, contractor don't know anything.

MR. SIMMONS: Yeah.

DR. JERGEAS: Only their bid.

MR. SIMMONS: Yeah.

And then the third set of risks are the contextual or global risks. So –

DR. JERGEAS: These are the unknowns outside the scope of work –

MR. SIMMONS: Yes.

DR. JERGEAS: – and outside the control of the project management team –

MR. SIMMONS: Right.

DR. JERGEAS: – and the executives and the organization.

MR. SIMMONS: So when you say outside of the control of the project management team, the executive and the management, do you mean things that they cannot influence or mitigate against?

DR. JERGEAS: Yes, and control as well. No idea. I gave, yesterday, and example.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: United States slaps another 20 per cent on steel, and this happened – the project uses lots of steel, and whatever budget we had is already gone.

MR. SIMMONS: Yeah.

DR. JERGEAS: Okay? That is management reserve.

MR. SIMMONS: So how do you quantify how much goes into that box?

DR. JERGEAS: Another number divisible by five.

MR. SIMMONS: So that's another guess.

DR. JERGEAS: Pick a number.

MR. SIMMONS: Pick a number.

DR. JERGEAS: There is no formula, unfortunately. I wish – I – honestly I said it – an incomplete – I wanted to study that to provide some guidance, and nobody will allow me to look at previous project because of confidentiality.

MR. SIMMONS: So what happens if we take your suggestions here – your proposals – which I take it to be somewhat of a change from what many people would regard as being best practices, correct? The doing – managing the three buckets in this way. That's not – would you say that there is a best practice that this was the way it has to be done, or is this your view on what you regard as being the appropriate (inaudible)?

DR. JERGEAS: I – you know what? I think better way I would say it is my strongest recommendation and view –

MR. SIMMONS: Yes.

DR. JERGEAS: – not opposed by industry once they hear me talk about.

MR. SIMMONS: So –

DR. JERGEAS: I – sorry – part of this analysis –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – to prepare myself today: I sent email to few people I know – executives and very highly regarded professionals – and asked them this question.

MR. SIMMONS: Mmm.

DR. JERGEAS: Where do you include (inaudible) all of this?

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: You should see the answers, confusion. And not a – there is not clarity until –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – I went back again and back again. Once I explained it is way – like what I just did –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – people think, yeah, makes sense.

MR. SIMMONS: Some people would say it's very surprising that in – as – that it would be as widespread as this in industries that are as sophisticated as oil and gas and large megaproject, civil industry, that there could possibly be confusion about things like this, if you're capable of explaining it to them and then the light bulbs go on and they understand how to do –

DR. JERGEAS: Yeah.

MR. SIMMONS: – it.

DR. JERGEAS: Yeah, and I said – this Commission, and at – this problem summarizes in three words. I can summarize it: communication –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – governance, leadership.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Three.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Three things.

Lack of communication – if industry always talk about contingency and forget the others, we have a problem. So if I am the owner, from now on, I will add two buckets or one bucket – it's up to you – as – either call it management reserve and put a number. If somebody wants to remove it, fine, we have a good communication.

MR. SIMMONS: Yes.

DR. JERGEAS: We (inaudible) removed it, then it will be extra.

MR. SIMMONS: I think we've already covered this in that discussion, but if we go to slide 59, please.

DR. JERGEAS: Yeah, yeah, this is the one.

MR. SIMMONS: This is just at the bottom. And I'm not gonna work through this with you, but I just note the last bullet, and you've got in bold there: "**Lack of clarity in industry practices.**" So that seems to tie in to what you've just –

DR. JERGEAS: I just said.

MR. SIMMONS: – you've just told us, yeah, okay.

A more technical question now, if we go over to slide 61, please. Many of us would now recognize this as an S-curve, having had no idea a year ago what an S-curve is, and I want to make sure that I understand a little bit about what you've said here.

So on the bottom of this graph you've got A, B, C. And A, "Sum most probable value," you also describe as the base estimate or the traditional deterministic calculation. So that's the estimate the estimators prepare –

DR. JERGEAS: Yes.

MR. SIMMONS: – when they add up all the hours and add up the cost of all the materials and add up all the overhead –

DR. JERGEAS: Thank you.

MR. SIMMONS: – the sum total at the bottom, that's the deterministic estimate, is it?

DR. JERGEAS: Mm-hmm.

MR. SIMMONS: Okay.

And then on top of that, then you add a contingency allowance. Is this your first bucket?

DR. JERGEAS: This is the first bucket –

MR. SIMMONS: This is –

DR. JERGEAS: – here.

MR. SIMMONS: – the first bucket.

And I think you said that that first bucket brings you up to a 50 per cent of probability, that's our P50.

DR. JERGEAS: Correct.

MR. SIMMONS: Right.

And then you say contingency reserve. Is that your second and third buckets together?

DR. JERGEAS: Combined.

MR. SIMMONS: Combined.

DR. JERGEAS: Yes.

MR. SIMMONS: And I understood you yesterday – and you've got "X%" there on the chart. In response to a question from Mr. Learmonth, I – when asked about what X should be, I understood you to say 85 – P85 or 85 per cent now.

DR. JERGEAS: Yes.

MR. SIMMONS: That was my note of what you said: now.

Now –

DR. JERGEAS: (Inaudible.)

MR. SIMMONS: – why did you said now?

DR. JERGEAS: You are correct –

MR. SIMMONS: Mmm.

DR. JERGEAS: – because – it depends. If I am the project leader –

MR. SIMMONS: Mmm.

DR. JERGEAS: – and I will consider the condition of the project, the market condition, this geographic location, stakeholder management issues, all of this, I could go to 90.

MR. SIMMONS: Mmm.

DR. JERGEAS: I could go to 80. And this is – in a new book, we suggested 85 in the book.

MR. SIMMONS: And that's – the note on the bottom – this is your 2019 book that you've –

DR. JERGEAS: Correct.

MR. SIMMONS: – that you brought out where you suggested that.

DR. JERGEAS: And this – actually, I've done it where expert in risk analysis in Norway.

MR. SIMMONS: Not too much more.

Slide 72, please.

This is under the governance and oversight section. And you've got a – sort of a chart here. I don't want to spend too much time on this, but I didn't understand the internal stakeholder and external stakeholder boxes on the side and how they tie into project executive officer and project sponsors, to what you were referring to there –

DR. JERGEAS: Yeah.

MR. SIMMONS: – in this structure.

DR. JERGEAS: Yeah, yeah.

For example, the project sponsor needs to deal with all the other VPs and issues between different departments, government, all of that thing.

MR. SIMMONS: Those are the internal stakeholders, are they?

DR. JERGEAS: Internal stakeholder.

MR. SIMMONS: Internal to the corporate organization.

DR. JERGEAS: Internal – and, by the way, they will – basically, the project sponsor will protect the PEO from all of those above his level (inaudible) –

MR. SIMMONS: Okay. That's an interesting concept.

DR. JERGEAS: Yeah.

MR. SIMMONS: But why is that?

DR. JERGEAS: Because the sponsor, in my point of view, is an equivalent to a VP –

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – and he has, or she has, more influence on these guys. But usually the VP level are more powerful than the project director, anyway –

MR. SIMMONS: Mmm.

DR. JERGEAS: – so –

MR. SIMMONS: Why does the project director need to be protected from the VPs?

DR. JERGEAS: Oh, they interfere. They interfere, they conflict, they don't support, they have different mandate, not aligned – oh, God, there is a lot of thing.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Because some of this, if you go to the lower level – PM, PM, FM –

MR. SIMMONS: Yeah.

DR. JERGEAS: – at the bottom – some of these functional manager – let's say functional manager number one, manager of engineering on this project –

MR. SIMMONS: Mmm.

DR. JERGEAS: – he/she can be reporting to VP of engineering. Right away. There is absolutely no control on this, and this VP can remove this person from one project to another, different priorities –

MR. SIMMONS: Okay, yeah.

DR. JERGEAS: – so that's what I wanted –

MR. SIMMONS: Yeah.

DR. JERGEAS: – to say.

MR. SIMMONS: So the external stakeholders, who are they intended to be in your reference here?

DR. JERGEAS: Oh, any – anybody who is affected by the project or can affect the project, so two words.

MR. SIMMONS: Yeah, so why are they tying in at a lower level than the project sponsor? I would've thought at least we would be at – up at the project sponsor level to be –

DR. JERGEAS: Oh yeah –

MR. SIMMONS: – dealing with external stakeholders.

DR. JERGEAS: – yeah, no, no – if you look at that – the line, there is a connection line between –

MR. SIMMONS: Okay.

DR. JERGEAS: – the two. And they will work together on this.

MR. SIMMONS: Okay, so this is not such – this is not a clear division of responsibilities –

DR. JERGEAS: No, no.

MR. SIMMONS: – here, as you're just drawing – okay, yeah.

DR. JERGEAS: So because the project director, or PEO, still need to deal with some stakeholders, but sometimes the project sponsor

deal with other stakeholders like government. If I were to do that, I say, sponsor, you deal with the government.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Is how I would do it. But maybe – Aboriginal issue, maybe both of them will work on it. This is why you see the line connecting between the two.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: But regardless what I say, it is flexibility needed; it's not rigid. If we have rigid systems, we will never deliver big project. We need to have this agility. That's another one. Agile project management. It's not about structures; it's not about lines.

MR. SIMMONS: Right, and of course these concepts you have here on this chart, these would have to be applied and worked into whatever the corporate structure was for the particular organization, this – yeah.

DR. JERGEAS: Yeah, always we have a CEO, VP, VP, VP. Always.

MR. SIMMONS: Yeah.

DR. JERGEAS: And each VP has a hand in it.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: Contributing something, some of them designing, some of them delivering, some of them commissioning, some of them operating. So they are contributing to this project, but I need the maestro – is the sponsor. And the other maestro later, the PEO.

MR. SIMMONS: Slide 106, please. This is the last one I'll be bringing you to, Dr. Jergeas.

DR. JERGEAS: Thank you.

MR. SIMMONS: And this is just to raise the topic of collaborative relationships that you've spoke of yesterday.

DR. JERGEAS: Thank you.

MR. SIMMONS: And in the context of dealing with contractors.

So I think I did understand you to say though that it's not just a matter of ad hoc collaboration. The collaboration still has to take place within the framework of the contractual relationship that exists between an owner and a contractor. Would that be fair to say?

DR. JERGEAS: Yes.

MR. SIMMONS: Yes, okay. And for the collaboration to be successful, you really need two willing participants. You have to have both sides willing to engage, I would suggest.

DR. JERGEAS: But must be initiated by the client.

MR. SIMMONS: Okay.

DR. JERGEAS: Without the client –

MR. SIMMONS: And –

DR. JERGEAS: – nothing happens. Even if I am willing, I am the contractor. I am willing to, but if the client does not initiate it –

MR. SIMMONS: Mmm.

DR. JERGEAS: – believe in it –

MR. SIMMONS: Mmm.

DR. JERGEAS: – leading it –

MR. SIMMONS: Mmm.

DR. JERGEAS: – it doesn't happen, it does not work.

MR. SIMMONS: But we heard – and I'm not asking you to comment on the project, I'm just gonna refer to this because it's a conceptual thing that I want to know if you heard of it before. But one thing we heard of in earlier testimony about relationships between owners and contractors was, a way to classify them is you can have contractors that are being productive and being cooperative, sort of the best. There – so you got good collaboration and

it's working out productively and that's kind of the best relationship you could have.

You could have a contractor that's being productive but uncooperative in the sense that you're still having commercial disputes and so on.

Or you could have contractors then who are being unproductive on the job, not achieving very well, but could either be cooperative with the owner or uncooperative with the owner.

Is that a conceptualization for the relationship that you've encountered?

DR. JERGEAS: You know what, I am lucky I worked in this area a lot, not as a researcher only, it is as a facilitator on this –

MR. SIMMONS: Mmm.

DR. JERGEAS: – project. And I have seen very successful stories when we start with open, honest communication; when the owner leads it, when the owner encourages it, when the leaders of our organization wanted it. It's unbelievable it was going to happen.

I don't know about this – categorization that you're talking about, but in a trust-based relationship, innovation will come, care will come, the attitude of we are in it together as a project team, your problem is my problem, my problem is your problem–

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: – what can we do together.

MR. SIMMONS: Mm-hmm.

DR. JERGEAS: But still, still there – we need the owner to encourage it –

MR. SIMMONS: Mmm.

DR. JERGEAS: – the owner to drive it, owner to believe in it. If we do what the contractor want – easy, simple, they don't want to lose money. The – what the owner wants? Want to get the project done in a cost-effective manner and do it within the specification and in a safe manner. And these are not contradictory kind of things.

So there is a lot in common between all of us and we can work together. Need to be encouraged, that's another governance, need to be done.

And may I say final words here on this one: We have the best technology and computerized system, we have the best tools, we have the gate to the process, we have done project execution plan and we got the best estimators, best risk analysts, best, best, best, all of this. What are we missing? Think about it. We are missing this working together collaboratively. The adversarial relationship and the perception that the contractor gonna come and cheat and not work collaboratively and I want to just make money and they don't care, and the owner doesn't want to be fair. We have perceptions in industry – and engineers don't know what they are designing, what is the scope of work. And so always we enter into this relationship in a very adversarial mood, just a protection kind of thing, and I know this is tough on contract and contract administration.

We need to stop this and we say: We are in it together as a community working together. And trust me, this will create success. This is the only missing link if you think about it.

MR. SIMMONS: So is this one of those things that we would put in the category of a recommendation that you have as to how project relationships should work, but not necessarily what you observe across the range of projects as being fully implemented.

DR. JERGEAS: Absolutely.

MR. SIMMONS: Okay.

DR. JERGEAS: Yeah.

MR. SIMMONS: Thank you.

I don't have any other questions.

DR. JERGEAS: Thank you very much.

MR. SIMMONS: Thank you, Commissioner.

THE COMMISSIONER: (Inaudible), I think we'll take our break here this morning then for 10 minutes and we'll come back then with the Concerned Citizens Coalition.

CLERK: All rise.

Recess

CLERK: All rise.

Please be seated.

THE COMMISSIONER: All right, Concerned Citizens Coalition.

MR. HISCOCK: Good morning, Doctor.

Will Hiscock, I'm here on behalf of the Concerned Citizens Coalition. That's a group of private citizens who had voiced concerns around risks and costs and things of that nature early on in the project, either before sanction or around those periods.

DR. JERGEAS: Okay.

MR. HISCOCK: Doctor, you described the characteristics of a megaproject in your presentation, issues such as: Complexity and unpredictability, the fact that they're not easy to handle even with best efforts, the global experience of cost overruns and the list goes on.

It seems to me that you're saying that there's realistically a limited group of people who should take on megaprojects, namely companies with – and governments with very deep pockets, or otherwise only in especially profitable ventures. Would you agree that likely a small and heavily indebted province, like Newfoundland, might be wiser to consider trying smaller investments rather than megaprojects?

DR. JERGEAS: Yeah, it makes sense. I have no comment on your statement. It is risky, yes, and if the province decide to work on smaller project, that's a good decision as well.

MR. HISCOCK: Yeah.

Would you agree that a CEO of a Crown corporation, even one that's mandated to build a megaproject, should be cognizant of the financial risks that megaprojects pose?

DR. JERGEAS: Any one of us should be that – like that because we have seen it happen. Historically, every project going – overrun and delays, this is expected by all of us at all levels.

MR. HISCOCK: Okay.

And you've spoken about the 50 to 100 per cent cost overruns over the budget as being the norm in these megaprojects. In slide 16 of your presentation, you noted that the overruns have occurred – one of the overruns have occurred, quote: It's not easy to explain the new budget, that it isn't driven – that the overrun isn't driven by incompetence.

Would you say that an experienced CEO would understand those risks at the outset of a megaproject and account for them in the actual budget or ought to –?

DR. JERGEAS: The CEO?

MR. HISCOCK: The CEO.

DR. JERGEAS: I think this is – there is a need for better education in this area, not only CEO, vice-president level –

MR. HISCOCK: Mm-hmm.

DR. JERGEAS: – board of directors level, politicians, as well, and organizations. I would say politicians as well should be included, basically, just showing them this kind of slides that this is a challenge. Then we make a decision as a community. We do – do we want to go ahead with it or not?

MR. HISCOCK: And you spoke earlier as well about the fact that most of the specialized skills to question the real budget numbers are going to be within the company probably and not the government. Would you see it as the company's role in a Crown corporation – similar to the CEO's role, I guess, towards any shareholder in a company – to protect the shareholders? We're not expecting the shareholders to understand –

DR. JERGEAS: No.

MR. HISCOCK: – necessarily the risks of a megaproject. That would be the company's job to, once tasked with the idea of a megaproject, to go to the government and explain the significance of the risks of a megaproject and the significance, or even likelihood, of serious cost overruns. Correct?

DR. JERGEAS: Yeah.

There are lots of us in the room, shareholders – small shareholders, I guess, in companies. Nobody asked me, when they invested on a big project, what's my opinion or anything. So the corporation itself, we trust them to manage the project on our behalf, same – I guess, same with the government.

MR. HISCOCK: Would you agree that before embarking on a project like Muskrat Falls or a megaproject of that sort, that the leadership mandated with such a project ought to have experience – have had experience previously with that type of construction and at a very senior level? If you were going to be doing any of those kind of megaprojects, especially, you would want the leadership to have had – been very involved at a high level on previous projects that were not dissimilar from that?

DR. JERGEAS: A senior level, their role is leadership and understanding of the complexity of this project and making decision. If they have prior experience, that's useful. But there's still – their job is leadership; it's not to build, not to design, not to construct, not to commission a project. Like, what I am trying to say: ask the right question, provide the right decision, provide oversight and governance. If they are good at that, they will be successful. If they – because they going to rely on other people on the technical side.

So I would emphasize more the leadership role rather than knowing exactly they have build another power plant. If they built another similar megaproject, that's a great experience to have, but it's still – combine that with leadership.

MR. HISCOCK: Okay.

Would you agree that when cost overruns begin to occur, that it's critical that the board of the corporation should be informed at the earliest possible date?

DR. JERGEAS: Oh yeah. So they – we should have a committee – steering committees, regular reporting, all of that. And I expect this to happen on any project.

MR. HISCOCK: Presumably, besides a well-tested set of estimates, the bids for the major project packages are what will establish the trend line for the project costs, correct? So we'll have our established estimates, but once the bids start coming in, that's when we know –

DR. JERGEAS: Yeah.

MR. HISCOCK: – where things are headed, correct? Okay.

Would you agree that it is quite anomalous of the – if a CEO, in establishing project cost forecasting, does not use either the trending of those contracts or quantitative risk analysis, QRA, and instead waits for the project cost overruns to actually occur before acknowledging that there are overruns – that the project is overrunning?

DR. JERGEAS: No, let me do it this way. There are, on these big project, early warning signs –

MR. HISCOCK: Mm-hmm.

DR. JERGEAS: – and I listed a few of them yesterday.

MR. HISCOCK: You did.

DR. JERGEAS: One of them is you consume contingency very quickly. And if bids comes in, and contingency started evaporating, that's an early warning sign. Something must be done.

MR. HISCOCK: And that means to go to the board immediately that reassessment need to happen –

DR. JERGEAS: (Inaudible.)

MR. HISCOCK: – 'cause you know when the trend lines are at that point, right?

DR. JERGEAS: Yeah. That's one. Yeah.

MR. HISCOCK: Typically is an AFE sought from a board of directors based on the trend for bid result, if a QRA isn't available? Would the AFE be based on the trend lines of the bids that had come in to date? If we know we're over by 20 per w cent on the bids that we've gotten so far, the AFE needs to reflect that on the project on the whole, would you say?

DR. JERGEAS: I would – if this happens to me that 20 – your numbers, 25 per cent or 20 came above my budget, I would've stopped here and say, okay, now what's gonna happen? If we are going to continue, we haven't started and we lost 20 per cent of our flexibility. What's contingency? That – and all types of contingency. It's our flexibility.

It's gone and we haven't started the project yet. The problem is after we start the project, what's going to happen? With that – this discussion about quarter-baked engineering, well, the scope will change, everything can happen. So already contingency is gone. So I will stop here and revisit everything. Revisit, go to the board of directors. Go to government. Go to anywhere.

Stakeholders – shareholders, I mean, sorry. And decide to go ahead or not.

MR. HISCOCK: Right.

DR. JERGEAS: That's a wake-up call here.

MR. HISCOCK: It should be a wake-up call anyways.

DR. JERGEAS: Yes.

MR. HISCOCK: Yes.

Based on your study of megaprojects and your experience with megaprojects, how common would you say it is to proceed on a megaproject based on this – a P1 schedule?

DR. JERGEAS: P1 means –

MR. HISCOCK: P1 meaning well that, I guess, there's a 1 per cent chance of meeting the schedule and a 99 per cent chance of going over it.

DR. JERGEAS: Yeah. And all the documents I have seen on best practices now we talk about P50.

MR. HISCOCK: P50.

DR. JERGEAS: At P50, you have a 50 per cent chance that you will overrun.

MR. HISCOCK: And if the timing of that power is one of the most critical factors in the development of the project or whatever you might actually want to raise that P factor. It might be very crucial to ensure that – you gave the example of the – of having a stadium ready for the Olympics.

DR. JERGEAS: Yeah.

MR. HISCOCK: In that case, we really need a P90 or 99, don't we, in order – 'cause there's no point in having it done six months after the Olympics are over.

DR. JERGEAS: Yeah.

MR. HISCOCK: So that, you know –

DR. JERGEAS: But – but –

MR. HISCOCK: – you can vary it like that.

DR. JERGEAS: But if the business mandate is go now and do it –

MR. HISCOCK: Mm-hmm.

DR. JERGEAS: – or we'll do it without an estimate, without anything, any number, we need the project.

MR. HISCOCK: Right.

DR. JERGEAS: So (inaudible) the situation could be different. Why do we need to do engineering? Sometimes in the case of emergency or national need, we start a project without any design. Like flood mitigation –

MR. HISCOCK: Right.

DR. JERGEAS: – floods come then and what do we do, we wait? We go and start construction

right away, and order equipment and just do it. So it depends on the situation (inaudible).

MR. HISCOCK: Thank you.

The phrase aggressive schedule has been used frequently by parties at this Inquiry. Some engineers have suggested that within the discipline of engineering, there is only accounting for a schedule that is based upon best engineering practices, taking into account the climatic and other conditions of the workplace.

Would you comment on these assertions, especially the matter of an aggressive schedule, combining an aggressive schedule, I guess, with the other risks –

DR. JERGEAS: Yeah.

MR. HISCOCK: – that are there?

DR. JERGEAS: Oh, absolutely.

So, I call this fast-tracking. What is fast-tracking? When you have a time you have to complete the project, when a final completion date is already decided –

MR. HISCOCK: Mm-hmm.

DR. JERGEAS: – for good reason: Olympics.

MR. HISCOCK: Sure.

DR. JERGEAS: Business decision.

So when we do that, it is basically we are squeezing engineering a little bit –

MR. HISCOCK: Mm-hmm.

DR. JERGEAS: – doing 25 per cent engineering, overlapping construction with engineering –

MR. HISCOCK: Yes.

DR. JERGEAS: – with engineering, and then whatever delays happening, delays happening, and many things at the early stages, the completion date will not be pushed, no extension of time, that is disastrous – that is disastrous. If we don't have extension of time to accommodate for early delays, we are fast-tracking the fast track, and I think yesterday I talked about this. That is recipe for disaster on any project, unless it's the mandate, deal with the flood, cost is not important anymore, just to throw people and equipment and machine and just get it done. That's another scenario.

So fast-tracking, no fast-tracking, that's no problem, do it. Sometimes we need to do that.

MR. HISCOCK: And people in private construction, even at, you know, the small-end level of refurbishing a kitchen, will tell you that, you know, you can really – you got to sacrifice one thing. You're either gonna sacrifice quality, time or cost. If you want something done well and you want it done quickly, it's going to cost you a lot. If you want it done cheaply and well, it's gonna take more time and so on.

Is that what you're saying here, I guess, basically that, on the contractor's triangle, if you require a quality job and now you're going push the pace faster, you're just gonna end up paying a lot more?

DR. JERGEAS: Yeah, thank you. This is a great – I wish I have a board I can draw the triangle. So imagine a triangle, and on the border – in the middle put quality –

MR. HISCOCK: Yeah.

DR. JERGEAS: – in the middle put quality, and on the side I put time, I put cost on the other side, at the bottom I put resources. That is the scope of the project; quality, time, resources, cost. You touch anything anywhere, inside the triangle or outside the triangle, you change the scope of work. What does this mean?

If you shorten the time – okay, you shorten the time. What's going to happen? I will add resources –

MR. HISCOCK: Mm-hmm.

DR. JERGEAS: – increase cost. And if you remove resources, you're gonna increase time, and so it's all system in balance. It's all connected. That is the best definition of scope of work. It's all connected. You touch anyone, anything, anywhere, inside, outside – you

change the scope, by the way. If you change the scope in the middle – the quality – change the quality or the scope, you played with resources, you added more resources, you probably increased the time, probably increased cost.

MR. HISCOCK: Okay. Thank you.

The project management team – the Muskrat Falls project management team chose a P50 probability for overruns of tactical risk – operational risks you referred to it as.

Bearing in mind that this – Muskrat Falls – was the first megaproject undertaken by this Crown corporation and considering the construction site, obviously, sub-Arctic conditions and remote and so on, what is your impression of the decision to go with a P50 value for operational risk?

DR. JERGEAS: I'm – okay, for P50, I'm okay with –

MR. HISCOCK: Okay.

DR. JERGEAS: – P50. P50 for contingency – okay with. What is the – where is the management reserve? Did they include management reserve for the other two buckets I am talking about?

MR. HISCOCK: We'll come and discuss management –

DR. JERGEAS: Yeah.

MR. HISCOCK: – reserve in a moment because it was –

DR. JERGEAS: Then –

MR. HISCOCK: – handled differently.

DR. JERGEAS: – and P50 I'm okay with.

MR. HISCOCK: Okay.

Would you say that in circumstance – in these circumstances, the project management team also excluded strategic risk from the estimates? Would that make sense to you?

DR. JERGEAS: The project management team – they are responsible for the contingency, as we discuss earlier. So I will give them the contingency – the P50 number – and say go handle the contingency.

MR. HISCOCK: Right.

DR. JERGEAS: If you – it seems to me they have done the right thing. They excluded it from their own budget, meaning it is somewhere else.

MR. HISCOCK: It's at the CEO or the –

DR. JERGEAS: It's –

MR. HISCOCK: – higher level.

DR. JERGEAS: – the management reserve.

MR. HISCOCK: Right.

DR. JERGEAS: Or, as I said it, management reserve plus scope contingency.

MR. HISCOCK: Yes. Okay.

Whether – and you've said that that could be two buckets or one bucket, so you –

DR. JERGEAS: Exactly.

MR. HISCOCK: Okay.

On slide 63 of your presentation, you noted that, "There is only one thing certain about a cost estimate: It will be wrong!!!"

DR. JERGEAS: Yeah.

MR. HISCOCK: Could you explain to the Commissioner the typical process for testing estimates on a megaproject. Should they be stress-tested by consultants from various engineering disciplines involved? Should there be an executive review of the estimates? How – what would be the best process for reviewing the estimates, I suppose?

DR. JERGEAS: Again, this is part of the regular gated process and organization will hire consultant to estimate, consultant to check, consultant to do benchmarking with other,

previous project. There are studies like peer-review, so –

MR. HISCOCK: Mm-hmm.

DR. JERGEAS: – and I got involved and – with Chevron, for example, on a small project, actually. They have something really great. It's called peer-review. So they brought me one of the people, among others, and they brought the project management team at a stage gate, and the project management team presented something, and we started questioning – completely outsiders. So that's called peer-review.

So there are many, many things could be done, to satisfy – I think you guys call it due diligence – to satisfy ourselves. It's – did we do everything that supposed to do? Did we miss anything? And if we do it, we want consultation with outsiders and insiders. That's great.

MR. HISCOCK: Right.

DR. JERGEAS: So, there is another tool – there are other tools, called CII, Construction Industry Institute, they have something called PDRI. Are we ready? The project, P, project, D, definition, R, rating, I, index. Okay? That's what they have. A specific question you ask, did you do this? And marking scheme, did you do that? Question by question by question by question, just to do due diligence. And people – that's industrial practice, as well, a good practice, to satisfy ourself. And I guess, on this project, probably they have done that.

MR. HISCOCK: Okay.

Did you have any concerns or suggestions regarding the management structure of Nalcor and the project management team from the documents you reviewed? Do you think that the structure was top heavy? Would it have been – benefit from a flattening? Or do you prefer – did you think the project management structure was fine?

DR. JERGEAS: Honestly, I did not have good time to review this. I can't answer this.

MR. HISCOCK: Thank you.

DR. JERGEAS: Thank you very much.

MR. HISCOCK: I have a few more questions, as well. Should capital construction risks be conflated with financial risks, when doing a risk analysis? Or are they two separate – completely separate factors?

DR. JERGEAS: Can you explain please?

MR. HISCOCK: Capital construction risks, I would assume, would be risks that you had identified directly dealing with the processes of construction, as opposed to the financial risks to the project, or risks to the project financing and the costs, potential fluctuation costs around the financing half of it.

DR. JERGEAS: If we include management reserve, then we included everything.

MR. HISCOCK: Okay.

Should risks in the business case – or potential benefits in the business case, I guess, such as improved sales, for example – should those be offset against the construction cost overruns as you're progressing through – so, I want to give you exactly – explain exactly what I mean here.

In the early days of this project, there was a substantial overrun on the construction side of things –

DR. JERGEAS: Okay.

MR. HISCOCK: – $300 million, very early days. However, there was a financing savings in that when they went to market, they were able to achieve a $300 million savings.

DR. JERGEAS: Very good.

MR. HISCOCK: So, they say to themselves: Well, it's a wash. We're not really off our budget at all.

DR. JERGEAS: Yeah.

MR. HISCOCK: But obviously, on the construction side of things, there was a trend line developing, and a kind of frightening one.

DR. JERGEAS: Yeah.

MR. HISCOCK: Should those kind of – should those have been kept separate, in your mind, in terms of separate risks into – that have been allocated separately, considered separately in the trend line separately? Or is it legitimate to say: Look, we're over here; we're under here; we're basically on the right path?

DR. JERGEAS: That's a good question. I could go either way.

You know, I don't want to put myself in a position – of their position at that moment. Probably people are driven to achieve the goal and they see saving here, they see overrun there, and we're going to lose it here, win there, lose, win. Maybe we will get the goal on objective. So, I don't want to judge them.

Probably I would have done something similar, but in my third book with those Norwegian colleagues of mine, we looked at risk and opportunities in the project.

MR. HISCOCK: Mm-hmm.

DR. JERGEAS: Risk are the negative things and the opportunities are the positive things that could happen on a project, and we suggest that sometimes we take – we capture the opportunities. It's a good idea. So, on that side, I said I'm neutral on this one.

MR. HISCOCK: Okay.

Dr. Westney – or Mr. Westney, who you – obviously, you've – you know quite well, is – presented at this Inquiry.

DR. JERGEAS: Yes.

MR. HISCOCK: And he spoke of taking a wide-angled approach to risk – taking a broad view of risks.

And I'd like, if we could, turn to Exhibit 00130.

It'll come up on the screen there now in just a moment. And we're looking at – if can move to page 287 – 2-8-7.

Thank you.

Here we see just a few risks mentioned. Now, Nalcor had claimed that most of the other risks – or the other risks had been mitigated. Do you believe that alleged mitigation should be used to take identified risks off the table? Because what we see here, I would suggest, is very far from a wide-angle view of risks. It's just the three or four – or four risks there identified, very limited number of risks.

Should the efforts or the knowledge that – of the company, that they have some capacity to mitigate other risks, be used to simply eliminate them from your list of risks and from the factors being considered?

DR. JERGEAS: Yeah.

We have – we should have a risk register. In the risk register we identify the risk and the probabilities of happening and what we're going to do to mitigate. So, for example, if you identify geotechnical –

MR. HISCOCK: Mm-hmm.

DR. JERGEAS: – issues as a risk, great. I'm going to ask what you going to do about it? Oh, we're going to have more soil testing. Great. How you going to do the soil testing? I'm going to hire a company to do drilling and testing and all the … how much that's going to cost? Half a million dollar. That's the mitigation. That will be in the budget.

So these are the known risk, identified risk and the mitigation action is reflected by cost, time, delay – whatever it is – in the budget. Then I mitigated it. Anything I did not mitigate become one of these other buckets that I listed.

MR. HISCOCK: And, even in that example, though – let's take the geotechnical, excellent example, one pertinent to our situation. Even if we allocate the extra half million dollars and we budget an additional half million dollars for the geotechnical work, we still have a risk there, right?

DR. JERGEAS: Yes.

MR. HISCOCK: If we're able to work towards mitigation through the recognition of the risk and the allocation of the resources to do further

work there. But we still have a risk that we need to account for because we might get results that were unfavourable.

DR. JERGEAS: And that's the contingency.

MR. HISCOCK: Right and that should fall in the contingency.

DR. JERGEAS: Absolutely.

MR. HISCOCK: Absolutely. Okay.

If a P75 is selected for tactical or operational risk –

DR. JERGEAS: Yes, P75.

MR. HISCOCK: If a P75 was – is selected for tactical or operational risk, should that be used for each basket of risk thereafter or would that …?

DR. JERGEAS: No. That's, again, back leadership judgment story.

MR. HISCOCK: Yeah.

DR. JERGEAS: I would look at this megaproject and cut it to pieces. Which piece worries me more? So I might add different percentages for different components or all of – one percentage applies to all. Now, this is – again, it's a judgment thing.

MR. HISCOCK: Right.

DR. JERGEAS: But, I – personally, I would go what is the riskiest of place, where is the riskiest of place and I put more contingencies there.

MR. HISCOCK: Yeah.

DR. JERGEAS: So if we are building an LRT and there is a bridge, an on-grade train and a tunnel, which is the riskiest place? The tunnel, so I'll focus right away on the tunnel.

MR. HISCOCK: Okay.

How often should a project rebaseline its risk reserves? Is that a process that should be ongoing? Are there certain milestones that would trigger it?

DR. JERGEAS: Yeah.

If you look at AACE requirement, they are rebasing and percentages for the remainder of the work. So we are always revising.

MR. HISCOCK: And so that should be a continual ongoing process –

DR. JERGEAS: Generally –

MR. HISCOCK: – of assessing those risks.

DR. JERGEAS: And they have – all these project, they have good project –

MR. HISCOCK: Mm-hmm.

DR. JERGEAS: – quality project control teams. And I bet on this project they had qualified project controls team. And they will look at risk, they will look at cost, they will look at time, schedule and monitor productivity, schedule, cost and report. You should have this.

MR. HISCOCK: Okay.

In our situation, Muskrat Falls was compared with another possibility to achieve the end of electricity generation: That was an Isolated Island Option. In that comparison, Nalcor included the benefits, such as future dividend payments from Muskrat Falls, to predict a net benefit for this project of about $7 billion over a theoretical alternative.

Should that sum, the full $7 billion, the difference between Project A and Project B – we want to achieve Island on the – electricity on the Island, sufficient electricity. We have two options. They say that Muskrat Falls is going to be better for the province by $7 billion. Should that $7 billion then be taken as a management reserve for the full amount? Is that appropriate then?

DR. JERGEAS: If I understand this, you're talking about phase 1, probably –

MR. HISCOCK: Yes.

DR. JERGEAS: – and when they had alternatives. And I read that report. I think somewhere, somebody refuted–

MR. HISCOCK: Yes.

DR. JERGEAS: – the Grant Thornton, I think.

MR. HISCOCK: I think so.

DR. JERGEAS: Yeah.

And I was happy with that, but not the number. Don't worry about the number for the –

MR. HISCOCK: No, no.

DR. JERGEAS: Did they evaluate, generate, evaluate all the options? Absolutely. I think they did, although it's not my area, but I saw contact. Then did they select an alternative? Absolutely.

MR. HISCOCK: Yeah.

DR. JERGEAS: They selected that alternative. Now, everything else is gone. Now, we have this alternative becomes a project. I don't care about what's the differences and all of that. Now, I have – this is the project, what is the budget for this project? Now the discussion, only this project, picked – removed other alternative. We removed them because they were not feasible.

MR. HISCOCK: Right.

And so, the management reserve should be based on the merits of the project itself, not a comparison between it and some other –

DR. JERGEAS: Yes.

MR. HISCOCK: – theoretical project.

DR. JERGEAS: Absolutely. I will never thought about this thing even.

MR. HISCOCK: Okay.

And I took it from your evidence earlier, I just wanna clarify that the management reserve should be kept secret from the overall project cost estimate in order to avoid a red-meat concern or a concern that contractors are going to look for a lot more money when they hear that this extra money is out there.

DR. JERGEAS: I didn't say –

MR. HISCOCK: Would that be a concern?

DR. JERGEAS: – the word "secret."

MR. HISCOCK: Okay, I – no.

DR. JERGEAS: I – we don't need to disclose this.

MR. HISCOCK: Right.

DR. JERGEAS: We don't need to. And the contractor, they are bidding on a little component here, a different component there. Everybody knows – in the media and the news – that we announced this project today at a value of a few billion dollars. So they know, everybody knows that – the number, the overall number.

But the detail number – where, what's contingency, how much for contingency –

MR. HISCOCK: Yes.

DR. JERGEAS: – how much for management reserve, we don't need to disclose this to everybody. The board of director knows, the CEO knows, the government knows. Who else? Mmm. The project management team, if they want to know, that's fine. I don't want to hide it for any wrong reason.

MR. HISCOCK: Okay. So let me give you a concrete example.

If we had a project where the estimate plus the operational contingency was whatever, let's say $6 billion. But then we had a $2-billion management reserve, in addition. Would we go to the public and say, this is a $6-billion project or this is an $8-billion project? Would you – would the management reserve – should that be kept separate from the overall project costs or should that be included in what we consider the project to cost? Is –

DR. JERGEAS: I'm gonna –

MR. HISCOCK: – the management reserve part of that number?

DR. JERGEAS: My opinion –

MR. HISCOCK: Yes.

DR. JERGEAS: – I'm gonna give you my opinion based on what I have seen in these project disasters.

MR. HISCOCK: Yes.

DR. JERGEAS: I would go with $8 billion.

MR. HISCOCK: Okay. So you –

DR. JERGEAS: Definitely I would go to the government and say: This could take us all the way to $8 billion.

MR. HISCOCK: And so the – your thinking on this is that the management reserve is real money that we have to have held back in order to make sure we have enough cash to pay for the project –

DR. JERGEAS: Just in case.

MR. HISCOCK: – to deal with the risks.

DR. JERGEAS: Just in case because we don't know. We are just human beings –

MR. HISCOCK: Yes.

DR. JERGEAS: – we don't know what's gonna hit us through this journey. So we have that.

If we want to exclude it, a specific comment will be made that these risks are excluded. And if they do happen, they will be extra. At all level of communication between any level you want.

We don't want to hide anything. We don't want to hide anything. So if contractors know that the project is $8 billion, so what? I am bidding on my little component which is a billion or two of 500. Okay, I'm gonna give you my bid based on my scope of work; anything else of the scope of work, I will come back to you and claim it. And we have a change-order mechanism to deal with that. So really, they know about it, or exist or does not exist, this reserve is non-issue.

MR. HISCOCK: Okay.

Dr. JERGEAS: They're entitled, if we change the scope, to be paid.

MR. HISCOCK: Right. So I –

DR. JERGEAS: (Inaudible.)

MR. HISCOCK: – I just wanna clarify, this is my last point that I had for you, really. So –

DR. JERGEAS: Please, no **–**

MR. HISCOCK: – so, I wanna be clear because the management reserve is a real part of the project cost, real part of the budgeting process –

DR. JERGEAS: It should be –

MR. HISCOCK: – just like contingencies.

DR. JERGEAS: – on megaproject, it should be.

MR. HISCOCK: Okay.

And so that would form part of the whole. And we wouldn't need to be concerned about giving a high real budget number. You don't think that that's going to cause our contract cost to escalate –

DR. JERGEAS: No.

MR. HISCOCK: – including the management reserve?

DR. JERGEAS: No, no. Because contractors, they are obligated to comply with their scope of work, whatever we told them.

MR. HISCOCK: Mm-hmm.

DR. JERGEAS: Anything about the scope of work is well understood and practiced, that is extra and we have the legal mechanism to compensate the contractor regardless of the existence of any kind of contingencies, regardless. The contractor don't care, they say: This is extra –

MR. HISCOCK: Right.

DR. JERGEAS: – pay me.

And we have a policy and process for this and we call it change management process. And I have seen this document, it's a great one.

MR. HISCOCK: Yeah. Okay.

So the concept of red meat, is that a concept you're familiar with? It's a term I have – the idea –

DR. JERGEAS: Can you explain it?

MR. HISCOCK: Yeah, okay.

My understanding is it's the idea that if the cash is there and they know there's additional cash for overpayments, that they'll be salivating and go at it –

DR. JERGEAS: No.

MR. HISCOCK: – in a way that they wouldn't otherwise.

DR. JERGEAS: They are protecting their business and their scope.

MR. HISCOCK: Yes.

DR. JERGEAS: They don't want to lose money and regardless of the red – existence of red meat or not –

MR. HISCOCK: Mm-hmm.

DR. JERGEAS: – they will claim extra if the scope changes. They will, regardless. They know about it or not, it's not the real issue. The real issue: Did the scope change from the AFE after? I ask is – so their question I'm gonna ask it again: What happened to the quantities on this project before, during the – from the AFE Decision Gate 3 –

MR. HISCOCK: Mmm.

DR. JERGEAS: – and when we are awarded the contract? That will tell you the scope already changed or not.

MR. HISCOCK: Right.

DR. JERGEAS: The quality of engineering is the root cause of – the percentage of engineering is the root cause of scope changes. And this is why contractors come back to you. Or misunderstanding, misunderstanding of the contractor, they don't read their contracts or – this could either way. So I'm not trying to say the contractors are innocent 100 per cent, but they will take advantage of an adversarial relationship in a lump-sum contract if the contract is vague, it's not clear, they interpret differently than you – the owner interprets. I can go on and on why – what happens in this relationship. And somebody with good leadership, I will start with collaborative relationship –

MR. HISCOCK: Mm-hmm.

DR. JERGEAS: – proper understanding of roles and responsibilities, of what is in scope, what is out of scope. When we hire a contractor, do you understand the scope? Do they understand the scope? What's in? What's out? Then we are relaxed a little bit, red meat or not? In – red meat is always there.

MR. HISCOCK: Yeah.

I appreciate your comments.

Thank you very much for your time today.

DR. JERGEAS: Thank you.

Thank you very much.

THE COMMISSIONER: Thank you.

Edmund Martin.

MR. SMITH: Good morning, Sir.

DR. JERGEAS: Good morning, Sir.

MR. SMITH: Harold Smith for Edmund Martin.

I will not be as long as some of my colleagues.

DR. JERGEAS: Thank you.

MR. SMITH: I only have a few questions, some of which are the type of question that I think falls out of the category of clarification.

DR. JERGEAS: Thank you.

MR. SMITH: So I'm going to ask you – the clerk, Madam Clerk, to go to slide 59 or page 59.

THE COMMISSIONER: This is in P-04102.

MR. SMITH: And –

DR. JERGEAS: Oh yeah.

MR. SMITH: – looking at slide 59, I noted you have bolded "**Lack of clarity in industry practices.**"

DR. JERGEAS: Correct.

MR. SMITH: Could you tell me what you mean by a lack of clarity in industry practice?

DR. JERGEAS: Thank you, great question.

I hope I answered it before, but I'm glad you brought it back again.

MR. SMITH: Yeah.

DR. JERGEAS: Lack of clarity, first, there is one clarity: contingency always included in the budget in industry practice. We could argue about percentages, okay? What is lack of clarity is management reserve or the two buckets I'm talking about? Is it included in the budget or outside the budget? That's the lack of clarity. People will go this way or that way.

MR. SMITH: Okay, so there are – in terms of practice of the industry, it's sometimes included and sometimes excluded.

DR. JERGEAS: Yeah, and just before my trip here, two weeks ago, I sent an email to a few people from industry.

MR. SMITH: Yeah.

DR. JERGEAS: Oh, how do you deal with management reserve? Is it included or not? And I had different answers.

MR. SMITH: Okay.

So, at this point in time, you cannot identify a best practice but you would recommend that would be included?

DR. JERGEAS: Exactly. This is what I said, I think, somewhere my recommendation. Yes.

MR. SMITH: Page – or sorry, slide 93.

DR. JERGEAS: Mm-hmm.

MR. SMITH: Okay. On slide 93 I noticed that you talk about timely –

DR. JERGEAS: Yes.

MR. SMITH: – decision-making.

DR. JERGEAS: Yeah.

MR. SMITH: Timely, to me, is a bit of a subjective concept.

DR. JERGEAS: It is.

MR. SMITH: Okay.

DR. JERGEAS: Yeah.

MR. SMITH: Timely to some contractors who are looking to get – to go with their change orders and get approval for change orders, timely to them is –

DR. JERGEAS: (Inaudible.)

MR. SMITH: – well –

DR. JERGEAS: Now.

MR. SMITH: – maybe now –

DR. JERGEAS: Yeah.

MR. SMITH: – and timely to the project team might be –

DR. JERGEAS: Yeah.

MR. SMITH: – considerably longer, okay? But I noted from some of the evidence we've heard is that a change order – are expected, the contracts all expect that there will be change orders and there's process and I think you have already commented that the change order process was robust and meets the test of best practice.

DR. JERGEAS: That's correct.

MR. SMITH: In that – in those change order changes, my understanding is that contractually they set out timelines. In other words, you put it in and you put this kind of information with it and we'll decide within X number of days. Would that be considered, from your perspective, timely –

DR. JERGEAS: No.

MR. SMITH: – if it's in the contract?

DR. JERGEAS: Oh, if it is in the contract. But not all the contracts will have time limits.

MR. SMITH: Yeah.

DR. JERGEAS: Not all of them. So if it's in the contract – and that is timely. But if it's not in the contract, what is reasonable? One month? Or one week? Or one hour?

MR. SMITH: My understanding is that most of them are in the contract, but that's the answer I'm looking for –

DR. JERGEAS: I have seen contracts where there is no time.

MR. SMITH: No time –

DR. JERGEAS: Yeah.

MR. SMITH: – in this project?

DR. JERGEAS: No, sorry. Not this project.

MR. SMITH: (Inaudible.)

DR. JERGEAS: I'm not talking about this project. If it is in this project, then that is timely.

MR. SMITH: Okay.

I was wondering if you could turn just a page or two back to page – or slide number 92, okay?

DR. JERGEAS: Yeah.

MR. SMITH: And I'd like you to, if you will, reconcile – because I'm having difficulty reconciling your comments in slide 24, which is the slides about having 80 to a hundred per cent depending on the engineering being done.

DR. JERGEAS: Yeah.

MR. SMITH: You indicated 80 to a hundred per cent is good – would be a good practice. It's not necessarily the practice now, but it would be a good practice.

DR. JERGEAS: Eighty to 90 per cent.

MR. SMITH: Eighty to 90 per cent.

DR. JERGEAS: Yeah.

MR. SMITH: And I think a hundred per cent before you actually start construction.

DR. JERGEAS: Correct.

MR. SMITH: Right.

So could you reconcile that concept with – in slide 92 –

DR. JERGEAS: Yeah.

MR. SMITH: – you say – in Engineering and Procurement, there's "Large potential for design errors …." And this is in Disadvantages – under Disadvantages?

DR. JERGEAS: Disadvantage – and which –?

MR. SMITH: Which – well, either Engineering Only or Engineering and Procurement.

DR. JERGEAS: Yeah.

MR. SMITH: You make the comment that "Large potential for design errors" in both of those situation. And I'm wondering, if you're on the one hand saying –

DR. JERGEAS: Mmm.

MR. SMITH: – you get the engineering to 80 or 90 per cent, and a hundred per cent before you start shovels-in-the-ground type thing, how do you reconcile that with –

DR. JERGEAS: Yeah.

MR. SMITH: – large potential for design problem?

DR. JERGEAS: I was asked, what is the best practice? This is another one. This is industry best practice. This is – again, it's used in industry – how we do packaging, how we decide, and the reason I brought this is to illustrate, also, a change in – I learned that the change of the contract from design – from EPCM to – the equivalent in my mind – to design-bid-build.

So, the EPCM company's role was changed to design role. So, no longer they have a role during construction or managing construction, because I understand it that a project management team, now, took over, including all the expertise from different contractors – consultants of contractor engineers. So that's – I'm showing you this industry practice.

MR. SMITH: Okay. This –

DR. JERGEAS: Yes, this one not mine.

MR. SMITH: Okay.

DR. JERGEAS: Yeah.

MR. SMITH: Now, in answer to a question from the Concerned Citizens –

DR. JERGEAS: Yeah.

MR. SMITH: – counsel a few minutes ago, you mentioned that you would see a trend and you would incorporate that trend in the budget. If the trend is showing a lot of increased cost, you might even actually shut down and re-evaluate.

DR. JERGEAS: Re-evaluate.

MR. SMITH: Yeah.

DR. JERGEAS: Good point, yes.

MR. SMITH: Okay.

How do you incorporate concepts of mitigation to the trends? In other words, if – a trend may be shown in terms of a bid and – but the project team may want to look at it and see if there's ways of mitigating, maybe moving some of the work to another scope or another contractor or negotiating with that contractor to try and find alternatives to the way that they've – they view the scope, you know, there is – to mitigate, effectively, those bids. Is it an automatic shutdown and re-evaluate or –

DR. JERGEAS: No.

MR. SMITH: – do you go through a process of looking at mitigative efforts?

DR. JERGEAS: No, obviously not automatic shutdown, no, absolutely. No automatic shutdown.

And mitigating is – I understand this, that they already awarded a contract and the contract came above what they expected. So this is an early sign we have a problem.

MR. SMITH: Yeah.

DR. JERGEAS: Now, how we resolve it, this could be many ways. Stopping the project – probably unreasonable now, it's too late, probably, we are ahead. Had we done a good estimate to begin with, but – then probably all of these came within that range that we have – big range. So I'm not advocating shutdown; I am advocating a revisit, okay? We have a problem, what should we do? And, cancel some, change of scope, reschedule – I hope that they renegotiated or negotiated. It's a bidding process and the old – the contract then, they can negotiate after, which is tough, but anyway – yeah, I agree with both options.

MR. SMITH: But you're – what I'm hearing you say is that your comments were really based upon the contract or the bid being accepted and turned into a contract.

DR. JERGEAS: Yes, and if that comes and we already lost our contingency, that's a problem. So I will stop here and say I have a problem, what should I do? I will go to whoever up my level, and say we have a problem, where do we want to go, what to do? Okay, I – if I need another approval, I will get another approval.

MR. SMITH: Yeah –

DR. JERGEAS: And by the way, it's normal that we plan today something and if for economic reason – nothing also with estimating, wrong estimating – for economic reason, the price has jumped up and all the bids came above. Whatever we planned six months ago or a year ago estimate, now is different market condition.

That could happen; could go down, it could go up. Now I need to say: What happened to my contingency? Do I have a flexibility? Somebody need to revisit this. If I am a project manager, I go to my director. If I am the director, I go to my VP, sponsor.

MR. SMITH: So, trying to paraphrase a little, but essentially the – just the bids themselves wouldn't cause you concern until at least after you looked at what mitigation efforts could be taken to modify the bids before they got to an awarding of the contract.

DR. JERGEAS: Fine, fine. That's okay, but, still, it's an early warning sign among many other signs, and that makes me – as a leader, I need to worry.

MR. SMITH: Okay.

Now, you indicated that – you know, I'm a little confused because on the one hand, you said there was no real need to disclose the management reserve, the number of the management reserve, but you would – in terms of the – in this case the shareholder, or the government – you would use the $8 billion. I think the example was it's a $6-billion project, but your risk assessment says it's gonna cost another 2; you would go to the shareholder with $8 billion as opposed to 6.

Now, the question is, is it expected that that contingency or – I better not say contingency – management reserve, is required to be funded, or is it sufficient if there are ample monies available to cover the management reserves?

DR. JERGEAS: Good question. I just – I want to respond to the beginning of your question. I did not say it should not be disclosed; I said it should not be disclosed to the contractor. So please, the contractor doesn't –

MR. SMITH: Okay.

DR. JERGEAS: – need to.

MR. SMITH: He doesn't need to know.

DR. JERGEAS: No, he – there's no need. We'll tell him, so what's the advantage? That's –

MR. SMITH: There's no –

DR. JERGEAS: – back to the meat story.

MR. SMITH: Yeah.

DR. JERGEAS: Yeah.

MR. SMITH: No need for the project team necessarily to know – it's not a requirement –

DR. JERGEAS: Yeah.

MR. SMITH: – they know –

DR. JERGEAS: Yeah.

MR. SMITH: – if it's being controlled by the CEO.

DR. JERGEAS: By the CEO. And on a smaller project, you know what I say? I say have a management reserve that applicable to many project, like a program. Many project. We don't know which one gonna go wild, so have one management reserve applicable for lots of project. We – I say this.

But this one is a program; it's a megaproject, lots of project. So then the CEO will have something called management reserve. Now, I would go with this – I say I need $8 billion. Somebody said: You need $2 billion for management reserve, and we have this option, this option. Fine. Whatever option available to finance that, I'm happy with.

MR. SMITH: Doesn't have to be put in the bank.

DR. JERGEAS: Exactly. But at least understanding it's – we are exposed to up to $8 billion. That is the clarity we need in the future. So when I go announce a project, it's $8 billion.

How we get the money, how we finance it from which bank is another story.

MR. SMITH: Is – you know, in your research, et cetera, is there a difference between a cost estimate for an AFE – because you mentioned this at page, slide 75; you talk about it as a cost estimate for an AFE – and a cost estimate which may never be included in an AFE due to mitigation effort?

DR. JERGEAS: Well, this is the key function of project sponsor.

MR. SMITH: Yes.

DR. JERGEAS: Yeah. Yeah.

MR. SMITH: You say in the third-from-the-bottom bullet –

DR. JERGEAS: Yeah.

MR. SMITH: – "Assures that the project definition and cost estimate for AFE are consistent with the Process."

DR. JERGEAS: Yeah.

MR. SMITH: Okay, so the question I have is, is the AFE the actual cost of the project – that's what been approved for expenditure –

DR. JERGEAS: That's it.

MR. SMITH: – or is it some other number that may be –

DR. JERGEAS: No.

MR. SMITH: – kicked out by the project cost control team without mitigation, without discussion –

DR. JERGEAS: No.

MR. SMITH: – and testing?

DR. JERGEAS: I think the AFE is approval for expenditure. Some people call it FID: final investment decision. That is a number. Whatever project control prepared, included, excluded, the final number that went to the board of directors is the AFE number; it is at Decision Gate number 3.

MR. SMITH: And that is the budget?

DR. JERGEAS: That's the budget.

MR. SMITH: Budget.

DR. JERGEAS: That's my understanding. What other numbers, then, you pick, then we will have different numbers.

MR. SMITH: Thank you so much.

That's all the questions I have.

DR. JERGEAS: Thank you. I appreciate it.

THE COMMISSIONER: All right, Former Provincial Government Officials '03-'15.

MR. T. WILLIAMS: Good afternoon.

DR. JERGEAS: Good afternoon.

MR. T. WILLIAMS: My name is Tom Williams. I represent a group known as the former elected government officials for a period of 2003 to 2015 –

DR. JERGEAS: Yes.

MR. T. WILLIAMS: – with the exception of former premier Dunderdale. So this would have been basically the government in place at the time of approval of the project, sanction of the project and, ultimately, the start of construction.

So I wanted to just go back with respect to your evidence to Mr. Ralph.

DR. JERGEAS: Yeah.

MR. T. WILLIAMS: He questioned you this morning, and you folks had some discussion with respect to the role of government and where you saw the limited role that they should play in projects such as this. And I think I understood you to say government's role was not to do the job itself. Would that be correct?

DR. JERGEAS: Yes.

MR. T. WILLIAMS: Okay.

So in the scenario that we have here with respect to Nalcor Energy being a solely-owned corporation of government; that's government's Crown corporation, they are the sole shareholder. Nalcor is an energy corporation that – whose assets are substantially hydro as well as oil and gas, but they have a background in this.

My question is when you have that arm of government doing a project like this – and they either have the in-house expertise already or they have the means and resources to retain experts if required – there's been some issues as to whether or not government should have been re-evaluating some of their work. So they went out and did the base cost estimates – and we're talking some very detailed work here with respect to, you know, assembling estimates on powerhouses, on transmission lines, on switchyards, on constructions of dams.

And there was – there's been some discussion as to whether or not government should have played a role and then taking all those numbers and going back to their shop and reanalyzing them.

Where do you see government's role in that regard?

DR. JERGEAS: I can give you a parallel example from private sector and then see if I respond to your question.

MR. T. WILLIAMS: Okay.

DR. JERGEAS: Like, a few companies go into joint venture – big, major companies in the oil and gas industry. They go into a joint venture to build one project, but shareholders in different percentages. The biggest percentage company will lead the project. But the other companies will contribute, let's say, 30 per cent, 20 per cent of the money.

So they establish a steering committee where members representing each companies to make sure you do there, again, due diligence, that this company on our behalf is managing the project, spending our money, so we want to make sure they are doing the right thing.

So that could be done in an oversight, in steering committees, meeting with the project team – not the project team, leadership – at regular basis to assure themselves that things are going the way they should be gone – done. But I don't expect the government to do estimating.

MR. T. WILLIAMS: Okay, so you wouldn't expect government to have the resources to do estimating but to put in mechanisms with respect to oversight –

DR. JERGEAS: Mmm.

MR. T. WILLIAMS: – so that they would have –

DR. JERGEAS: They –

MR. T. WILLIAMS: – some sense of direction of the project.

DR. JERGEAS: I would expect the government to ask question to satisfy themselves – are they doing the right thing, did you consider these thing, how did you consider risks, what is included in the budget, did you deal with the stakeholder issues properly, how are we gonna care about the environment. These – the political high-level issues, government should ask for.

MR. T. WILLIAMS: Okay.

So in this – in the case before you, and we won't get into the minute details, but there was – government had been satisfied that there had been experts retained with respect to issues. For example, on estimates there was –

DR. JERGEAS: Yeah.

MR. T. WILLIAMS: – MHI had been retained. With respect to risk, there was Westney Consulting had been retained, but do you think that it was – would be reasonable efforts of oversight from a government perspective?

DR. JERGEAS: Yes.

MR. T. WILLIAMS: Okay.

DR. JERGEAS: I think they – a lot of good quality consulting, engineering companies involved in this project. Yes.

MR. T. WILLIAMS: Okay.

Another topic that you spoke of this morning was – and throughout your evidence, both your direct and your cross-examination was with respect to cost overruns. And without paraphrasing you, I think one of the slides that was brought up which I found quite interesting was: there's only one thing we can be certain about cost estimate, it'll be wrong –

DR. JERGEAS: Yes.

MR. T. WILLIAMS: – at the end of the day. So, in your expert opinion with respect to defining the success of a megaproject – and I know this morning you made reference of the Sydney Opera House – And I think again one of your slides defined success as: "Success is usually judged on the gap between" the "initial budget and actual performance."

DR. JERGEAS: Do you know why? Because we do not write the formula or the criteria for success. We should. Nalcor project charter should've included a section called success criteria. When we finish, this project should be judged on the following: number 1, did we achieve the business objective? I don't know how many kilowatt per something.

Did we improve the environment? Did we comply with some regulation, a new regulation coming? There are big issues if you do not write it down, people will judge you on the difference between the AFE budget, which is wrong estimate, and the actual, which include everything that we thought about and we didn't think about, we included and we didn't include.

Take those experts you – Nalcor hired, it's included many things not in their estimate. And now all happened. Now – and by the way, there's no perfect system, nothing in anywhere we go. There is incompetence everywhere, all the systems. So we have to be reasonable. But not all of that difference is incompetence.

MR. T. WILLIAMS: Okay. With respect to expanding on that topic, I mean, can we judge success? I mean at this point in time we're sitting before a commission of Inquiry. The project is not finished. It's substantially finished. It's in the 90 – 95 plus range.

DR. JERGEAS: (Inaudible.)

MR. T. WILLIAMS: But we haven't flipped the switch on first power yet and we're talking about a project that's going to have a 50 to – elements of it up to a hundred-year potential lifespan. So can we judge the success or failure at a project at this point in time? Or do we need to see what it actually results in?

DR. JERGEAS: I – this is why I brought the Sydney Opera House project. Now we judge it as a success. I can give you another example – two more examples. We had a project in Calgary, SAGD project. They call it SAGD; don't worry about that and on time, on budget. Unfortunately with geology, it could not produce oil, or little oil, not the designed capacity because of the geology of that area. On time, on budget, did not produce oil or little oil – park that.

I gave you earlier an example of a project, a hundred per cent overrun – a hundred per cent and produced oil and more and recovered everything. And they were a bit lucky, oil prices went up their side. Which one is successful? You tell me now.

MR. T. WILLIAMS: Okay.

DR. JERGEAS: I think the one with cost overrun was more successful. Now, I pray that something going to happen in the economy that this project when it's finished – a few years from now, all of us will say it was a successful project. I really want this to happen because I appreciate the effort of all these hard-working people and very qualified people. And put in a situation and – that happened and we could have done something earlier. We could have done something earlier.

MR. T. WILLIAMS: So, to the naysayers, who at this point in time or in the past have said we should never do that project, what would your response be?

DR. JERGEAS: I think five year, 10 years from now, 20 years from now, say, wow, that was probably a good decision.

MR. T. WILLIAMS: Okay. Thank you.

That's all my evidence.

THE COMMISSIONER: Thank you.

Robert Thompson.

Now, we have two more groups to question and I want to finish at 12:30 so –

MR. COFFEY: Yes, Commissioner, I –

THE COMMISSIONER: – guide yourself accordingly.

MR. COFFEY: I'm sorry, how many are left?

THE COMMISSIONER: Two more.

MR. COFFEY: Two more? Right.

THE COMMISSIONER: Yeah.

MR. COFFEY: Okay.

THE COMMISSIONER: The Consumer Advocate and there's –

MR. COFFEY: Oh, yes.

THE COMMISSIONER: – all the labour unions.

MR. COFFEY: Okay.

I'll be – my name is Bernard Coffey, Sir. I represent Robert Thompson, who is a former chief civil servant.

In light of the amount of time available, I'm going to just touch on a couple of areas. One of them was – I think yesterday you said that, you know, anyone looking at a history of megaprojects over the past 50, perhaps a hundred years, you know, would see that cost overruns are routine, schedule overruns are routine and you said lessons aren't being learned, I believe.

DR. JERGEAS: Yes, lessons are repeated.

MR. COFFEY: The lessons are repeated but not – the experience is repeated but the lessons aren't learned from the experience.

DR. JERGEAS: Yeah.

MR. COFFEY: Okay.

Now in relation to that, I'm gonna suggest to you that that's because of – or is attributable to human nature. It's attributable – why aren't lessons learned? Why aren't they learned? Because they're intelligent people –

DR. JERGEAS: (Inaudible.)

MR. COFFEY: – (inaudible) very sophisticated at times, very technically skilled and yet you point out – and you're not alone, there are a lot of authors who point out or who work in the field that you do – who point out that lessons are not learned.

DR. JERGEAS: Yes.

MR. COFFEY: Now why is it?

DR. JERGEAS: This goes to human history. I can take you to war and peace discussion. Every time we go into war we regret it and then we have another war and kill millions or thousands and we try again. But what did we learn from history? We learned something from history: that we didn't learn from history – that's what we learned. Why people are optimistic, people are positive, people like me go to them and say warning, warning, warning, they say, come on, it's – I'm different, who are you, kind of thing. I have seen – I'm gonna share this with you, without names.

I went to – with a colleague of mine one day, they hired him to – on consulting on a big megaproject. So he asked me to join him and we looked at the project and we told him that we – you gonna overrun by a billion dollar.

MR. COFFEY: Okay.

DR. JERGEAS: Okay? We wrote a memo, nicely, million dollar – billion, sorry. What do you think gonna happen? They fired us. We were wrong, actually, a billion and a half. They fired us. Another project –

MR. COFFEY: So in relation to that, okay – if I just could, it's a limited amount of time. I'm gonna suggest that you were terminated – they

fired you – because you were telling them something that they didn't want to hear.

DR. JERGEAS: – yes.

MR. COFFEY: Right?

DR. JERGEAS: Yeah.

MR. COFFEY: The point being this – and you referred to, as well, optimism bias – but there is such a thing called – it's known as confirmation bias, okay? And I'll put it to you this way; it's a situation where, to paraphrase Paul Simon, a man hears what he wants to hear and disregards the rest.

DR. JERGEAS: Yeah.

MR. COFFEY: And that is human nature, isn't it?

DR. JERGEAS: Yeah.

MR. COFFEY: We're hard – we are effectively, as a species, we're hardwired to do that.

DR. JERGEAS: Yeah.

MR. COFFEY: But sometimes – and in this context, sometimes projects do come in on time and on budget. And, you know, interestingly enough – and I don't know how much you know about the constituent parts of this, Professor, but the Maritime Link, which was sanctioned at a P50, apparently did come in on time and under a P50 amount.

DR. JERGEAS: Yeah, less –

MR. COFFEY: Okay.

DR. JERGEAS: – complexity maybe.

MR. COFFEY: And it may be because there's less complexity and it may be because they were luckier – it's possible, too, isn't it?

DR. JERGEAS: Mm-hmm.

MR. COFFEY: And it may be that certain times, crucial times, if there were management decisions to be made that, you know, they went – you know, they went one way and Nalcor, in the same situation, went the other when they were executing the project.

DR. JERGEAS: But you can't compare the Link with a pumphouse.

MR. COFFEY: Yes. And I appreciate that. Generate –

DR. JERGEAS: Their complexity is –

MR. COFFEY: – generation plant is –

DR. JERGEAS: – I would have put more emphasis on the generation plant.

MR. COFFEY: Yes.

And although here, in the context here, the Labrador-Island Link is significantly – our transmission line is significantly over budget as well, okay?

But my point being this, that there's evidence before this Inquiry from the CEO of Emera which built the Maritime Link, in which he says that, in fact, Emera does not use a management reserve – they don't use that term. They just – they lump it all together and call it contingency.

DR. JERGEAS: Fine.

MR. COFFEY: Okay? And you'd be fine with that as long as all the parts are in it.

DR. JERGEAS: If it's included, that's good.

MR. COFFEY: All the risks are in –

DR. JERGEAS: Yeah.

MR. COFFEY: – exactly.

DR. JERGEAS: So I'm happy they have included that management reserve and they called all that in one lump sum –

MR. COFFEY: Contingency.

DR. JERGEAS: – one what it's called contingency. Fine.

MR. COFFEY: Sir, if I could, it's – you've – a number of times said it's all about communication.

DR. JERGEAS: Yes.

MR. COFFEY: Times – and I'm gonna suggest that that is – you're saying that because it's important to manage the expectations of people.

DR. JERGEAS: Yes, that's one. And to inform.

MR. COFFEY: Now you've also – I move on now to another aspect of this so I'll probably finish up here, Commissioner, with this. You, in one of your slides – and you brought to it at least twice if not three times – there's a lack of clarity in industry practices –

DR. JERGEAS: Yes.

MR. COFFEY: – in relation to the terms used to describe and account for risks, and quantification of risks, and estimates of risks, and you – okay.

Now, Sir, if we could bring up, please, Commissioner – and this is why I've put them there – Exhibit P-00103.

THE COMMISSIONER: P-04103?

MR. COFFEY: I'm sorry, P-04103. I apologize, Commissioner. Yes, P-04103, yes. And this will be on the screen, Sir.

Now this is an article which was published, I believe, in 2018, and that's – is titled Do Classics Exist in Megaproject Management? And if we could just go to page – I believe it's page 9. Page 9. And if I could come back up to page 8 please? Ah, just go down a bit, please? I apologize.

DR. JERGEAS: Okay.

MR. COFFEY: Now go up – anyway, they – I'll tell you this: The – this paper is written by two gentlemen named Rodney Turner and Bent Flyvbjerg.

DR. JERGEAS: Yeah, I know.

MR. COFFEY: Flyvbjerg, you know all this.

DR. JERGEAS: I know both of them.

MR. COFFEY: You know them. And in this paper, the thesis of it is, is is that – and if we go back to page 1, please – is that as of last year, and both of those gentlemen, including Mister – or Dr. Flyvbjerg, have posited, and when you read the paper, that there is no such thing as a classic in megaproject management –

DR. JERGEAS: Yeah.

MR. COFFEY: – classic texts. There are some texts that are a bit more popular than others, but there are no classics, that's their thesis.

DR. JERGEAS: Fine.

MR. COFFEY: And do – you wouldn't particularly disagree with that?

DR. JERGEAS: What do you mean by classic?

MR. COFFEY: And that's the point, he makes that point and –

DR. JERGEAS: Okay.

MR. COFFEY: – they do make that point, but they do finally conclude that, and I commend it to your reading, that there aren't classic classics per se, or there's no agreement on what the classics are if there are classics, okay?

If we go look at, please, at Exhibit P-04104. Now this is a text, it's published in 2014 – this is not the text, the – because the text itself is 1,400 pages long. If you look at the top right, to the right, you'll see a two-volume set. You see that, Sir? 1,400 pages out to the – it says – if you look on the right-hand side of the screen, two-volume set, yes, thank you.

DR. JERGEAS: Yeah, yeah, yes, sorry, yeah.

MR. COFFEY: And this was edited by Dr. Flyvbjerg, *Megaproject Planning and Management: Essential Readings*.

DR. JERGEAS: Okay.

MR. COFFEY: And then if we scroll down, and it's only – scroll down a bit, you'll see that there's volume – continue on, please – volume

1, there's a – he has a list of articles or excerpts from books, and he goes on through volumes 1 and 2, covering 1,400 pages, okay?

DR. JERGEAS: Fine. Lots of authors wrote chapters, and this guy edited –

MR. COFFEY: Yes.

DR. JERGEAS: – and put them together in a book.

MR. COFFEY: Yes. And he called it *Essential Readings*.

Now, how practical do you think – or how realistic do you think it is for civil servants to have any real grasp of, or to be able to understand in any accurate way, the project management –

DR. JERGEAS: Probably –

MR. COFFEY: – in the way that you understand it?

DR. JERGEAS: Probably zero.

MR. COFFEY: You said probably zero.

DR. JERGEAS: Yeah. I don't expect them to know this.

MR. COFFEY: And wouldn't that be particularly so where within the field of project management itself, there's disagreement about what should and shouldn't be included in, you know, particular terms –

DR. JERGEAS: Absolutely.

MR. COFFEY: – categories.

DR. JERGEAS: Yeah.

MR. COFFEY: It's –

DR. JERGEAS: Absolutely. Different definitions.

MR. COFFEY: And to use a phrase that's been used here: they wouldn't know what they didn't know.

DR. JERGEAS: Yeah.

MR. COFFEY: They wouldn't recognize it.

One final question – thing, because you were involved in project management and the study of it. If we could bring up, please, Exhibit P-03047.

Now, you haven't seen this before, Sir. I'm just gonna …

DR. JERGEAS: Yeah. No problem.

MR. COFFEY: So if we could go to page 2, please. And scroll down a bit. Okay, right there – go up a bit, please.

Now, Sir, if I could just put in this context – this is my last question.

DR. JERGEAS: Thank you.

MR. COFFEY: On May 1, 2014, a gentleman named Ron Power, who was the general manager of the entire project, okay? He wrote the following to – I'm sorry. Ron Power, I'm sorry – Ron Power wrote to Paul Harrington, who was the project director, his –

DR. JERGEAS: Okay.

MR. COFFEY: – direct boss.

DR. JERGEAS: Yeah.

MR. COFFEY: And he said the following, he said: "Paul – some issues that need focus (I have elaborated to give you details – bullets would not be adequate)."

And then he says, number "**1 – Astaldi: Failure to Perform** I visited site last Saturday. The situation there is virtually hopeless. When I returned I prepared a deck entitled 'Astaldi: The Road to Failure'. I presented this to Lance, Scott, Gilbert, Ed Bush, Pat, and Brian. Des (and later Jason) tied in by phone."

And if we could scroll down a bit more, please. He says – his conclusions were: "Astaldi are perceived as a joke on site

"the Astaldi troops on the ground are laughing at Astaldi

"we have paid in well in excess of $100,000,000 to Astaldi to date and have nothing to show for it.

"the schedule is probably lost …."

Okay? Now that was said at the beginning of the 2014 construction season, which is the first construction season.

DR. JERGEAS: Okay.

MR. COFFEY: If you were involved in a project, or knowing what you do about megaprojects, and you learned that –

DR. JERGEAS: Mm-hmm.

MR. COFFEY: – what would be your reaction?

DR. JERGEAS: I would react in trying to find the root cause of the problem, get the facts first.

MR. COFFEY: Yes?

DR. JERGEAS: Maybe there is bias in this, maybe not.

MR. COFFEY: Yeah.

DR. JERGEAS: Get the facts. I want to understand the facts, nothing hidden. Once I understand the facts, I get to meet Astaldi, the contractor, and I'll go on a recovery mission.

MR. COFFEY: Okay.

DR. JERGEAS: I will work with the team, and back to connect you to the team discussion I had, the team approach. What can we do here together?

MR. COFFEY: Yeah (inaudible). Now, my final question is this then: if it turns out you inquired, and you found that there was legitimacy to this point of view, okay?

DR. JERGEAS: (Inaudible.)

MR. COFFEY: It was borne out, assume it was.

DR. JERGEAS: Yeah.

MR. COFFEY: Assume it was borne out. Would it be appropriate to tell the owner?

DR. JERGEAS: The owner?

MR. COFFEY: The owner, as in the funder, the person who's funding this, that this is the situation we face.

DR. JERGEAS: I thought this email is to the owner?

MR. COFFEY: No, this is not to the owner, this the project team – this is internally within the project management team. The owner being the government, would it be appropriate to tell the government?

DR. JERGEAS: Hmm.

MR. COFFEY: That you're facing – with your major contractor, these – Astaldi was building the powerhouse.

DR. JERGEAS: To me, the owner is Nalcor.

MR. COFFEY: Okay.

DR. JERGEAS: Nalcor is the owner. The government is a stakeholder.

MR. COFFEY: Yeah, well –

DR. JERGEAS: And I think they call it the stakeholder.

MR. COFFEY: Yes.

DR. JERGEAS: Now, I am always open to communication, I will encourage that. But, this is maybe, I will deal with it first, I will –

MR. COFFEY: Okay.

DR. JERGEAS: – bring the contractor, put a recovery plan together and, what you tell the owner is another story – we should have regular communication with them like, weekly, monthly, whatever.

MR. COFFEY: Yes.

DR. JERGEAS: And then, in that, I will include a statement like: we are experiencing

issues with the contractor and, again, mitigation action are done.

MR. COFFEY: Thank you, Commissioner.

DR. JERGEAS: Thank you.

MR. COFFEY: Thank you, Sir.

DR. JERGEAS: Thank you. Appreciate it.

THE COMMISSIONER: All right.

Consumer Advocate.

MR. HOGAN: Good afternoon.

DR. JERGEAS: Good afternoon.

MR. HOGAN: My name is John Hogan. I'm counsel for the Consumer Advocate. So, if you're not aware, the Consumer Advocate represents the ratepayers that are paying for the cost of the Muskrat Falls Project.

DR. JERGEAS: Yes.

MR. HOGAN: So – if we can just quickly turn to your presentation, page 15, on which you say – you're obviously familiar this – the cost overruns typically are 50 to 100 per cent –

DR. JERGEAS: Yeah.

MR. HOGAN: – of the budget. So in this case we had a $6.2 billion budget, therefore – is what you're saying is this is really a $9.3 to a $12.4 billion project from the start.

DR. JERGEAS: Yeah.

MR. HOGAN: Yes, okay. And you wouldn't be surprised now to find out –

DR. JERGEAS: No.

MR. HOGAN: – that the project is $10.1 billion right in –

DR. JERGEAS: I wouldn't be surprised if this project end with $13 billion.

MR. HOGAN: Thirty.

DR. JERGEAS: Thirteen. One, three.

MR. HOGAN: Thirteen. Okay.

Well then – with financing, it is actually 12.7. So there you go.

But my point is that would have been the number from the start, if you were analyzing the project from – based on what you know in your experience –

DR. JERGEAS: Yup.

MR. HOGAN: – and your knowledge of megaprojects. Okay.

So my question then is, is it reasonable for Nalcor and the government to have gone to the public to say this is a $6.2 billion project, knowing – knowing what you know, that the risk is really that it's going to be between a $10 and a $13 billion project?

DR. JERGEAS: Now, after the fact, we –

MR. HOGAN: We're not after the facts, we – I'm asking, knowing what you know about megaprojects, would you have gone to the public with a $6.2 billion number?

DR. JERGEAS: I would have gone with the best estimate plus contingency plus management reserve and including all the numbers that I have and gone to the government with the biggest number I have.

MR. HOGAN: And you –

DR. JERGEAS: I will – a range, and I will not go with the lowest number.

MR. HOGAN: And you can't say what the management reserve would be, you would have had to analyze the project back then?

DR. JERGEAS: We have to have – at the very beginning of the project when we have no engineering done, very little engineering, we have to guess the estimate at phase 1. And at phase 1 the range is wide. So this is what we should have done: had a range saying I need an SUV and it could cost me between 30,000 to 150,000. What SUV? I don't know yet.

MR. HOGAN: So based on that, then, do you think it was reasonable for the public to be told it was going to cost 6.2?

DR. JERGEAS: No.

MR. HOGAN: No.

DR. JERGEAS: They should be told 6.2 to 15 billion.

MR. HOGAN: Okay. Thank you.

DR. JERGEAS: Range.

MR. HOGAN: Range. Fair enough. Thank you.

Now you – you were at – you referenced the Maritime Link not too long ago, and your words were – it was less complex, which is why – I guess, was your basis for why it didn't go over budget and over schedule.

DR. JERGEAS: Maybe. Maybe other factors. Maybe better project management.

MR. HOGAN: Sure.

DR. JERGEAS: Maybe lucky.

MR. HOGAN: And Mr. Hiscock walked you through this morning the fact that there were other projects that were – or maybe it might have been Mr. Smith, I'm not sure. But anyways, that there were other projects that this – that Muskrat Falls was compared to. So you're familiar with that.

DR. JERGEAS: Other projects?

MR. HOGAN: Yes.

There had to be a decision that was made about whether we proceed with Muskrat Falls to get our power, or otherwise. Right?

DR. JERGEAS: Oh yeah, yeah. Yeah, yeah.

MR. HOGAN: So the other one is –

DR. JERGEAS: Alternatives – you mean alternatives.

MR. HOGAN: Other alternatives, sure. So is that – the other alternatives are smaller projects. So does that mean there would've been less risk and less chance of overruns for smaller projects –

DR. JERGEAS: Yeah.

MR. HOGAN: – the same way there is with the Maritime Link?

DR. JERGEAS: No, the other alternative is a much smaller project than this one?

MR. HOGAN: Yes.

DR. JERGEAS: Okay, this isn't news to me now. If it is smaller project, the complexity is smaller. It's less. It's less. I said in one of these slides, if you go backward – and we worry about technological complexity and size complexity. So if you have a smaller project, you reduced one of – you removed one of the complexity. So the risk is less.

MR. HOGAN: And you said you wouldn't compare the Maritime Link to the generating facility, for example.

DR. JERGEAS: I wouldn't –

MR. HOGAN: Wouldn't be a fair comparison?

DR. JERGEAS: No.

MR. HOGAN: Because the overrun –

DR. JERGEAS: It's different.

MR. HOGAN: The overruns with the riskier project are greater.

DR. JERGEAS: Yes, riskier.

MR. HOGAN: Riskier.

DR. JERGEAS: More complex.

MR. HOGAN: Thank you.

You also mentioned this morning, you were talking about experience and you said – you referred to, actually, cold-weather conditions. So I want to ask: Does the fact that this project in

particular, or any project generally, is being built in cold northern climates, does that increase the risk of overruns –

DR. JERGEAS: Should be a –

MR. HOGAN: – that fact in and of itself?

DR. JERGEAS: Yeah, no. We know it is cold region. We know it. That's part of the contingency.

MR. HOGAN: So it's an extra factor to build into the contingency?

DR. JERGEAS: Yeah, but already accounted for in the estimate when we calculated the labour productivity.

MR. HOGAN: Right. It should be.

DR. JERGEAS: It should – no, that's at – if you compare a construction site in northern region versus southern region – go to Houston, okay? It's the front estimate, so productivity is different in this region. So it's already accounted for. Bad weather condition or normal weather condition is in the original budget and the contingencies, if it's major changes.

MR. HOGAN: What about should it accounted for in the management reserve?

DR. JERGEAS: What is a management reserve, the weather?

MR. HOGAN: Well, I mean could there be a black swan event related to weather that should be accounted for in the management reserve?

DR. JERGEAS: If it's a black swan, suddenly we have a tornado, that's another story. Let's identify tornado. That could be insurance thing. So I will exclude it from management reserve and make sure this is insurance. So a proper risk analysis will identify all of these.

MR. HOGAN: Right.

DR. JERGEAS: Yeah.

MR. HOGAN: And it has to be accounted for –

DR. JERGEAS: Yeah.

MR. HOGAN: – in some –

DR. JERGEAS: But normal weather condition, like minus 20, minus 30, that is in the original plan.

MR. HOGAN: Okay. Thank you.

DR. JERGEAS: That's normal. If you – I said yesterday if you go to the Middle East and work in a hot region, that – you don't come back to me and say: George, it is hot here, okay? Welcome to reality. That is part of the estimate, the base estimate, and estimators already done that.

MR. HOGAN: And should the management reserve – when you add everything in together, including the management reserve, would that be the worst-case scenario number?

DR. JERGEAS: Maybe. Maybe, yeah. It could be – it could get worse on this.

MR. HOGAN: It could get worse.

DR. JERGEAS: Absolutely. We live in an uncertain environment, unpredictable environment, none of us is capable of anticipating the future with accuracy. And that is what we are trying to do with – once we put the budget, we considered all of these and start focusing on getting the job done, properly coordinated, making quick decision, working in a team, properly communicating with others. So hopefully, to avoid big disaster.

MR. HOGAN: So the worst-case scenario, then the number be properly documented and communicated to everybody?

DR. JERGEAS: Always.

MR. HOGAN: Okay. So, I am just gonna run through some – very quickly, some evidence we heard at the Inquiry when I was questioning former Premier Kathy Dunderdale. And I said to her – Mr. Martin who is the CEO, I said: Well, Mr. Martin said to you that there would be overrun risks would be about $500 million. Ms. Dunderdale said: Well, it was a casual conversation in a meeting after – you know, I don't know where, I can't tell you if we were all at the table when I asked the question or it was

an aside when we were getting a cup of or whatever, but I wanted to know worst-case scenario.

Do you think that's a proper practice to discuss between the CEO and the shareholder, the premier, worst-case scenario?

DR. JERGEAS: The $500 million, I think it's a reference to the management reserve. And that – even if you added it today to the original budget, will not help.

MR. HOGAN: Right, so – so we –

DR. JERGEAS: Will not help.

MR. HOGAN: – so your point there is that it's not enough.

DR. JERGEAS: Not enough, and I gave you the reason why it's not enough.

MR. HOGAN: Okay.

DR. JERGEAS: And the reason is – when they started, 25 to 40 per cent engineering not enough to give you the accuracy at the end. I would've said to any premier: I will get back to you with the number once we have a better number, once we have detailed engineering done, but for the time being my SUV is between $130,000 to $150,000. It could be BMW, it could be a Mazda, it could be Toyota.

MR. HOGAN: Yeah. Thank you.

We had some sort of comments about future projects and we can't judge them 'til the future, and you talked about, I guess, hope in relation to projects. But I put to you that we don't really have time for hope here because the ratepayers have to pay for this right away. Okay. You understand that?

DR. JERGEAS: Yes. Yes.

MR. HOGAN: Okay.

DR. JERGEAS: And the hope is something will go up, prices of oil or something.

MR. HOGAN: Well, that won't really help, but we have – the ratepayers have to pay to for the entire project once the lights turn on, as Mr. Williams used that phrase. It's different than what you suggested, you know, the opera house. There's still opera 50 years after the opera house was built, right? You understand that? Okay?

So I just wanna ask you about that. In relation to the fact that electricity, which is what the hydro project is for, is facing other competitive markets such as natural gas and fracking, other future discoveries that we might not have even thought about yet.

So how does that play a role into determining whether this is a successful project or not?

DR. JERGEAS: I guess we have to wait.

MR. HOGAN: Right, we have to wait.

DR. JERGEAS: We have to wait, but now I think we have to focus on: What can we do next time? It's the lessons –

MR. HOGAN: Well, where –

DR. JERGEAS: – learned.

MR. HOGAN: – that – the Commissioner will make recommendations on that.

DR. JERGEAS: Yeah.

MR. HOGAN: But I also wanna talk about what we should've done at this point in time.

DR. JERGEAS: Yeah, fine.

MR. HOGAN: Right. And my –

DR. JERGEAS: Yeah.

MR. HOGAN: – point is that there are other considerations that could've been looked at in terms of the future.

Do you agree with that?

DR. JERGEAS: They did. In phase 1, they looked at all options and they evaluated them and they picked one.

MR. HOGAN: Right, but –

DR. JERGEAS: Yeah.

MR. HOGAN: – we won't – we won't necessarily – we can't just wait to determine if it's gonna be a successful project. It may very well be, but it may very well not be because of what could happen in the future.

Do you agree –

DR. JERGEAS: Fine.

MR. HOGAN: – with that?

DR. JERGEAS: But I just responded to your question about alternatives: They did, they did. And I trust the judgment that professional people looked at many factors and decided, they picked the alternative and went through it. Unfortunately, experienced cost overrun that we expected, and I gave you the reason why.

Now, a few years from now, oh, I think we all can judge. We don't know, I don't know either, I can't.

MR. HOGAN: No, that's my point.

DR. JERGEAS: Yeah.

MR. HOGAN: That's my point.

DR. JERGEAS: Right.

MR. HOGAN: You also said that we need to define success, which –

DR. JERGEAS: Right.

MR. HOGAN: – Nalcor didn't do, and one of the examples you use as a definition for success in this case would be electricity rates.

DR. JERGEAS: Yes.

MR. HOGAN: So do you – you do agree that a very good way to judge the success of the project is how much people in this province will pay for electricity once it's built.

DR. JERGEAS: Fine.

MR. HOGAN: Fine.

DR. JERGEAS: Yes, yes.

MR. HOGAN: Okay.

DR. JERGEAS: Yeah.

MR. HOGAN: Thank you very much.

DR. JERGEAS: Yeah.

MR. HOGAN: That's all the questions I have.

DR. JERGEAS: Yeah.

THE COMMISSIONER: Redirect?

MR. LEARMONTH: Yes, thank you.

Now, Mr. Williams mentioned or put a question to you as to whether government could've, you know, properly relied on the fact that Nalcor had obtained reports from experts –

DR. JERGEAS: Yeah.

MR. LEARMONTH: – in – yeah.

But what Mr. Williams didn't say was that even though Nalcor did obtain quantitative risk assessment for management reserve strategic risk from Westney, Nalcor never provided that to government.

DR. JERGEAS: Yeah, I don't know.

MR. LEARMONTH: Were you aware of that?

DR. JERGEAS: No.

MR. LEARMONTH: Do you think that that's a problem that that wasn't disclosed to government?

DR. JERGEAS: I think if – did we disclose the numbers?

MR. LEARMONTH: Yeah.

DR. JERGEAS: I understand Westney recommended management reserve –

MR. LEARMONTH: Yes.

DR. JERGEAS: – and a number.

MR. LEARMONTH: Yeah.

DR. JERGEAS: So if I don't present Westney's report, at least I present a number.

MR. LEARMONTH: Yes, but it wasn't included in the 6.2.

DR. JERGEAS: And I think I said many time, now if I were now in a new project, I would.

MR. LEARMONTH: Yeah. And in the 6.2 estimate that the government relied on and communicated to the public, there was only $368 million for what you would call –

DR. JERGEAS: Contingency.

MR. LEARMONTH: – operational risks or –

DR. JERGEAS: Yeah.

MR. LEARMONTH: – contingency. There was not one cent for scope contingency and not one cent for management reserve.

DR. JERGEAS: Yeah.

MR. LEARMONTH: So what do you think of that?

DR. JERGEAS: I think this is a problem.

MR. LEARMONTH: Yeah.

DR. JERGEAS: And the professional people in that project, they knew about it, they know about it. They have a good process for managing change. Somehow we lost somewhere the communication. This where I talk about communication.

MR. LEARMONTH: Yeah.

DR. JERGEAS: So they have a good process for how we manage change, so obviously they are expecting change. Okay. Did we account for it?

MR. LEARMONTH: Yeah.

DR. JERGEAS: Please add one more thing to this: Are we clear, in industry, that in our estimating of contingency, do we put all of these? Now we are providing this clarity.

MR. LEARMONTH: Yeah.

But whether – you know, whether – Mr. Smith asked you about whether the management reserve should be included in the budget – and I think you said it should've been, but there may be different points of view. But, in any event, isn't it obvious that even if the budget did not include anything for management reserve, government should've been informed by Nalcor of an estimate for management reserve?

DR. JERGEAS: Or excluding management reserve. I say my number is 6.2 –

MR. LEARMONTH: Yeah.

DR. JERGEAS: – but I did not include for all of these –

MR. LEARMONTH: Exactly.

DR. JERGEAS: Yeah.

MR. LEARMONTH: Yeah, disclosure.

DR. JERGEAS: Yes.

MR. LEARMONTH: That's obvious, isn't it?

DR. JERGEAS: Yes.

MR. LEARMONTH: It is, okay.

One other point, the – you may not be aware of this, but the government sent a question to the Public Utilities Board, okay, saying, okay, here's the Isolated Island Option and here's the Muskrat Falls option, questioned, generally, which one is the lower cost?

DR. JERGEAS: Mm-hmm.

MR. LEARMONTH: This would – at the time the Public Utilities Board heard this application, the engineering that had been completed by Nalcor was 5 per cent, and the Public Utilities Board declined to express an opinion because of the low level of engineering –

DR. JERGEAS: Yeah.

MR. LEARMONTH: – that was done. Do you not agree that that was a reasonable decision?

DR. JERGEAS: Yes, I agree.

MR. LEARMONTH: Yeah. And –

DR. JERGEAS: How would I make a decision on 5 per cent engineering?

MR. LEARMONTH: Yeah, or even 10 per cent.

DR. JERGEAS: Yeah.

MR. LEARMONTH: Agree with that, yeah, yeah.

DR. JERGEAS: Yeah.

MR. LEARMONTH: Okay, thank you. That's all my questions.

DR. JERGEAS: Thank you very much.

THE COMMISSIONER: And my apologies to the Newfoundland and Labrador Building and Construction Trades Council/Resource Development Trades Council Newfoundland and Labrador. Did you have any questions?

MS. QUINLAN: No, we don't, Commissioner.

THE COMMISSIONER: Okay. Thank you very much.

Thank you, Dr. Jergeas –

DR. JERGEAS: Thank you, Commissioner.

THE COMMISSIONER: – Jergeas, I appreciate your time.

DR. JERGEAS: Thank you.

MR. LEARMONTH: All right. We're adjourned and we'll start again tomorrow morning.

Tomorrow we have our environmental panel, so we do have two short witnesses to go before the Panel. I – I am a little bit worried about not having enough time for this environmental panel, so I'm going to be an autocrat this morning or dictator, as just the words come across, and we're gonna start at 9 o'clock tomorrow morning, 9 o'clock.

CLERK: All rise.

This Commission of Inquiry is concluded for the day.