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Chair

Mr. Leon Benoit

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● (0845)

[*English*]

The Vice-Chair (Mr. Peter Julian (Burnaby—New Westminster, NDP)): Hello. I'm Peter Julian, the vice-chair who is temporarily replacing our chair, who is en route.

We would like to thank our witnesses for coming today.

We have Martin von Mirbach, director of the Canadian Arctic program of the World Wildlife Fund. From Babcock and Wilcox Ltd., we have Christofer Mowry and Christopher Deir, president and manager, respectively. From the Canadian Nuclear Safety Commission, we have Michael Binder, president and chief executive officer; Barclay Howden, director general for the directorate of regulatory improvement and major projects management; and Patsy Thompson, from the directorate of environmental and radiation protection and assessment.

Thank you all very much for coming here today.

We will start with the Canadian Nuclear Safety Commission.

Mr. Binder, you have 10 minutes. *Merci beaucoup*.

Dr. Michael Binder (President and Chief Executive Officer, Canadian Nuclear Safety Commission): Good morning, Mr. Chairman, and committee members.

[*Translation*]

My name is Michael Binder. I am the president of the Canadian Nuclear Safety Commission. It is indeed a pleasure to accept your invitation to be here today to explain what the CNSC is involved in and how it relates to the committee's study of resource development in Northern Canada.

[*English*]

The CNSC is Canada's nuclear regulator with the mandate to protect the health, safety, and security of persons and their environment and to implement Canada's international commitments on the peaceful use of nuclear energy. Furthermore, the mandate includes the dissemination of objective scientific information. The CNSC carries out its mandate under the Nuclear Safety and Control Act, the NSCA.

The CNSC is an independent quasi-judicial commission that regulates all things nuclear in Canada, including uranium mining, nuclear fuel fabrication, nuclear reactors and power plants, the production and use of medical isotopes, and the decommissioning and remediation of nuclear sites.

As you can see, the CNSC is involved in several areas that relate to resource development activities. But first let me give you a quick update on our response to the Fukushima nuclear accident in Japan.

I'm sure you're all aware of the massive earthquake and tsunami that hit Japan in March 2011 and the impacts on the Fukushima Daiichi nuclear plant. The CNSC immediately formed an internal task force to assess whether lessons learned could be applied to the Canadian nuclear facilities. Its recommendations were presented to the commission tribunal on May 3. While the task force found that, overall, Canadian nuclear power plants were safe, recommendations for safety enhancements were presented for the commission's consideration.

Today, however, I'm here to give you a brief overview of the CNSC's perspective on environmental protection, uranium mining, aboriginal consultation, and small power reactors.

● (0850)

[*Translation*]

As I mentioned, the CNSC is a safety regulator and its mandate under the Nuclear Safety and Control Act includes protection of the environment. This means that we always examine the potential impact on the environment whenever a licence application is before the commission.

[*English*]

We are experts in doing environmental assessments. Since 2003 we have completed, or are now conducting, 66 environmental assessments. We've just completed the joint review panel study of the Darlington nuclear plant new-build project. The joint review panel for the deep geological repository is currently under way.

The environmental assessment process in Canada's three territories is a bit different from in the rest of Canada. It is carried out under specific legislation or land claims agreements such as the Nunavut land claims agreement. In the case of Nunavut, the Nunavut impact review board runs the environmental assessment process and the CNSC staff provide the technical support. If the environmental review results in the project being given the green light, then the CNSC will take into account the environmental assessment recommendations when it licenses the project.

The CNSC has been regulating uranium mining in Canada since the mid-1980s. The legacy of Canada's mining industry has often been to abandon the projects when the ore body is exhausted. Part of the CNSC's focus has been to bring abandoned uranium mines under regulation and remediate them so that they are not an ongoing safety or environmental risk.

Most of Canada's uranium mining activity is currently taking place in northern Saskatchewan, but there are proposals being considered with the Matoush project in northern Quebec and the Michelin project in Labrador.

[*Translation*]

In recent years there has been greater interest in Canada's north for its uranium reserves and the potential economic benefits which this activity holds; with typically around 50% of the workforce being northern workers.

[*English*]

Although there are other potential projects, only one, Kiggavik, is moving ahead at the present time. It is still in the environmental assessment stage, which is being led by the Nunavut Impact Review Board.

Again, let me emphasize that the CNSC will not license these projects unless they are safe. The CNSC is a hands-on regulator, and we will ensure that our licensees are operating safely and are meeting the licence conditions while they are in operation. Our regime includes annual inspections and reporting on compliance. Licensees also have to provide financial guarantees up front, which ensure that they have the required financial resources to properly clean up the site when they terminate their mining operations.

With respect to aboriginal consultation, the CNSC is an agent of the crown and is committed to fulfilling the crown's duty to consult with Canada's native people. We are proud to have developed a proactive and transparent aboriginal consultation policy. In March 2011, we launched our participant funding program to make it easier for the public, including aboriginal groups, to participate in our regulatory public proceedings.

● (0855)

[*Translation*]

Mining development in the north will require reliable sources of electricity and one alternative being talked about is small nuclear reactors. The CNSC is ready to review a design if a proponent brings us an application; and we will license it if we are convinced that it will be safe.

[*English*]

At the present time, two vendors have applied to us for design review. There is the Babcock and Wilcox mPower and the NuScale reactor system. We have had some very early discussion with other vendors. None of these designs will likely be ready for a licence-to-construct application for another three to five years, in our view.

There is a lot of global activity currently under way in the development of small reactor technology. For example, the U.S. Department of Energy has earmarked $450 million for the Nuclear Regulatory Commission to support the licensing of American-made small reactors and to demonstrate that the technology is viable.

You may be surprised to know that there are several small reactors already operating in Canada and the CNSC has decades of experience regulating and licensing these units. I'm referring of course to the small reactors known as SLOWPOKE, which are found at five university and research facilities in Canada. In fact, Canada was a pioneer in the development of these small reactors. They are safe and they continue to run reliably.

[*Translation*]

In closing, the CNSC is actively involved in issues relating to resource development in Canada's north.

[*English*]

Safety is our number one concern, both for human health and the environment. We will not license a facility if we are not convinced it will be safe.

I'd be pleased to answer any questions you might have.

Thank you. *Merci beaucoup*.

The Chair (Mr. Leon Benoit (Vegreville—Wainwright, CPC)): Thank you very much, Mr. Binder.

We will go now to the second group to present today, from Babcock and Wilcox mPower Inc., Christofer Mowry, president; and Christopher Deir, manager, Babcock and Wilcox Canada.

Mr. Mowry, I understand that you have to leave by 10 o'clock.

Mr. Christofer Mowry (President, Babcock and Wilcox mPower Inc., Babcock and Wilcox Ltd): Approximately. Yes.

The Chair: If questioners could remember that.... But Mr. Deir will be staying around to answer questions.

Go ahead with your presentation, for up to 10 minutes, please.

Mr. Christofer Mowry: Mr. Chairman, and members of the committee, thank you for the opportunity to testify today.

As you said, my name is Chris Mowry, and I am the president of Babcock & Wilcox mPower, a business unit of The Babcock & Wilcox Company. I am also the president and chairman of Generation mPower LLC, a majority-owned subsidiary of B&W.

I appreciate the opportunity to present testimony today on the promise of small modular reactors and to describe our innovative B&W mPower reactor, which is an advanced, passively safe, and economic alternative for the Canadian market. I will focus my remarks on the technical, safety, and economic attributes of SMRs and their potential applications in Canada, as well as on some related challenges.

B&W has more than 50 years of continuous nuclear engineering and nuclear manufacturing experience, in the U.S., Canada, and around the world. We provide customers with manufacturing and nuclear-related services from 17 facilities across North America and operate nuclear manufacturing facilities in Indiana, Ohio, Virginia, and Tennessee in the United States as well as in Ontario and Saskatchewan in Canada. We currently employ more than 1,000 workers at B&W Canada, which is our wholly-owned Canadian subsidiary in Cambridge, Ontario. We employ directly and through our joint ventures approximately 12,000 nuclear professionals across North America.

Today's North American reactors operate at a remarkable level of safety, making the U.S. and Canada global leaders in nuclear safety and security. In the wake of the devastating earthquake and tsunami in Japan and the resultant emergency at the Fukushima-Daiichi nuclear plant, the nuclear community, including regulatory agencies, industry, and the general public, is evaluating what additional layers of safety are appropriate to mitigate these types of challenges. Our efforts to work together to learn from Japan's experiences will help make tomorrow's nuclear technologies even safer than they are today.

The B&W mPower SMR offers significant safety enhancements to current safety goals through the use of an inherently safer plant architecture and significant defence-in-depth systems. These design features can be summarized in five points. First, there's an integral nuclear steam supply system that has no large penetrations in the primary cooling circuit, which is a design that eliminates the possibility of typical worst-case loss-of-coolant accidents. Second, it has a small reactor core with a low power density and a large water inventory, a design that provides a large buffer against short-term challenges to core cooling. Third, it has a containment and a reactor building that is fully embedded underground, a design that effectively isolates the reactor and all emergency cooling water sources and safety systems from natural disasters and external threats such as what occurred in Japan. Fourth, there are no requirements for AC power, emergency diesel generators, or pumps for any of the safety systems; this is a design that instead uses natural circulation to remove decay heat. Fifth, it has a fully protected spent fuel pool with very large cooling water volume located deep underground, which is a design feature that provides protection for spent fuel similar to that provided for the reactor core itself.

Taken together, these SMR design features result in a reactor that will be two to three orders of magnitude safer than the current U.S. Nuclear Regulatory Commission requirements mandate. The design creates a 14-day safe haven before any outside intervention is required to maintain reactor cooling and more than 30 days of inherent protection before the spent fuel pool could experience any exposure of the fuel. Furthermore, our SMR design requires no emergency operator action for the first 72 hours after an emergency shutdown, which is best in class for all advanced light water reactor designs, large or small. This feature allows the operators to focus on long-term mitigation of events.

The events at Fukushima were, more than anything else, the result of the plant site and location. The SMR industry is in a unique position to efficiently incorporate both design and regulatory lessons learned from Fukushima into our designs. We have an ongoing and extensive effort to evaluate the mPower SMR design in the context of what we are learning about the events at Fukushima. Our evaluation is confirming that the safety performance of our design is extremely robust when confronted by an extreme Fukushima-type event.

● (0900)

I'd like to emphasize that the success of SMRs does not require any changes that would weaken existing or proposed regulations that may be forthcoming in light of Fukushima. While the way in which an SMRs design meets regulations may differ from that for large reactors, the underlying safety requirements are exactly the same.

We are currently engaged in an extensive test program to provide regulators in-depth data to evaluate the safety of the mPower reactor. This includes our dedicated integrated systems test facility, which is an unfueled, scaled, prototype reactor system. We expect testing, which represents a significant investment on our part, to demonstrate to regulators, potential customers, and public stakeholders that the B&W mPower reactor will far exceed current safety requirements.

We are currently working with both the NRC and the CNSC on pre-licensing activities involving early reviews of our design, before starting our formal licensing activities. We are on track to submit a formal Design Certification Application in the U.S. by the end of 2013. We remain committed to placing the first B&W mPower units in service before the end of 2022 in the U.S. and to support in-service dates in the mid-2020s here in Canada.

With regard to economics, B&W would not be investing our own resources in this effort if we did not believe we could produce a very competitive product and create a viable business model. Market analysis concludes that the global addressable market for small modular reactors ranges from 100 to 125 gigawatts through 2020 for baseload carbon-free electricity. SMRs directly address the key challenges associated with the construction of large nuclear plants, including financial risks, cost and time uncertainty, production bottlenecks, and expensive power grid upgrades.

This is achievable through a paradigm shift from economies of scale to factory assembly of simplified, integral reactors in a manufacturing setting. Through this shift, we believe we will be able to offer SMRs to our customers without any cost premium for going small: we can compete with any new-generation large reactor design. Based on our large experience in manufacturing small reactors, we believe we can achieve our cost-efficiency targets in fewer than 10 modules.

In addition, we formed a consortium comprising 15 U.S. utilities, with a larger industry advisory council of 28 utilities, including three Canadian utilities. We are working closely with all of these and with our engineering, procurement, and construction partner to validate the economic value of our reactor. This process has allowed us to conclude that not only is our design competitive with traditional nuclear, but it provides substantial economic benefits over intermittent renewable resources.

In Canada, existing and proposed environmental legislation has highlighted the potential for nuclear power in areas that have traditionally relied on baseload coal-powered generation. The Ontario government's decision to shut down all coal-powered generation in the province by 2014 creates a potential baseload deficit in the northern regions of Ontario. At the same time, continued growth, such as the recently announced plan by Clifford Mines to develop a ferrochromite facility in Sudbury, can be expected to require significant expansion of reliable baseload generation. Similarly, western provinces' reliance on coal power will require options to meet expected demand growth in those regions. These needs are specifically what the B&W mPower reactor was designed to accommodate. We look forward to working with Canadian utilities and developers to ensure that our design is considered in future deployment plans.

There are two issues that could potentially impact upon our deployment of mPower technology in Canada. These are the current nuclear liability regime and the process for conducting environmental assessments for nuclear in Canada.

To align Canada with international standards, it is vital that Parliament promptly complete action on amendments to the 1970 Nuclear Liability Act and that Canada ratify the Convention on Supplementary Compensation for Nuclear Damage, known as the CSC. The CSC is an important International Atomic Energy Agency initiative to commit the international community to common and high standards for handling nuclear facility accident claims.

● (0905)

The September 2011 IAEA action plan on nuclear safety calls on member states to become part of a global nuclear liability regime. The four bills introduced since 2007 were generally consistent with the CSC but require a few technical changes to ensure alignment with the requirements of the CSC. The CSC was ratified by the United States in 2008.

Prompt CSC ratification by Canada would address nuclear liability issues; attract international contractors for power reactor life extension and new build projects; and drive further Canadian nuclear exports, which we would participate in, helping to preserve Canadian nuclear jobs and infrastructure. The CSC has already been ratified by Argentina and Romania, two countries where B&W Canada and other Canadian nuclear suppliers have done significant amounts of work.

We applaud the recent decision of the federal government to accept the recommendations of the review panel for the new build in Darlington. While we're fully supportive of a robust and thorough environmental assessment, it's imperative that the process be predictable and provide value. The recent example at Darlington began six years ago, and final issue of a licence to prepare the site is still to come, demonstrating the need to ensure the process works for the benefit of all involved.

I'd like to close by noting Canada's leadership in nuclear power generation. The Canadian Nuclear Safety Commission is one of the most respected regulators in the world, an independent body without influence from special interest groups and one that ensures that any project under its purview is undertaken with one objective: the safety of the Canadian public. The nuclear regulatory regime in Canada is mature and well understood by us. This has given B&W the confidence to begin pre-licensing activities with our mPower design in Canada. We believe our design will receive a fair, impartial, thorough, and timely review.

Canada's long history in nuclear technology, including the development of the successful CANDU reactors, nuclear medicine advances, and a robust nuclear supply chain, gives B&W and the rest of world confidence that Canada can support new nuclear now and in the future.

Thank you for the privilege of testifying today. I'm happy to answer any of your questions.

● (0910)

The Chair: Thank you very much, Mr. Mowry, for your presentation.

We'll go now to the third and final presentation for today.

From the World Wildlife Fund Canada, we have Martin von Mirbach, director of the Canadian Arctic program. Go ahead please, sir, with your presentation.

Mr. Martin von Mirbach (Director, Canadian Arctic Program, World Wildlife Fund (Canada)): Mr. Chairman, committee members, thank you for inviting the WWF to appear before you today to contribute to your important study on resource development in northern Canada. I'll limit my remarks this morning mainly to offshore oil and gas development in Arctic waters, informed by past experiences in the Mackenzie Valley as well as offshore developments elsewhere.

WWF's mission is to stop the degradation of the planet's environment and to build a future in which humans live in harmony with nature. With 150,000 supporters across Canada and 5 million worldwide, we have an outstanding history of partnership with government and industry in Canada and globally.

Today, as we address this committee, WWF is releasing its eighth Living Planet Report in major capitals and business centres around the world. The key findings of this latest report are that while the global demand for natural resources has doubled since 1966, biodiversity has declined by roughly 30% over the same period. The economic and human costs of poor stewardship in an increasingly populated world could be devastating to the prospects for society and the world's economies.

The WWF recognizes and supports the need for carefully planned economic development in the Arctic, in particular, development that provides long-term sustainable benefits to northerners. We also acknowledge that Arctic development is being contemplated in the context of a projected growth of 500 new projects nationwide in the coming decade, attracting $500 billion in new investments. More than ever, now is the time for our government to step forward and demonstrate convincingly to Canadians that there is a regulatory and policy regime in place that is equal to the task of planning, assessing, and implementing these new projects in a manner that conserves key environmental and cultural values and minimizes conflicts with other social, economic, and environmental objectives.

For example, one key cross-cutting objective is the urgent need for effective action to address climate change, which requires national leadership and coordinated global action. The WWF has published a study, *The Energy Report: 100% Renewable Energy by 2050*, that charts the potential to achieve a renewable energy future. In this context, new investment in high-cost, high-risk fossil fuel developments is arguably questionable public policy, particularly if it is not accompanied by more effective mitigation actions for national climate change than we've seen to date.

Recent measures embedded in Bill C-38 are designed to accelerate the project review and approval process. An effective and streamlined regulatory approach is certainly a laudable goal, but only if it actually achieves the objectives of the review process—to understand the potential negative impacts and avoid, minimize, or mitigate them. In the case of Arctic offshore oil and gas development, there are reasons to believe that a more cautious approach is appropriate that, if done right, would potentially be beneficial.

Last year we participated in the National Energy Board's review of offshore oil and gas regulations in the Arctic and made several detailed submissions. Our key recommendations are summarized in the presentation we made to the NEB round table in September 2011, a copy of which has been shared with you. This morning I'll simply note a few of the knowledge and technology gaps that exist in the Arctic context.

Compared with other regions of Canada, the Arctic has relatively sparse environmental baseline data on species distribution and abundance. This dearth of information is compounded by the accelerating impacts of climate change in Arctic waters, with significant uncertainties about how ecosystem components will respond to those changes. The impacts of unprecedented new developments in Arctic waters add a further degree of uncertainty to the picture.

It is encouraging to note that the Beaufort regional environmental assessment, although misnamed since it has no assessment mandate, will address many of these knowledge gaps during its five-year mandate. As well, the WWF has recently published an analytical tool for identifying and mapping features that support ecosystem functioning in a changing Arctic.

The challenges of operating under arctic conditions are well-known: woefully inadequate logistical and support capabilities, with technical crews and equipment far distant and difficult to mobilize; short operating seasons; harsh environmental conditions that strain the performance limits of people and equipment; and the unique challenges of spilled oil in icy conditions. Using research prepared for the NEB, we found that during the short summer season in the Beaufort Sea, conditions are likely to be too harsh to deploy emergency response personnel 65% to 85% of the time. Throughout the remaining long winter months, there would be no ability to carry out blowout capping or cleanup operations. The treatments themselves, including dispersants, containment, and in situ burning, are less effective in ice-infested Arctic waters.

To put it bluntly, there's currently no oil spill response capacity to address a sizeable well blowout or large-scale spill in Arctic waters. This message is echoed in a recent report from the leading international insurance company, Lloyd's, which concludes that cleaning up any oil spill in the Arctic would present “multiple obstacles, which together constitute a unique and hard-to-manage risk”, and which urges companies not to “rush in [but to] step back and think carefully about the consequences of that action”.

● (0915)

Lloyds is not the only business interest to question the advisability of offshore oil drilling in the Arctic. WestLB, a bank based in Germany, will no longer loan money to offshore oil projects in the Arctic. As a spokesperson for the bank put it, “the further you get into the icy regions, the more expensive everything gets and there are risks that are almost impossible to manage. Remediation of any spills would cost a fortune”.

As you can see, it's not only conservation groups who believe that we're not yet ready to move forward with offshore Arctic drilling. However, while we address the aforementioned knowledge and technology gaps we can and should simultaneously invest in the full range of preparations needed to move closer to sustainable development in the Arctic.

First, time is needed to develop and test new methods to increase the safety of operations and the efficacy of oil-spill cleanup; to strengthen Arctic support infrastructure, including search, rescue, and spill response capacity; and to provide the training needed for northerners to benefit from new developments in their territory.

Second, there are no easy shortcuts when consulting with affected parties, especially Indigenous rights holders. In this regard, I call your attention to the "Circumpolar Inuit Declaration on Resource Development Principles in Inuit Nunaat", copies of which have been shared with you. This declaration was developed by and on behalf of the Inuit Circumpolar Council and its constituent members. It recognizes that responsible development, including from non-renewable resources, "can make an important and durable contribution to the well-being of current and future generations of Inuit". But a common concern throughout is that the pace of development must not outstrip the capacity of Inuit to participate meaningfully in addressing the challenges and taking advantage of the benefits of development. I urge you to study this declaration and to invite the ICC to speak with you about it.

Third, the regulatory review process for offshore oil and gas activity would proceed more smoothly and with less expensive and time-consuming conflict if it occurred in the context of a previously completed regional marine spatial plan. Such a plan would consider all significant activities in an integrated way and explicitly delineate areas where activity can occur as well as sensitive areas meriting special consideration. It would be developed in an inclusive manner involving all stakeholders, resulting in an open, transparent, and accountable decision-making process that produces socially acceptable decisions. These conditions don't currently exist in the Canadian Arctic, although there are noteworthy planning processes such as the Beaufort Sea partnership that can be built upon and learned from. As well, strategic environmental assessment is a tool that can address cumulative impacts and set overall thresholds for an entire region. Investment in upfront ecoregion-wide planning ultimately results in less financial and political uncertainty.

Forth, we have an excellent opportunity to strengthen the circumarctic governance regime for offshore development. Oil spills ignore national boundaries and, therefore, it is in our strong self-interest to ensure consistent and good regulations are in place and effectively implemented throughout the Arctic. Initiatives are currently under way through the Arctic Council—the chair of which Canada will assume in 2013—to create internationally binding rules on offshore Arctic oil development. In taking part in those negotiations, Canada has an opportunity to secure the well-being of its northern people by ensuring that development in Canada and in neighbouring countries is held to the same high standards.

Fifth, we have an opportunity in Canada to develop a truly visionary Canadian energy strategy, charting a course for Canada that is aligned with this country's climate change commitments and that addresses the shortcomings noted in the recent report by the environment and sustainable development commissioner. Opening up new frontiers for oil and gas development without a long-term energy plan that tackles CO2 emissions risks pushing us further from our national goals and international responsibilities. In an increasingly carbon constrained world, this can affect not just Canada's reputation but also our access to markets for our products and services.

In conclusion, there is currently insufficient knowledge and inadequate technology and infrastructure to safely carry out drilling in Canadian Arctic waters. More time is required to address these gaps, but this necessity can become a virtue if at the same time we collectively invest in the research, planning, infrastructure, and dialogue that are the key characteristics of responsible stewardship. It may take longer for new Arctic developments to come on stream, but those developments, whatever they turn out to be, will be better planned; less contentious, with greater social licence; and less risky for investors, governments, communities, and the environment.

The WWF stands ready to work collaboratively with government and industry to chart a course for well-planned and sustainable development in the Arctic.

Once again I thank you for giving me the opportunity to share our views with you.

● (0920)

The Chair: Thank you very much for your presentation, Mr. von Mirbach, director of the Canadian Arctic program for World WildLife Fund Canada.

Before we go to questioning I want to remind people of our study. At the last meeting I noticed a fair bit of straying, I think on both sides, from the topic that we were here to discuss. We're here to do a study on resource development in northern Canada. I would ask all members to keep their questions to the topic at hand.

We'll start the questioning with a seven-minute round.

Mr. Allen, you have up to seven minutes. Go ahead, please.

Mr. Mike Allen (Tobique—Mactaquac, CPC): Thank you, Mr. Chair.

Thank you to our witnesses for being here today.

I'd like to focus a little bit on Babcock and Wilcox, since they'll be leaving at 10 o'clock.

We've heard a lot of testimony on supporting resource development in the north. A tremendous amount of infrastructure is going to be needed, and that includes energy. When I listened to your presentation on the small reactor, it was interesting. It almost sounds to me as if you're going after a niche market in rural and potentially remote areas, based on some of the plant architecture you did talk about.

Just in general, at what size, in megawatts, would you see these units, even though you're at the preliminary stage? You talked about 100 to 125 gigawatts. What are you looking at in terms of size of these units for marketing?

Mr. Christofer Mowry: Thank you for your question.

There are a couple of things. One of the advantages of small reactors is their siting flexibility. Our reactor is 180 megawatts, which is the baseline for one unit. That is 15% of the size of a standard, large 1,000-megawatt type plant. As a result of that, it has quite a bit of flexibility with siting, and it can support siting in more isolated communities where 1,000 megawatts isn't needed or something like that. And because it is designed to be cost competitive with the large reactors, we have a lot of interest from utilities that would traditionally want to site large reactors but can't accept the financial risks.

Designing a reactor only for a niche application would not create and close a business case for us, so we have to develop a solution that has the flexibility to be economically competitive for both large generation as well as more niche applications.

Mr. Mike Allen: Have you done any preliminary work on the cost per kilowatt hour?

Mr. Christofer Mowry: Yes, and our view right now is that the cost per kilowatt, including the owner's cost, would be under $5,000. That's backed up by detailed civil structural cost estimates from our EPC partner.

Mr. Mike Allen: Okay.

Regarding your plant architecture, a couple of times you referred to “deep underground”. In the case of the containment, you talked about the small core, big water reservoir containment deep underground. Then you talked about spent fuel disposal deep underground.

Can you define what deep underground means? How would you see the challenge of developing deep underground storage in rural and remote areas?

Mr. Christofer Mowry: Yes, that's a great question.

Our reactor and containment building—the nuclear island—is approximately 140 feet deep. That would result in basically a single-storey building that's above ground, similar to a supermarket, which has no safety function whatsoever. It has a number of truck bays and those types of things. All of the safety structures are embedded underground.

The key there, of course, is that they are what I will call below grade. So in locations where you have issues with deep excavation or water, it's then more about creating a berm under which the structure can be located to protect it from external threats. That's the main goal.

Mr. Mike Allen: But in a traditional area, would it almost be treated a little bit like a mine in terms of it being 140 feet deep? Would you treat it typically like a mine and excavate? Would that typically be how you'd do that?

Mr. Christofer Mowry: Yes, and we've done calculations to look at the incremental costs of having the nuclear island completely underground. For a two-unit plant, which would be 360 megawatts at $5,000 a kilowatt, you're talking about an overall investment of about $1.8 billion. The extra cost for digging that hole is about $9 million, so it's not much. It isn't just a straight-down hole, but it necks down.

The key here is to ensure the safety performance of this thing against extreme events and extreme threats without having to have a lot of infrastructure around it, and having a high degree of confidence that the technology and the reactor are protected in a very good way.

● (0925)

Mr. Mike Allen: Okay.

Let me ask you about the resource profile when you actually look at building these things and actually operating them. Have you done projections of the staffing requirement for the construction jobs that would be created by this and, in the long run, staffing projections as to what it would take to actually operate it?

Mr. Christofer Mowry: That's a great question. When you look at a truly economic competitiveness environment, you have to look at both the construction costs and the long-term operating costs, that is, with a total cost-of-ownership perspective. It's not only imperative that the construction costs be competitive but also the operating costs. Again, for a two-unit type of power plant, you're looking at a couple of hundred people to operate it in total, and that would include maintenance, operating, security, all of those types of things.

One of the features of our design is that it only needs to be refuelled every four years. It was specifically designed that way to reduce the amount of continuous on-site presence and logistics requirements. That period is approximately twice as long as the normal refuelling interval for a large non-CANDU-type heavy water reactor.

Mr. Mike Allen: Good.

Mr. Binder, I want to get to the regulatory side of this a little bit in terms of some of the pre-licensing discussions you've had. We do have these SLOWPOKEs. Obviously, this reactor differs significantly from a SLOWPOKE reactor.

Do you have an idea of the average time it would take to pre-license, and even license, a reactor like this one?

Dr. Michael Binder: Thank you.

The way a pre-license review takes place is that we get to know each other, because a lot of these brand new designs have not been built anywhere before. As a result, there's no practical demonstration of this technology as yet. In fact, that's why I think the Americans are now in the process of trying to build such a prototype, to see how it performs in reality.

What we do is to compare the proposed design against our regulatory requirements, and to try to acquaint the proponent with our requirements for safety and security, etc. You have to understand that this is not a license to build: the vendor has to find a client, and the client comes to us with an application to build, whereunder all of those issues will be looked at.

The Chair: Thank you, Mr. Allen, and thank you, Mr. Binder, for the answer.

Mr. Julian, for up to seven minute, please. Go ahead.

Mr. Peter Julian: Thank you, Mr. Chair, and thank you to our witnesses here today. We appreciate your being here.

I'll start with you, Mr. Binder. You mentioned Fukushima in your presentation, and I'm going to ask you two questions about it. The first is, can you give us an approximate idea of the liabilities resulting from what happened with the Fukushima nuclear plant, the total cost of cleanup? Those estimates would be helpful to us.

My second question is on the issue of the small nuclear reactors in the north. You do flag small reactors in your presentation, the SLOWPOKE research reactors. Those are in ideal conditions, of course, in southern Canada. What's being proposed, of course, is not for the ideal conditions found on some university campus in southern Canada; we're talking about very demanding, very difficult conditions, particularly if the proposal is to have these small nuclear reactors operating as power sources to mining developments in the north. We're talking about very harsh, very difficult conditions.

When you talk about evaluation, I'd like to know to what extent the commission would be evaluating any type of application under harsh conditions? To what extent would these additional criteria be brought in, the ones that are obviously present, which would make this a more risky proposition than having a SLOWPOKE reactor on a university campus in the south?

● (0930)

The Chair: Mr. Binder, go ahead, please.

Dr. Michael Binder: On your first question on the total liability, all I will give you is what I have read in the press. I think the latest figure I read in the press is that the total cost is estimated to be $100 billion. That's for everything: cleaning up the communities, the infected communities, and the facility itself, etc. I don't know the validity of those numbers. I'm not aware of those things. My answer is picked right from the press.

In our assessment, and I'll ask my colleague Mr. Howden to give you more details, it is up to the proponent, the client, to come to us with arguments about the safety case. It's up to them to demonstrate to us why the proposed facility would be safe for the environment, for people, and for security in the proposed location, if you like.

That's no different in any location. I don't necessarily see that as any different from operating a mine in the northern climate, for example, where they have to deal with some of those same kinds of harsh realities, the harsh weather, etc.—but the current proposal is to dig deep underground. We would have to look at what that means in terms of its impacts, in terms of the operation. So I cannot tell you a priori what it's going to be, but we have a definitive kind of requirement for the proponent to prove to us that it's going to be safe for the environment, for the people, for security.

Mr. Peter Julian: I don't want to put words into your mouth, but what you're saying is that for the moment, the commission has not developed unique criteria for these types of applications.

Dr. Michael Binder: Oh, no. We've just released a regulatory document that at very high level and in general terminology does define the minimum criteria.

Mr. Howden, you may want to jump in.

The Chair: Go ahead, Mr. Howden.

Mr. Barclay Howden (Director General, Directorate of Regulatory Improvement and Major Projects Management, Canadian Nuclear Safety Commission): Thank you very much.

Within our regulatory framework we do have two documents focused on small reactors. One is “Design Requirements for Small Reactors” and the other is “Deterministic Safety Requirements for Small Reactors”. What these do is to set out the safety goals.

They set out the safety goals for accident frequencies and consequences. One of the things we look at is external events, whether they would be weather events or security type events, and those are assessed uniquely in the particular site that is chosen.

Based on the Fukushima events that occurred last year, events that were then thought to be beyond the design basis are now considered to be within the design basis. So we require our proponents to come in and explain, regardless of how they got there, how they are going to survive without power and water. Then they really have to show that their safety case could hold up. Then we don't worry as much about what caused it, but how the reactor is going to survive the event regardless of what caused it.

Mr. Peter Julian: Thank you.

I'll move on to Mr. von Mirbach.

I have two questions for you, Mr. von Mirbach. First, in the commission's presentation that you've just heard, they talked about consultation with aboriginal people. You as well have spoken repeatedly about the importance of consultation. I would like you to come back to what you raised when you talked about ensuring that any offshore oil and gas exploration be coupled with a regional marine spatial plan. Then you referenced the Beaufort Sea partnership as a basis for this.

Could you give us a little more detail about the Beaufort Sea partnership, how you see that as a foundation for consultations with aboriginal peoples? As well, can you offer some suggestions both for the nuclear commission and for any other regulatory agency in the north as to how they should be consulting appropriately with aboriginal peoples in the north?

Mr. Martin von Mirbach: Thank you.

I'll perhaps respond to your second question first and just urge everyone to look at the ICC declaration on resource development, which, in 57 principles, gives more detail than I can and is really appropriate. It's really a valuable document for all resource development users—and done in a very thoughtful way.

ICC was challenged in doing this. It was a protracted process because its members have varying degrees of confidence and interest in resource development. So it's a nuanced document, and I think valuable because of that.

That, in some ways, is a segue to the first question around the Beaufort Sea partnership. Its characteristic is that it's a multi-stakeholder body that has developed an integrated ocean management plan for the Beaufort Sea, involving all of the key management agencies from the federal and Inuit land claims holders and also a variety of stakeholders, including industry, environmental organizations, and municipalities.

The virtue of the Beaufort Sea partnership, and in some ways what is offered through this initiative, is that it has in its mind and its planning the idea of developing a marine spatial plan, but at this point it hasn't yet established the momentum to actually to do that and is operating quite carefully and cautiously.

The characteristic that I would say distinguishes what the Beaufort Sea partnership might do with a marine spatial plan, as opposed to what is currently done, is that instead of dealing with a particular issue in a sector-specific way, which currently is the case with Aboriginal Affairs and Northern Development Canada, which looks at licensing in the offshore areas and specific leases and particular conflicts around those leases, there is, in a larger sense, an opportunity to look at all of the issues, including shipping, commercial fishing, and other subsistence uses, and assess all them together in a plan.

The virtue of it, ultimately, is that while a plan including a variety of stakeholder perspectives can be a little more complicated and lengthy to put together, once it's done, it's more politically robust, I would say, in producing a decision that is likely to be sound. Any politician would like a clean recommendation to approve, and that's more likely to happen if all of the interests of stakeholders are involved at the front end.

● (0935)

The Chair: Thank you.

Thank you, Mr. Julian, for your questions.

We'll go now to Mr. McGuinty for up to seven minutes.

Mr. David McGuinty (Ottawa South, Lib.): Thank you, Mr. Chair.

Thanks to all of you, ladies and gentlemen, for being here today.

All three of you have referenced environmental assessment directly.

Mr. Binder, you conduct environmental assessments—your council does.

Mr. Mowry, you said there were two important issues to be addressed, one of which you referred to as getting environmental assessment better.

Mr. von Mirbach, you repeatedly referred to both environmental assessment and strategic environmental assessment.

In that context, Mr. Chair, because we're talking about energy in the north and energy and its exploitation and use, the government is obviously bringing in some pretty interesting changes to environmental assessment procedures. Were any of you consulted?

Mr. Binder, was the CNSC consulted with respect to those changes that are now in the budget?

Dr. Michael Binder: Yes, we were. It's not going to affect us much.

I have to explain. Take a new uranium mine. We are dealing with uranium mines from cradle to grave. It means a 60- to 70-year relationship with a mine, with the mining operation, and with the community that lives around it, so we have always done environmental assessments.

More importantly, the mitigation that comes out from the environmental assessments is written into our licence conditions. Then we monitor it on an ongoing basis, on an annual basis, with inspectors, etc. So to us, it has always been the same. These changes make it a little bit more timely and clarify responsibilities.

Mr. David McGuinty: So on a 60- to 70-year relationship with a community, for example, are you going to be able to conduct an environmental assessment within, ostensibly, an arbitrary timeline of two years?

Dr. Michael Binder: We believe we can do that—absolutely.

Mr. David McGuinty: You said you have done 66 environmental assessments since 1996. How many have gone over two years?

● (0940)

Dr. Michael Binder: I don't have the figures right here. But going over two years is not only a function of us; it's a function of proponents for a variety of reasons. They stop the clock, consult with other departments, etc. Many did go over. But in terms of lapsed time, from our perspective, by and large, it's been less than two years.

Mr. David McGuinty: You also say that at CNSC you've just made additional funding available. You said, “we launched our participant funding Program to make it easier for the public, including Aboriginal groups, to participate....”

Will the changes being brought to bear now, circumscribing who can testify and be invited to testify, based on either immediate vicinity impacts or expertise only, have a bearing on who—

Dr. Michael Binder: That's not the way the program runs. We announce a public hearing, and anybody who thinks they have some value-added to bring in front of the commission can apply.

Mr. David McGuinty: So your processes won't be affected by the new tests being applied by the government now in the budget bill.

Dr. Michael Binder: They won't, to my knowledge.

Mr. David McGuinty: Are you sure about that?

Dr. Michael Binder: The way I read the proposal right now, the way it's being consulted, it will not affect our public hearing and our public consultation.

Mr. David McGuinty: Mr. von Mirbach, was WWF consulted on the changes that are contemplated on environmental assessment?

Mr. Martin von Mirbach: No.

Mr. David McGuinty: To your knowledge were any hearings held or any meetings convened—round tables, councils?

Mr. Martin von Mirbach: As you know, a number of environmental groups have raised concerns around the measures. One of the concerns is the fact that they're embedded in a budget bill. I should qualify that and say we are a member of the green budget coalition. The green budget coalition did indeed consult on financial and budget issues during the development of the budget. It's just our contention that quite a few of the measures in the budget bill should be assessed separately from the strictly financial mechanisms.

Mr. David McGuinty: Mr. von Mirbach, Mr. Binder was asked whether he could give a number on the cost of Fukushima.

I'm hoping, Mr. Chair, we can get those numbers other than from media reports.

Do you know, or can you provide this committee with numbers, for example, on what it cost to deal with the *Exxon Valdez* spill and the BP spill?

Mr. Martin von Mirbach: I'm afraid I don't have those numbers at hand. I can look into them and get them to the committee.

Mr. David McGuinty: Do you have any idea on the order of magnitude?

Mr. Martin von Mirbach: I would be on shaky ground, as Mr. Binder was.

Mr. David McGuinty: In your testimony, Mr. von Mirbach, you said we basically don't have the technology to deal with a potential spill in the Arctic. I asked senior officials from the relevant government department at the last meeting, if we lined up four or five engineers, whether we could get a consensus on that. They were unable to answer that, just as they admitted they don't factor greenhouse gas implications into their regulatory decisions either—licensing, for example.

Do you think we can get consensus that there is no existing technology to deal with this?

Mr. Martin von Mirbach: Will we get consensus? No, I think the issue will tend to be shaped according to people's interests. For example, we made an intervention and the entity agreed with us in general that the requirement to be able to drill a same-season relief well was important and should be retained. There was a point of contention around whether or not there were equivalent methods in place.

There are comparable or equivalent methods in place, but only for certain types of blowouts. A blowout that happens right at the point where the oil emerges, for instance, can potentially be capped. But a rupture in the pipe farther down can't be capped with a cap. On the statement that this is equivalent, it's equivalent but only for certain types of spills. Of course, if we could control the type of blowout that might happen we wouldn't need the provisions in the first place.

Mr. David McGuinty: Mr. Mowry, you talked about the economics of your new equipment, your new system. If the Government of Canada were to follow through on the Prime Minister's promise to price carbon emissions at $65 a tonne in the next five years—an explicit international promise he made in London, England, in 2008 on pricing carbon—what effect would that have on the economics of your industry?

● (0945)

Mr. Christofer Mowry: With that type of carbon tax, a small reactor would be the lowest-cost baseload option available, when compared with coal or natural gas.

Mr. David McGuinty: Are you in favour of carbon pricing? The Prime Minister was in 2008, but we're not sure where he is now. Is your industry in favour of carbon pricing?

Mr. Christofer Mowry: I don't think there is consensus in the industry. There are a lot of different stakeholders involved in this, and our company is involved in a lot of different clean energy technologies, including biomass. We think that the environmental impact of different technologies should be factored into how the technologies are viewed for deployment.

The Chair: Thank you, Mr. McGuinty.

Mr. Galipeau.

[*Translation*]

Mr. Royal Galipeau (Ottawa—Orléans, CPC): Mr. Chair, I want to thank our guests for coming today.

[*English*]

What I remember about the 2008 carbon tax is that the Prime Minister of Canada fought against it and so did I.

I am interested in these small modular reactors. Mr. Binder, you mentioned that there were five universities that have them. Which ones?

Dr. Michael Binder: There's RMC in Kingston, the University of Alberta, the Saskatchewan Research Council—

Mr. Royal Galipeau: Alberta, that's Edmonton?

Dr. Michael Binder: Yes.

Mr. Royal Galipeau: It's 40 below?

Dr. Michael Binder: It's on campus.

Mr. Royal Galipeau: But it's 40 below sometimes?

Dr. Michael Binder: It's in the building. I did time in Alberta. I graduated from the University of Alberta, please. I know exactly what you're talking about. In fact, it's working very well.

Mr. Royal Galipeau: Okay, so now we have Kingston, Edmonton....

Dr. Michael Binder: And we have École Polytechnique of Montreal. I think Dalhousie just signed the process of decommissioning. It has been running for 20 years or so. It's been running as a research facility and hundreds of students went through it. The fact that people don't know about it is good news. It's been working inside campuses, in the middle of campuses, without many people knowing about it.

Mr. Royal Galipeau: So there've been no demonstrations.

Dr. Michael Binder: No.

Mr. Royal Galipeau: What is the fifth one?

Dr. Michael Binder: McMaster University.

Mr. Royal Galipeau: We have Babcock and Wilcox as witnesses today, but I remember Canatom used to be in the nuclear reactor business. Are they in business now?

Mr. Barclay Howden: That was before my time. I don't recall.

Mr. Royal Galipeau: It was a consortium and included SNC-Lavalin, Marshall Macklin Monaghan, and a few other engineering firms.

Mr. Barclay Howden: I believe it was created for some large projects and existed for quite a while, but it hasn't been around for maybe 10 years.

M. Royal Galipeau: Are there any Canadian firms involved in this now?

Mr. Barclay Howden: Candu Energy Inc. bought the Candu arm of AECL and Candu Energy Inc. is owned by SNC-Lavalin.

● (0950)

Dr. Michael Binder: Well, there are a couple of things. On your first point with the public, I have to tell you we do not a priori screen who can come in front of us, who cannot. Everybody's welcome to a public hearing, and we have many of them through licensing processes, though environmental assessments.

We have proponents for nuclear, we have opponents of nuclear. We have Greenpeace, the Sierra Club, as well as OPG and Bruce Power. They all come in front of us; they all have a say. And the commission integrates all of the material that comes in front of us in the deliberation and rendering of a decision.

With the application, with the applicant, it's always what the safety case is and how we can make sure that the operation will be safe. That's always something we don't compromise on, and it's up to them to prove the case. We have a lot of technical experts who can challenge the assumption, challenge the design, and we'll ask for mitigation to deal with any particular impact on the environment, and more importantly, follow through to make sure that what was promised is delivered.

Just as a point to correct Mr. McGuinty when he asked the question about the north, I'd like to remind everybody that in the north most of the environmental assessments are being conducted with boards from the north. So in Nunavut it's the Nunavut Impact Review Board that conducts the assessment. We provide just technical support to them in terms of the nuclear technology. But the assessments are conducted by those independent boards, which most of the time are composed of aboriginal communities.

So we are absolutely agnostic about who appears in front of us. What we want is the safety case, and that's the only way we render a decision.

The Chair: Thank you, Mr. Galipeau.

We go now to Mr. Daniel, for up to five minutes, please.

Mr. Joe Daniel (Don Valley East, CPC): Thank you, chair, and thank you, ladies and gentlemen, for coming here.

Clearly, you've obviously done a good job of assessing your designs, etc. But have you actually assessed the requirement for a catastrophic failure? What could cause a catastrophic failure for this sort of system?

Dr. Michael Binder: That's a good question, and post-Fukushima we decided that we would look at what the industry in Canada is calling the “Binder's doomsday scenario”, which is that we don't care how we got into the doomsday scenario but that what we want to know is how we're going to mitigate the disaster.

That means, for example, that one of the important new enhancements in safety is that the industry is now talking about putting assets outside the site. So if you recall, in Japan what happened was it took them a long time to bring assets into the site. So the industry in the U.S., and in fact globally, is looking into how to enhance. This is only one point. They're also having backup to backup, so they can operate with diesel, and backup to diesel, etc. All of these have now been put in our task force report, and the commission is now looking into actually implementing them.

Mr. Joe Daniel: So from backup and backup in your design, what considerations have you taken to make sure that there isn't a catastrophic failure?

Mr. Christofer Mowry: There are two things. One is that we have moved beyond, let's say, a more deterministic approach to safety, in which you try to guess what the specific catastrophe would be, to more of what we call a risk-informed design, which is more a defence in-depth strategy.

If you look, for example, at the Fukushima incident, the plant itself survived the earthquake and the tsunami and actually shut down. The problem was that it required, after a very few hours, outside help for power and for water, and other types of things. We see that we need to move past that what I'll call fragile design and on to a more robust design that doesn't require this outside intervention. That is especially appropriate for the discussion we're having today regarding northern Canada.

Mr. Binder, you talked about these assets that are located not directly on site. That is an approach being taken to, again, mitigate the more fragile nature of some of the older operating plants, which, again, is not necessarily practical or appropriate for application in northern Canada, because they would be very difficult logistically.

Our approach is actually to make the reactor system itself very robust in terms of what I call a coping time. The idea is that it can survive for two to four weeks without any outside help whatsoever after the most severe type of accident. You can almost look at it as being that these extra assets are pre-positioned inside the containment underground, safely protected. So you have layer upon layer of defence. That's the way you need to think about how to create a system that is safe.

For example, for the airline industry, advanced airplanes today are designed to have an accident once in every 10 million years per flight. We try to take that to even a couple of orders of magnitude safer than that. In order to do that, you need to think differently about safety. The safety case we are in the process of starting to share with the CNSC does exactly that.

I'll give just one example to make my point. If you think about power, I made the comment that we have a passively safe design that doesn't require power. But we don't ever want to get to that situation. So of course the first line of defence is that you're connected to a power grid. If you lose the power grid because of an ice storm or something like that, then you have on-site diesel generators. If you lose those on-site diesel generators, you have backup batteries. If you lose those batteries, then of course you have natural circulation from gravity. Behind that, you have another layer of defence. So there are many layers here.

The key is that all of these designs are contained inside this safety containment underground. It's a very different approach. There's a shift from what I'll call a fragile design that is dependent upon outside help in a very short period of time to a very robust design with multiple layers of defence that has long-term coping capabilities so that it doesn't rely on immediate outside assistance. This is designed in from the beginning. Again, part of the reason was to create an option that is applicable to more remote locations where you don't have these kinds of support capabilities.

● (0955)

Mr. Joe Daniel: So you say that—

The Chair: Thank you, Mr. Mowry.

Mr. Daniel, your time is up.

Mr. Nicholls, you have up to five minutes. Go ahead, please.

Mr. Jamie Nicholls (Vaudreuil-Soulanges, NDP): This is a question for Mr. Mowry. You spoke about desired changes to the 1976 Canadian Nuclear Liability Act. Presently we have the polluter-pays model. The operator pays for on-site and off-site damages from the accident, without having to prove negligence. In turn, the public is guaranteed an expedited claims process and the right to collect.

Given the history of the company B&W, the fact of the Three Mile Island accident, and the fact that the company went bankrupt in February of 2000 due to asbestos claims, I'm concerned about what changes you would be proposing to the 1976 act.

Could you elaborate briefly on that?

Mr. Christofer Mowry: Sure. I'd be happy to do that. In fact, I grew up 50 miles from Three Mile Island. I was in high school when that happened. So I have a very personal and deep connection to that event and happen to know quite a bit about it.

The consensus from every industry expert who's evaluated it is that the accident was actually a result of operator error, not design. That's not to say the design couldn't have been more robust. But I believe the assertion that it was a B&W-induced event misses the mark in the consensus of the industry.

Mr. Jamie Nicholls: In the interest of precision, I'm interested in what changes you want to make to the 1976 act.

Mr. Christofer Mowry: The change to the act is more about the magnitude of the liability protection and the cross-border aspect of this thing.

Mr. Jamie Nicholls: In other words, you mean changing the insurance cap from the present $75 million to—I think it's been proposed four times—$650 million. However, if I'm correct—and correct me if I'm wrong—the U.S. presently has a cap of $10 billion. So why the differential? Would you support a cap that would be similar to that of the U.S.?

● (1000)

Mr. Christofer Mowry: The CSC, which is what we're talking about, the Convention on Supplementary Compensation, seeks to harmonize the overall backup across borders and in other countries. What we are proposing and asking for would be something that would be harmonized with what the U.S. has today, because the U.S. has ratified the CSC. So it would not be any more than what the U.S. has ratified under the CSC.

Mr. Jamie Nicholls: I have a question specific to the mPower and the underground containment aspect. There are risks associated with periglacial environments. One of them is frost heaving in bedrock. In the south bedrock is fairly stable, but in northern climates you have frost heaving, which makes the bedrock unstable. Has your company prepared a risk management plan for such unstable and unpredictable events?

Mr. Christofer Mowry: I think there are two answers.

One is the general answer, which is that whatever assessment or mitigation we come up with will have to get past Mr. Binder's agency. We'll have to make the safety case and will have to satisfy him and all the stakeholders.

The specific answer is that at the depths of embedment we're talking about, this isn't the same type of issue. Once you get down to 100 or 150 feet, you don't have the same challenges as in the top 10 to 20 feet of subsoil.

Mr. Jamie Nicholls: My final question would be to Mr. Binder, then. Has Canada signed any international agreements on nuclear liability, to the best of your knowledge?

Dr. Michael Binder: No, I don't know. This is a policy or particular file that NRCan is managing. I'm not aware of it.

Mr. Jamie Nicholls: You're not aware of it. So the Nuclear Safety Commission isn't aware of whether we are party to nuclear liability agreements. Is that the case?

Dr. Michael Binder: It's a piece of legislation that right now sets the rules, and we abide by the rules. I think the government has proposed a few times to amend this legislation; it just isn't passed yet.

Mr. Jamie Nicholls: Okay, but to the best of your knowledge we're not party to international agreements on nuclear liability?

Dr. Michael Binder: I am not aware.

The Chair: Thank you, Mr. Nicholls.

Thank you, Mr. Mowry. I understand you have to leave at 10 o'clock, so just leave as you must.

Mr. Anderson, you have up to five minutes, please.

Mr. David Anderson (Cypress Hills—Grasslands, CPC): Mr. Mowry, before you go, I'm just wondering what size of communities can benefit from your technology. This is a study on northern resource development. We talked a couple of years ago about the possibility of these small scale reactors being used. I'm just wondering what size of community. How big do the communities have to be before your technology is feasible for them?

Mr. Christofer Mowry: There are two applications. There's the industrial type application—for example, smelters and that type of this thing. I think the size of this reactor is perfectly suited to match up with one smelter, let's say. That maybe gives you a sense of the power output of this thing. Of course it depends on the geographic density; at 180 megawatts, that's for a very close-packed, high-density location. It could be a small city.

But it's also about the robustness of the power grid, right? Clearly you'd want to distribute the power, and one of the things we look at in more remote locations is the robustness of that power grid and the best size power reactor to put in one place to support a broader area. So it would be 180 megawatts, in that range. Less than 200 megawatts is a size we believe is broadly supported by existing transmission infrastructure. In the western provinces, for example, Saskatchewan is a size that does not require significant changes to the transmission grid and would allow that power to flow out across the broader part of the province.

Mr. David Anderson: How many different sizes of machines would you like to be able to produce? Are you just talking about one or two sizes, or are you talking about a variety of sizes available for different uses?

Mr. Christofer Mowry: Our reactor is a single-size 180 megawatts, but you've almost got to think about it like Lego building blocks. Each reactor, of course, has its own fully independent safety system, but it's really meant to be modular in the sense that you can group any number of these together depending upon the desired power output at the power plant itself. It's almost like wind turbines—you just change the number of turbines in a specific location to change the output of the plant.

Mr. David Anderson: Mr. Binder, how would your process change then as you go from one plant to, say, six of them put together? Is there a different process for you, or if they convince you that it can done properly with one unit, would it change your assessment process to see them put six together? How do you deal with that?

● (1005)

Dr. Michael Binder: As you know, in many of our nuclear sites there is more than one unit—in Darlington, in Bruce Power and Pickering. Again, with the new technologies it's hard to know a priori how they interconnect and what the safety case is if things go wrong. So we would have to assess that. I really cannot assess a priori a particular technology without knowing their safety case and all the defence in depth, with all the supporting layers. We'd have to see how they interact with each other, if there is any.

Mr. David Anderson: So do you see, say, three, or four, or five together in one excavation area, or are you using the grid and putting them in different places? How do you visualize that?

Mr. Christofer Mowry: It just depends on how much is needed in a specific case, but I'll answer specifically the point that Mr. Binder brought up, because we believe that this is a very important lesson learned from history, which is that you should have no safety interconnection requirements between modules. In our design at least, each SMR is fully independent by safety case, so the question that you raised never comes up. And because it's underground, the ability to envision some type of common mode environmental threat really goes away: you don't have exposure to ice storms or any other kind of natural disasters. These are fully independently safe, underground, and separated from each other. They could be within 50 acres, or something like that. You could put four of them in that area, but they wouldn't be physically connected to each other.

Mr. David Anderson: Mr. Binder, you talked about the Nunavut Impact Review Board. I'm interested in that. You have a relationship with them. I'm just wondering how far their authority extends. Where does your authority and theirs cross? You said you supply technical help to them. What is your authority in that part of the country?

Dr. Michael Binder: I'll start and have Dr. Thompson elaborate.

They are a board, which has to come up with approval of the environmental assessment. All we do is to provide technical support, because at the end of the day, if there's a uranium mine that will get the green light, they'll have to come to us for licensing. So it's in their interest to make sure that they want this project, and if they want the project to know what is the safety requirement we need to approve to give them a licence.

Mr. David Anderson: So nothing happens until you give the licence.

Dr. Michael Binder: Absolutely.

Mr. David Anderson: How does that differ from the role the provinces play then, from the authority of the provinces—

Dr. Michael Binder: It's very similar with the provinces.

For example, in Saskatchewan, we have this arrangement where we don't like to duplicate each other. So if they need to have something required according to their legislation, we'll let them lead, but it's in their interest is to make sure that we don't reject the environmental assessment. So we work together. We've been working together for years on those projects.

The Chair: Mr. Anderson, your time is up.

Dr. Thompson, could you give a short response, please.

Dr. Patsy Thompson (Director General, Directorate of Environmental and Radiation Protection and Assessment, Canadian Nuclear Safety Commission): I'll provide a short response.

Essentially the Nunavut Impact Review Board is responsible for conducting the environmental assessment. What the CNSC provides is the scientific and technical support for all aspects of the environmental assessment, and we play the role of coordinating the scientific support to the NIRB with other federal government agencies like Environment Canada and DFO. So that's the role we play.

Should the project be accepted by the NIRB, then there are some water boards in Nunavut that need to give permits, and the CNSC would also need to provide a licence.

The Chair: Thank you.

Thank you, Mr. Anderson.

We go now to Ms. Liu for up to five minutes.

Go ahead, please.

[*Translation*]

Ms. Laurin Liu (Rivière-des-Mille-Îles, NDP): I want to thank our witnesses for coming to the committee today.

Mr. Von Mirbach, in your presentation, you are more or less advocating the precautionary principle. You said we do not have the required knowledge for resource development. If I understood you well, we need to develop this expertise before we start drilling.

I will now go directly to the issue of agency management.

[*English*]

When we talk about safety and emergency response, something that often comes up is the CNSC's relief valve capability requirement. Do you see this as an essential tool in emergency response? What would be some of the consequences of removing this requirement?

● (1010)

Mr. Martin von Mirbach: I think the NEB basically agreed with us that the CNSC relief valve requirement was a key component of safe offshore drilling. The really critical component in the Arctic is this. If you're drilling, the principle is that you need to stop drilling operations early enough in the season so that it will still be possible, in the event of a blowout at the tail end of your season, to drill a relief well before the season ends.

The consequences of having a blowout that isn't capped, that isn't stopped in the season, is that once the ice forms in the fall it's absolutely impossible to do any operations for seven to nine months, depending on how far north you are. During that time there would be oil spilling out without any mitigation measures being possible.

So not only would there be up to seven months of activity, but that oil, then, would also be coming up to the surface and fusing with the newly formed sea ice. That changes the whole trajectory of spilled oil, because the oil becomes layered in kind of a sandwich of the newly formed ice, and then it's distributed as the ice is distributed and released when the ice melts. It creates much more complex recovery and mitigation obstacles.

Ms. Laurin Liu: So from what I understand there are no response measures to that?

Mr. Martin von Mirbach: Certainly not for ruptures that happen, for instance, just below the top of the well.... Imagine the pipe rupturing and then the oil comes out of the sides of the wellhead. That's not something that can be contained with a well cap.

Ms. Laurin Liu: Stakeholders have also expressed some concern about our next process in terms of the leasing option. They have expressed concerns that there are no environmental studies or insufficient environmental studies and no public input. So perhaps you could share your comments with us concerning this. What would be your recommendations or your concerns about this process?

Mr. Martin von Mirbach: Well, in some ways it would come down to the need. What we've been advocating for is the upfront, large-scale planning, which looks at the entire area, both at areas where it's appropriate to carry out activity and areas where it's not appropriate; and looks at what the thresholds are for the region as a whole, or the overall capacity of the region to sustain industrial activity; and then manages activity within those limits. Then it becomes much easier.

That's why we're advocating for the large-scale planning so that we're not looking project by project all the time. This does exist in Alaskan waters, where there are processes in place to do strategic environmental assessments and to set overall thresholds. Now, in Alaska they don't set spatially explicit areas, which we see as a weakness, but there are tools in place across the Arctic to do that in a more careful manner.

Ms. Laurin Liu: So would you be a proponent of cumulative environmental assessments?

Mr. Martin von Mirbach: That's right.

Cumulative impacts are the way in which a strategic assessment sets the thresholds, but then also there's the other component, which is really different but can happen at the same time. By that I mean doing the spatial planning to identify, in effect, the relative sensitivities of coastal areas and mapping out the trajectory of where a spill might happen and where there's an overlap between spill trajectory and particularly sensitive sites. Then you work backwards and say, well, maybe it's not appropriate to carry it out. There could simply be seasonal restrictions; it may not be an absolute no-go zone.

Ms. Laurin Liu: Let's go back to the document that you submitted to the NEB concerning offshore drilling in the Arctic. You suggested modelling the trajectory of possible oil spills.

In your point of view, who should be responsible for this modelling process? Should it be the private sector or should it be the government?

Mr. Martin von Mirbach: Ultimately, we've been recommending that the NEB do it. I think, ultimately, an independent third party body should. The tools exist to do it. There are good trajectory models in different parts of the world, including the west coast.

As I've said, there are additional complexities by modelling not just ocean currents but also ice movement, when you get oil and ice. From a credibility perspective, we're looking at doing it, but in the long-run perspective it would be helpful for it to be done by a third-party body.

● (1015)

The Chair: Thank you, Ms. Liu.

We go now to Mr. Trost for up to five minutes. Go ahead, please.

Mr. Brad Trost (Saskatoon—Humboldt, CPC): Thank you, Mr. Chair.

In our study on northern development, we're trying to figure out what decisions the government could make to enhance the economic development of our north, in particular, the natural resources. With that in mind, I listened to Dr. Binder talk about how he works well with Saskatchewan, with the history of uranium there. On other issues we've often heard how some jurisdictions have better practices than others.

As you develop projects, as you work with proponents of projects in Labrador, Quebec, and potentially Nunavut, etc., are there things you've learned from Saskatchewan that you could transfer over to work with other provinces? In dealing with your regulatory body, the Nuclear Safety Commission, do other provinces have similar practices to Saskatchewan's, or do you have a different approach depending upon which jurisdiction you're in?

Dr. Michael Binder: That's an excellent question because, as I said, one of our mandated objectives is to disseminate objective information. For example, on June 5 we'll be in northern Quebec in the community of Mistissini for one day, an aboriginal community. The next day, we'll be in the community of Chibougamau. We are trying to explain the safety case for nuclear. There is a hearing about a nuclear mine.

We've implored the proponent to bring in people from Saskatchewan. They have a lot of experience in interacting with communities regarding employment, mining, and the safety case, bringing all of that to the table so that everybody can see it. We are not promoting the mine; our mandate is not to promote. Our mandate is that whatever you build, it should be safe. But the level of ignorance of some of the safety cases is astounding in many cases, so we try to bring actual factual, objective information to the table so that people can hear it.

Mr. Brad Trost: If I read you right, you're saying that one of the most effective things we could do is to assist in the transfer of knowledge from one northern community's experience to other regions of the north that don't have that experience.

Dr. Michael Binder: Absolutely.

Mr. Brad Trost: Okay.

Listening to Babcock and Wilcox and the discussion of the potential reactors they're planning reminded me of other groups who have come and talked about putting reactors in the north. They were taking off-the-shelf technology produced in Japan and other places. One thing they said was that their business case would depend on how quickly they could obtain regulatory approval.

Now, I don't know how the business has gone for what they've done, but, Dr. Binder, with every new reactor, with every new program that comes before you looking for a safety case, how do you ensure the timeliness of approval in your own organization? What internal steps are you taking to make sure this is cost-effective? We cannot bring new sources of power, potentially nuclear power, to the north if the cost is too high. Apparently, regulatory impediments or the requirements are a major cost factor for companies looking to the north. How do you internally assess this so that you know that your regulatory process is not wasting time? How do you know it is effective and timely at the same time?

Dr. Michael Binder: We've done a few things. First, we clarified our regulatory requirements. In the last four years that I've been on the job, we've been overhauling all of our regulatory documents and trying to make sure that our requirements are crystal clear.

Second, for new technology, as we heard from Mr. Mowry, we accept a pre-licensing discussion to get to know each other, so that they will know our requirements and we become acquainted with their new technology. This is before they come to us with a licence. So when they do come with a licence, at least some of their philosophy and technology is known.

Last but not least, we're not going to reinvent the wheel. They have an application in the U.S., for example. The U.S. is also going to do some prototyping. We will take a look at whatever evidence they can bring to us. The last I've seen, physics in the U.S. is the same physics as here. So we can transport over a lot of this stuff and not reinvent the wheel.

All of this to say that if you look at the CNSC time itself, we are very disciplined. We aren't going to be the regulatory bottleneck.

● (1020)

The Chair: Thank you, Mr. Trost.

We go now to Monsieur Gravelle for up to five minutes. Go ahead, please.

Mr. Claude Gravelle (Nickel Belt, NDP): Thank you, Mr. Chair.

And thank you to the witnesses for being here today.

Mr. Deir, I'm hoping you can answer this question. In his presentation, Mr. Mowry said that they would bury nuclear waste 140 feet deep. Where?

Mr. Christopher Deir (Manager, Babcock and Wilcox Canada, Babcock and Wilcox Ltd): Just to clarify that, what he was referring to was the spent fuel, which during the operation of the reactor we keep on site in a special spent fuel pool 140 feet below grade, for the first 20 years or so. That's just the fuel we actually produced during the operation. After that comes out of the spent fuel pool, it goes into dry storage. Then the Nuclear Waste Management Organization that's set up in Canada or a similar organization in the United States would take ownership of that fuel, and we would continue to pay into that fund of course.

He was referring to just the fuel that was used during the operation of the reactor's life. Then after the reactor's life is over, it would go into a larger, more national type of organization for control.

Mr. Claude Gravelle: So it's not waste?

Mr. Christopher Deir: I would never call nuclear spent fuel waste, no. It's quite viable.

Mr. Claude Gravelle: So it's buried on site during....

Mr. Christopher Deir: It's not buried; it's kept within a spent fuel pool on site.

Mr. Claude Gravelle: One hundred and forty feet deep....

Mr. Christopher Deir: Within the containment structure, that is correct.

Mr. Claude Gravelle: Thank you.

Mr. von Mirbach, we always consider these oil wells and nuclear plants safe when they're built, but they're safe until something happens.

How are we going to guarantee that if we have a well in the Arctic it's going to be safe and it will never spill oil?

Mr. Martin von Mirbach: That's a good question.

Clearly, if we required 100% safety for all activity, there would be no activity. There are risks inherent in everything. Those risks can be minimized but they can never be removed to zero. The fact that a risk might be both very small but very high creates particular challenges.

We've been recommending to the NEB a risk management framework that really distinguishes between acceptable risks, which are risks that are managed in the ordinary business—for instance, you just accept the risk every time you get into a car—and tolerable risks, which are risks that need to be worked on, and then unacceptable risks that are a line that isn't acceptable.

It's a way of managing risks that accepts that some risk is going to be inevitable, but what you're simply doing is trying to move the tolerable risks into the acceptable framework and making sure there are no unacceptable risks. That's a social decision. There's no individual stakeholder who has the ability to actually determine what is an unacceptable risk versus a tolerable risk. We were keen to participate with the NEB to provide informed advice and support towards making that designation.

Mr. Claude Gravelle: Are we prepared for an oil spill in the Arctic?

Mr. Martin von Mirbach: Absolutely not.

The big challenge is the lack of infrastructure. The Gulf spill had approximately 40,000 people working on it. It's physically not possible to get even a fraction of that number of people working on an oil spill in the Arctic, even given the operating limits in terms of the number of days you can operate. That's the big challenge: the lack of infrastructure at this point. In theory that can be improved upon, but at this point it's quite small.

● (1025)

Mr. Claude Gravelle: If we have an oil spill in the Arctic, it will of course be in the ice. So how can we clean that up if there's an oil spill within an ice floe?

Mr. Martin von Mirbach: It would be done with difficulty. A typical way is to contain an oil spill with booms, and then burn it in situ, but those methods simply don't work if there's ice in the water. The ice interferes with them. You can't boom the area.

It really depends on ice conditions, which change from week to week and region to region. I can't make a sweeping generalization, but the presence of ice adds enormous complexity to containing the spill. As well, the coldness interferes with the effectiveness of dispersants.

The Chair: *Merci, monsieur Gravelle.*

Mr. Calkins.

Mr. Blaine Calkins (Wetaskiwin, CPC): Thank you, Chair, and my thanks to our witnesses for being here today. It's truly a pleasure to meet another University of Alberta alumnus. That's great.

In earlier iterations of this committee, we heard from the Northern Projects Management Office on their ability to facilitate and be a portal in helping various applicants navigate the complexities of getting projects approved. Mr. Binder, Mr. Deir, and Mr. von Mirbach, do you have any comments on whether you have had any dealings with or see any value in the Northern Projects Management Office?

Dr. Michael Binder: They are trying to organize. It's a new creation. We know the people. If they are up and running, we intend to use them. They're going to have their feet on the ground, and we hope they can assist us. This is a vast territory. To get to all the communities and try to explain what is being done, what is being proposed, we need all the help we can get. So we're looking forward to working with them.

Mr. Blaine Calkins: Mr. Deir, do you have any experience with the Northern Projects Management Office?

Mr. Christopher Deir: Not directly, no, but organizations like that help to make things happen. They know the rules and regulations and the people better than anybody else.

Mr. Martin von Mirbach: We haven't had any interactions that would allow me to shed any useful light on them.

Mr. Blaine Calkins: No problem.

Mr. Binder, in your presentation you said that in a cradle-to-grave scenario your regulatory agency looks after everything from the approval of a mine to the eventual cleanup after decommissioning. We know that this hasn't always been the case. How many sites do we have that still require cleanup and mediation and mitigation?

Dr. Michael Binder: I can't remember the exact number, but we are slowly bringing into the regulatory framework a number of old mines that were left abandoned. We're trying to bring them back as close to nature as possible. That's our intent. That's why we are so aggressive in demanding upfront money on any mine for future cleanup. We assess it.

Mr. Blaine Calkins: The process includes getting a bond or some kind of deposit. What is that mechanism and how does it work? In the oil sands, money is held in a fund to make sure that reclamation, remediation, and all of these kinds of things will happen if a company is unable to fulfill its obligations. In such cases, financial resources are there to deal with those risks so the taxpayers don't have to. Can you tell us what kind of instruments you use?

Dr. Michael Binder: The most popular one is the irrevocable line of credit, which we, and only the CNSC, can tap in case a company goes bankrupt. There are different mechanisms for doing this. Every five years, we re-assess it to make sure of the adequacy of the funds. I don't know if you're familiar with the Cluff Lake uranium mine in Saskatchewan. Right now in their fund there's $30 million for cleanup. The moment it starts, we have access to it.

● (1030)

Mr. Blaine Calkins: That's a pretty good safety net for the taxpayers. It makes sure those things are taken care of.

In your presentation, you highlighted the potential for mines in the north, that is, north of 60. How many applications are you aware of that pertain to this region? How much potential is there? What do you see on the horizon in the way of mining applications? Is there anybody who currently has an application to bring nuclear power generation to the north?

Dr. Michael Binder: On the nuclear power generation, no, we have not received any.

Right now there is a formal application. One, this is Kiggavik, a big AREVA mine with multiple sites in there. They are exploring quite a bit. I hate to give a number because exploration is held close to the chest. They don't like to brag until they find it, but there is a lot of activity in the uranium field now.

The Chair: Okay, thank you, Mr. Calkins.

Our time is up, but Mr. Julian has indicated that he would like to have his motion dealt with today. I would like to thank you all very much for coming, making your presentations, and answering questions.

Mr. McGuinty, you have a point of order.

Mr. David McGuinty: Before our witnesses leave, I was wondering if we could, through you, assure the committee members that we will get from Mr. Binder detailed Fukushima costing in terms of the spill, and from Mr. von Mirbach the costing with respect to the *Exxon Valdez* and BP incidents.

I also wanted to raise, because I have not heard back from you or the clerk, the question I had asked Madame Mimi Forter at the last meeting. I requested from her a detailed synopsis of the existing research around emergency preparedness and response in the Beaufort Sea. Her colleague, Mr. Michel Chenier, committed to send us that material. I just wanted to make sure that we get that for our deliberations.

The Chair: Yes. Mr. Binder indicated that he has no such figures, that he was drawing those numbers entirely from the media.

Mr. David McGuinty: You're right, Mr. Chair. I stand corrected.

Actually, what I asked Mr. Binder to provide us with was a list of the 66 environmental assessment processes that have taken place since 2003, to help the committee members understand how long these processes took place.

Dr. Michael Binder: I'll do that.

The Chair: Great. Thank you, Mr. Binder.

We will suspend for about a minute or so. I'd like to ask committee members that if they want to talk to the witnesses privately they should do it outside the room so we can get right to this motion. We will suspend the meeting for about a minute and then come back and deal with Mr. Julian's motion.

● (1030)

(Pause)

● (1030)

The Chair: We resume the committee meeting.

Mr. Julian, you had indicated that you would like to bring up your motion. I would assume it would be the second motion you submitted. The first one was out of order, of course, because a committee cannot refer legislation to a committee. That must be done by the House.

The House had actually referred the legislation to the finance committee, so that was done. Would you read your motion, Mr. Julian, and explain or speak to it, if you would like.

● (1035)

Mr. Peter Julian: Thank you very much, Mr. Chair. We did make some revisions. I would like to move the following motion:

> That, the Standing Committee on Natural Resources immediately undertake a study on the subject matter of the sections of Bill C-38, An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures, which directly fall within the mandate of this committee, namely Part 3, Division 2, National Energy Board Act; Part 3, Division 3, Canada Oil and Gas Operations Act; Part 3, Division 4, Nuclear Safety and Control Act; Part 4, Division 38, Coasting Trade Act.

I'm moving that motion. There's no need to have a great discussion. I was just going to speak for about 30 seconds to this. The bill itself, Bill C-38, is massive, as you know, Mr. Chair.

The bill is being referred to the finance committee for study, but as you know, the expertise on natural resources is here around this committee table. What we are suggesting is not a dramatic departure from past parliamentary practice—in fact, the bill is such a departure, not this motion. What we're suggesting is that the committee study the areas that fall within its domain.

The government will benefit from this because of the expertise we have around the table. It will provide for the accountability and oversight that Canadians expect and, certainly, insofar as the confidence of Canadians in a proper vetting of Bill C-38 is concerned, there's no way the public can have confidence if the bill is referred to the finance committee when aspects of it directly touch on natural resources.

For all of those reasons, we're moving this motion so that we can study the impact of Bill C-38.

The Chair: Thank you very much, Mr. Julian.

Seeing no further intervention, we will go directly to the vote.

Those in favour of Mr. Julian's motion?

Mr. Peter Julian: Could we have a recorded vote?

(Motion negatived: nays 6; yeas 5)

The Chair: As you can see, Mr. Julian, your motion is defeated.

I guess we will have the bells soon, but the business of this committee is over, so we will see you on Thursday.

Mr. David McGuinty: Before you bring that gavel down, what are we doing on Thursday? How are we doing with witnesses? What's the general update?

The Chair: The witnesses have been invited.

The Clerk of the Committee (Mr. Rémi Bourgault): We have three witnesses confirmed for Thursday. We will have representatives from the Canadian Electricity Association and Qulliq Energy Corporation. The mayor of Fort McMurray, which I think is called the Regional Municipality of Wood Buffalo, will also be here on Thursday.

Mr. David McGuinty: Will it still be on the theme of energy?

The Clerk: Yes.

The Chair: Thank you all very much.

The meeting is adjourned.

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