House of Commons
CANADA

Standing Committee on Natural Resources

RNNR • NUMBER 027 • 2nd SESSION • 40th PARLIAMENT

EVIDENCE

Tuesday, June 16, 2009

Chair

Mr. Leon Benoit

Also available on the Parliament of Canada Web Site at the following address:

http://www.parl.gc.ca

Standing Committee on Natural Resources

Tuesday, June 16, 2009

● (1530)

[*English*]

The Chair (Mr. Leon Benoit (Vegreville—Wainwright, CPC)): Good afternoon, everyone, and welcome.

We are here today, pursuant to Standing Order 108(2), to continue our study of the Atomic Energy of Canada facility at Chalk River and the status of the production of medical isotopes.

We have today four groups of witnesses. I will introduce the groups one at a time, just before they make their presentations. We will proceed in the order the individuals or groups are on the agenda. So we'll start today with Linda Keen, specialist in safety and risk management, who's here as an individual.

Go ahead, please, Ms. Keen, for about 10 minutes.

Ms. Linda Keen (Specialist, Safety and Risk Management, As an Individual): Good afternoon.

[*Translation*]

Mr. Chair and members , I would like to thank you for inviting me to appear before your committee today.

[*English*]

My name is Linda Keen. I am appearing as a private citizen today.

I would like to give a little bit of background, for those people who haven't met me and who aren't aware of my background. I am a scientist by training, and I've been a manager and leader of science organizations for about 30 years. I came to join the federal government in 1986 from western Canada, and I rose through the federal system to become senior assistant deputy minister. From January 2001 to January 2008, I was the president and chief executive officer of the Canadian Nuclear Safety Commission here in Ottawa.

As you are probably aware, in January 2008 I was fired by the cabinet of the Government of Canada, and since that time I have done a number of things, but I am working for the private sector in enterprise risk management, which may be a subject of interest today in a number of areas.

I was very proud of the work that I did at the Canadian Nuclear Safety Commission. I think it's an organization where there's some wonderful and talented staff. I am concerned about the developments. Some people took great joy in my losing my court case, which made it clear that I served at pleasure for the government. But I think citizens and parliamentarians should actually be very concerned about this.

What this means is that the head of the regulator of nuclear materials and substances in Canada now serves at pleasure and is a political appointee. The lawyer who was there for the government, from the Tories, a senior lawyer, said it was absolutely clear that there was no misconduct on my part. He made it clear also that this was, in the words he used, “a politically precarious position” and that no reasons had to be given for firing the president of the Canadian Nuclear Safety Commission. I think these implications for the future of Canada's regulator should be of concern to parliamentarians.

My other great concern, of course, today is for the future of radioisotopes and for all those patients—but more than patients, more than people involved in nuclear medicine, it's the whole cadre of people who work in hospitals who have been trying to increase their efficiency and effectiveness over the years and now are faced with even more problems than they had before, in terms of not just radioisotopes but telling cancer patients and other patients that there are interruptions of that kind. I know of what I speak, and I think waiting for that diagnosis is one of the hardest points of your life. I think this has to be looked at as a personal issue for patients in Canada and around the world.

I also feel that one of the areas that doesn't get discussed very much in this is the role of the NRU as really an incredible institution of research in Canada. Certainly it's discussed that this reactor produces more than radioisotopes, but it also is the home of research for many scientists in Canada and around the world. Its loss will certainly be felt as well for those people who have, as I and other people here today have, had an opportunity to study there and look at work from that area.

Those are just my opening remarks, Mr. Chairman. I'll be more than pleased to answer any questions later on that touch on my expertise or experience with the NRU reactor, principally during those seven years as president of the Canadian Nuclear Safety Commission.

● (1535)

[*Translation*]

Thank you very much.

[*English*]

The Chair: Thank you, Ms. Keen.

We will go now to Dominic Ryan, president of the Canadian Institute for Neutron Scattering.

Go ahead, please, Mr. Ryan, for around ten minutes.

Professor Dominic Ryan (President, Canadian Institute for Neutron Scattering): Thank you, and thank you for this invitation to appear before you.

As you said, I'm a professor of physics and president of the Canadian Institute for Neutron Scattering. This is an organization that represents researchers and students from universities and industries who need access to neutron beams to support their research programs. There are currently more than 500 individual members and 15 fee-paying institutional members from the universities. Our goal is to promote the use of neutron beam methods from materials research and to represent the interests of neutron beam use in communities. The government has announced that we're getting out of the isotope business once the national research universal reactor at Chalk River reaches the end of its operating life, probably around 2016. We've been asked to provide some input on this decision and on what should happen next.

The first part is relatively simple. It is clear the government has a role to play in providing infrastructure for science and industry, but it is not clear that the Government of Canada should be in the business of manufacturing medical isotopes for delivery below cost to a worldwide commercial enterprise, thus effectively subsidizing nuclear medicine around the world. As we understand it, it is this form of the isotope business that the government is trying to get out of—and who would argue with that?

The second part is far more complex and has much wider implications for Canada, for Canadians, and for Canadian science and industry. The NRU is far more than the world's largest single supplier of medical isotopes. It is a critical piece of infrastructure that supports stewardship and innovation in the nuclear power industry through experimental facilities located inside the core of the reactor. Neutron beams emitted from the core support research and development by Canadian industry, and the unique knowledge obtained by neutron beams helps companies to develop more competitive products that are safer, more reliable, and less expensive to manufacture.

The NRC's Canadian Neutron Beam Centre has established Canada as a worldwide leader in providing access to industry for key sectors—nuclear, aerospace, automotive, and manufacturing. The CNBC also provides competitive facilities to support fundamental and applied research in many important areas—physics, chemistry, material science, green energy technologies, communications, and materials for life sciences.

Rather than focusing on what the government should not be doing, perhaps we should ask what the government should be doing. For guidance, we can look back over NRU's 50-year history and see what the Government of Canada has already achieved through its support to the NRU facility at Chalk River. Medical isotope production at NRU has supported the health and well-being of Canadian citizens for both diagnosis and treatment of heart disease, bone disease, and cancer. Engineering research at NRU has supported Canadian industry, both nuclear and non-nuclear, improving competitiveness—

The Chair: On a point of order, Madame Brunelle.

[*Translation*]

Ms. Paule Brunelle (Trois-Rivières, BQ): The interpreter is asking if the witness could speak a bit more slowly.

[*English*]

The Chair: Could you please slow down a little bit so the interpreter can keep up?

Prof. Dominic Ryan: I'm sorry. I will try.

Engineering research at NRU has supported Canadian industry, both nuclear and non-nuclear, improving competitiveness and opening new markets to Canadian products. The research facilities at NRU have been used by thousands of Canadian engineers and scientists, training generations of Canadians who have added to the knowledge base of our industries and universities. This has raised Canada's profile as a technology leader around the world. The infrastructure for science and industry that the Government of Canada provided at Chalk River was an investment in Canadians that enabled Canadians to innovate and lead. This is what the Government of Canada does best, and this is what we need to do now.

What do we lose if we walk away from NRU? We abandon 50 years of Canadian leadership in nuclear science and technology. ZEEP was the first reactor ever built outside the U.S. It provided critical data for both American and Canadian reactor programs, and it led to the construction of NRX, and then a few years later NRU. When it was completed, NRU was the most powerful nuclear reactor in the world. It was big, effective, and, most importantly, flexible. It was built as a platform to enable research with neutrons. Fifty years later it continues to support world-class research—a strong testament to the vision and abilities of its designers.

The flexible design has proved to be a key feature, as almost all of the activities currently supported at NRU did not exist when it was built. There was no nuclear power industry, the medical isotope business was about to be created, and neutron beam research was in its infancy, limited by weak sources.

In-core research at NRU supported the development of the nuclear power industry in Canada by enabling fuel and component testing in realistic conditions. It continues to contribute both to the stewardship of our CANDU fleet and to the development of next-generation reactor designs.

The large flexible core permitted many materials to be irradiated, leading to the production and exploitation of a wide variety of isotopes, most notably cobalt-60 and moly-99, key medical isotopes around the world. The isotope business was invented in Canada, and the cobalt-60 irradiator was listed as number 11 of Canada's greatest inventions on the CBC. Today, 16 million radiation treatments per year depend on the cobalt-60 that is produced at NRU.

Neutron beam research facilities at Chalk River allow Canadians to study many new materials. These include High-T_c superconductors that offer the promise of zero-loss electrical power transport, hydrogen storage materials and battery electrodes that will enable more environmentally friendly uses of power, and high-strength super alloys and composites that will revolutionize manufacturing in the future.

By providing Canadians with the best neutron source in the world, the Government of Canada invested in Canadians and opened the door to innovations. Bertram Brockhouse was awarded the 1994 Nobel Prize in physics for his development of the triple-axis spectrometer, an instrument that is replicated in every nuclear neutron beam lab around the world. In many of the bigger facilities there will be several of these instruments. The stress scanner that was invented at Chalk River in the mid-1980s has also been replicated around the world.

These internationally recognized innovations bring me to what is perhaps my main point: closing NRU is not about shutting down a machine; it's about abandoning people.

With the infrastructure provided by the Government of Canada, it enabled all of these developments. But it was the people who brought their imaginations to the flexible, powerful NRU reactor and found a platform to refine their ideas into materials, products, and benefits to science and society. Today's researchers still come from around the world to NRU, not because it's the most powerful or the newest reactor, but for the people. The excellence of the technical and scientific environment provided by the NRC's neutron beam centre has been consistently recognized by NSERC and has stood up to review by international panels of experts.

I can do things in my own research at Chalk River that I could not try at other facilities because of the research environment the staff provides. It has been essential to my research and that of my many colleagues in the Canadian Institute for Neutron Scattering. We bring teams of graduate students and post-docs to NRU, where they get hands-on training by experts in neutron beam techniques and where they meet researchers from around the world. These are the next generation of Canadian researchers. But if NRU is not replaced, where will they work?

When the *Challenger* failed during launch, investigators focused their attention on the solid fuel boosters. One possibility was that stresses in the joints might have led to the failure. Even with access to neutron beam engineering stress-scanners in the U.S., Thiokol, the NASA contractor that built the boosters, brought a section of the booster up to Chalk River. It was analyzed there to look at the stresses around these bolt holes to make sure they were within tolerance. NASA came to Canada, to NRU, for the people and the expertise that this facility represented. So when Julie Payette goes up tomorrow to the space station, we can all be a little bit more proud knowing that NRU contributed in part to the safety of her trip.

● (1540)

So what happens when the government announces the closure of NRU in 2016 without making a firm commitment to replace it? We lose Canada's involvement in medical isotope development and supply, the world loses a major supply, and there's a gap that would be tough to fill. The Canadian Neutron Beam Centre, the people who did this work, would be gone in a year. With no future at NRU and no prospect of a new reactor to replace it, the staff will simply leave. They will go and find new places to run their careers. They will go to foreign laboratories, they will be lost to Canada, and our own access to neutron beam facilities will simply disappear.

The Canadian industry will lose its access to a key engineering materials evaluation facility, affecting product reliability and competitiveness. It's not just shuttle parts that get studied at Chalk River. Canada would be unable to participate effectively in the international Generation IV reactor development program that is tasked with creating the next new generation of higher-efficiency reactor designs, which we are going to need if we are going to kick our dependence on fossil fuels technologies.

What should be done? The role of government is to provide infrastructure for science and industry that will enable Canadians to carry out research and develop their businesses. In 1994 the Bacon report recommended that "Canada should make an immediate commitment to develop a new fully equipped reactor-based national source for neutron beam research", but we didn't. The need for neutron facilities has not diminished. We produced our report last year outlining our vision for what should be the replacement, a multi-purpose research reactor that will serve Canadians as a key piece of infrastructure for science and industry. The multi-purpose concept builds on the successes of NRU and is aimed at drawing together all of the current stakeholders while maintaining the flexibility to serve new and emerging needs. It would combine in-core research, isotope production, and neutron beams for a world-class facility.

A new world-class facility would be a magnet for talented engineers and scientists. Our continued leadership in nuclear engineering and neutron-based research, both fundamental and applied, would be assured. A stable, reliable source of medical isotopes and industrial isotopes would be put in place.

Why embark on such an expensive project in a recession? Construction of the new Canadian Neutron Beam Centre is about building for the future. It is forward-looking, investing in new industries, and training the technical and scientific leaders of tomorrow. As a stimulus project, it is a perfect fit. The construction phase would employ thousands of Canadians directly and generate many more jobs around Canada through contracts awarded to small and medium-sized enterprises. A large fraction of these would be in high value-added engineering projects that would expand Canada's design and manufacturing base in an industry that is poised for massive market growth. The government could reasonably expect to recoup most of the costs in taxes and developed industries, and it would be strengthening Canada's economy at the same time.

How should we proceed? CINS has already produced a statement of the user requirements for a new multi-purpose centre, as a world-class laboratory for materials research with neutron beams. To make this project a reality, the next step is to establish a formal engineering design, in collaboration with all of the stakeholders, and develop an accurate costing estimate for the project so that the construction can be undertaken in a transparent and responsible manner.

A suitable federal agency should be identified that can undertake such a project. It should be given both the mandate and appropriate funding to coordinate a multi-departmental working group and bring forward a properly costed design proposal within the next year. Canada will then be properly prepared to consider an investment in the future of the Canadian Neutron Centre, a world-class resource for science and industry for the next 50 years.

● (1545)

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

We have now three individuals from McMaster University. We have Mr. Christopher Heysel, director, nuclear operations and facilities, McMaster Nuclear Reactor; Dr. Dave Tucker, senior health physicist, health physics; and Dr. John Valliant, director of isotope research, McMaster Nuclear Reactor. I understand that Christopher Heysel will be giving the presentation today.

Go ahead for around ten minutes.

Mr. Christopher Heysel (Director, Nuclear Operations and Facilities, McMaster Nuclear Reactor, McMaster University): Thank you very much, Mr. Chairman.

I'll tell you a little bit about our background.

Before starting at McMaster in 2001, I spent 14 years at the NRU reactor in Chalk River. I started my career there as a young engineer in charge of operating the shift. I moved on to senior technical positions, and before coming to McMaster, I was the engineering manager at NRU.

With me is Dr. John Valliant, who is a professor with the university. He's both a Canadian and an internationally recognized leader in medical isotope research. In addition to teaching, he is the acting director of the McMaster Institute of Applied Radiation and Sciences. He is also the CEO and chief scientific director for the newly founded Centre for Probe Development and Commercialization.

Mr. Dave Tucker has over 20 years of radiation safety and regulatory compliance experience. Dave also spent 10 years at the Chalk River laboratories, where he had radiation, environmental, and regulatory compliance responsibilities for the NRU reactor, as well as the other associated facilities necessary for isotope production.

McMaster University is a medium-sized Canadian university. We have 20,000 undergraduate students, 3,000 graduate students, supported by a staff of about 7,000. We're a research-intensive university. We have a large research budget, given the size and constitution of our university, and our unique combination of nuclear facilities and graduate and undergraduate programs result in us being Canada's nuclear university.

I will talk a little bit about how McMaster can help on the isotope supply issue. We've approached the problem from the short term, medium term, and long term. In the short term, we've had to increase our I-125 production. The reactor at McMaster University is currently a global supplier of I-125. With the outage at Chalk River, we've been able to increase our production by 20%. This 20% is going to help prostate cancer patients, both here in Canada and around the world. Every week we're shipping to Europe, South America, North America, China. Right now, we're the largest producer of that isotope.

Our colleagues on campus, at the hospital, under the leadership of Dr. Karen Gulenchyn, have brought F-18 quickly to the clinic in support of helping display some of the treatments that rely on technetium. We continue to provide a leadership role in developing the next generation of isotopes and truly have the core-to-clinic infrastructure to carry that out.

In the medium term, we have proposed to the government to resume moly-99 production at the reactor, as we did in the seventies, and we believe we can help about 20% of North American men. Also, through the Centre for Probe Development and Commercialization, there are already new displacement technologies in front of Health Canada, soon to gain approval, hopefully, to get to the patients.

In the longer term, we intend to continue our leadership role in research for the displacement technologies through the development of the next-generation medical isotopes and through novel production techniques and applications.

A little bit about the reactor. We're the only Canadian research reactor with a full, reinforced containment structure. We are adjacent to the nuclear research building, which allows researchers close proximity to the isotopes they need to conduct their research. We're a five-megawatt MTR, or materials test reactor, design. It's an open-pool design, which is very flexible and conducive to isotope production. We currently operate on three megawatts, 16 hours a day, five days a week. For the types of isotopes that are required, we'd need to go to seven days a week, 24 hours a day.

As I said, we are in this commercial isotope production. Again, we are a global leader in I-125 production and distribution. We have a flexible and very useful and relevant education and research tool, and we hope to maximize the benefit of this infrastructure through the addition of more isotope production.

● (1550)

We're currently licensed until 2014, with full plans to renew our licence going forth for many years to come.

On slide 5 we've collected a couple of pictures and some data from what we did in the 1970s. Quite simply, in the isotope supply chain you need targets. We had targets manufactured. Targets were loaded into an irradiation facility. We would irradiate them for about two weeks and ship the targets to Chalk River to have them processed to recover the moly-99. During that time we made over 80 shipments and shipped over 100,000 curies of moly-99 to Chalk River. The demand at that time was much lower, so these numbers certainly don't represent our capacity.

The next slide gives you an overview of the reactor. If you look at the nine-by-six grid, each one of those blank locations is where we would put a fuel rod or fuel assembly to power the reactor. If you remember what the target irradiation holder looks like, it's exactly the same as a fuel rod or a fuel assembly. Each one of those white holes is a potential moly-99 production site.

At the bottom slide we've done some calculations on capacity. We've looked at two assemblies and four assemblies. Those numbers would be equivalent to about 20% of the North American demand. It isn't the entire demand, but it certainly could reach a significant number of patients in critical need of these isotopes.

I'd like to compare NRU and MNR, because a lot of people don't know much about the actual production of isotopes. It's all the game of flux: the amount of neutrons and target material you can get into your core. From the little comparison there you can see that NRU and MNR can irradiate the same amount of targets, but our limitation to approximately 20% of the North American market is borne out by the difference in flux between the two reactors.

On the next slide I describe the supply chain for isotopes in Canada, how McMaster can play a role, and how we played a role in the 1970s. We have our targets manufactured in France at a company called CERCA. They currently make all the irradiation targets for the European supply chain, and they make our fuel. They're tooled up and licensed to take on this work. Targets are inventoried at the Chalk River lab and brought to the reactor for irradiation on demand. We irradiate the targets for about 200 hours—about a week, ship them to ACL for processing, and then to the normal supply chain as it exists in Canada right now.

When we first looked at this proposal 18 months ago, we really saw a role for McMaster to help NRU relieve some of the pressure they have on their operating cycle. Right now they have a six-week operating schedule. Then they have a very short shutdown window of about four days. The first day they get ready to do the work and the last day they start up. They really are under a lot of pressure to do a lot of outage work in a very short period of time. We thought McMaster could help extend that outage window to allow them to take on longer inspections, more involved maintenance, and relieve some of the pressure the machine was under.

As we see it now, we can come online in a different mode, in a crisis mode, certainly not to meet the entire supply that NRU is providing, but to bring Canadian content to the international solution the federal government is looking to position.

The European model works well because they rely on a number of different machines to do the irradiations with one central processing facility. That's what we're trying to replicate here in Canada, with a machine at Chalk RIver that can do irradiations and a back-up machine in McMaster that can also irradiate targets. So you would have a distributed radiation system with one central processing facility. This model has worked well for Europe for a number of years and has kept them with a more robust supply when one facility was going through an outage.

● (1555)

I think the key requirements we're looking for are the staff and the fuel to take on the new duty cycle. It's quite simply scaling up. We have a certain number of staff for 16 hours a day, five days a week. In order to make this process work, we require more fuel and more people to go to a 24-hour, seven-day a week duty cycle, as we did in the 1970s.

As I pointed, we're just one member of the supply chain. It requires cooperation with a number of stakeholders, including the federal government, AECL, and those further down the supply chain. We really need to establish strong partnerships focused on a mandate to make this happen.

One of the issues that came up was the access to HEU. In recent discussions with the Americans, it's our impression that they would be more than willing to supply the target material to France to allow targets made to be irradiated at the university.

On a regulatory front, it will be very important to work with our regulators throughout this process. We see no direct change in our reactor operating licence requirements. We've done this work before. Our safety analysis report addresses this operation. We will need licensing of a flask to transfer the irradiated material, but again we'll look to the Europeans to get their designs and technical knowledge to support us on that.

We'd have to start working with Nordion to look at the impacts downstream on getting it to the patient. We're talking about using the exact same chemical composition for the targets, but the NRU target has a different geometry than a McMaster target. The NRU target is pin-shaped, whereas the McMaster target and most of the other targets used around the world are of a pleat design.

In conclusion, we're here to help. We're a Canadian institution and we're ready to use Canadian infrastructure to help Canada through this issue. We believe we can have an impact in the short term, medium term, and long term. We don't claim to be the final solution, but I think it has become clear to the international community that this is a complicated problem with no quick solution. It will require an international effort looking at a number of different solutions and coming together to protect patients around the world.

Thank you.

● (1600)

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

Nigel Lockyer from TRIUMF is our next presenter.

Dr. Nigel Lockyer (Director, TRIUMF): Thank you for this opportunity to testify before the committee. So who is TRIUMF? TRIUMF is Canada's national laboratory for particle and nuclear physics. It's run and operated by a consortium of about 14 Canadian universities, stretching from Saint Mary's in Nova Scotia to McMaster—my colleagues next to me—through to the west coast, the University of Victoria.

We're here to talk about nuclear medicine, but first let me say a little bit about what TRIUMF does for nuclear medicine. We have five cyclotrons at TRIUMF, all of which produce medical isotopes of various types. The main research program of TRIUMF is particle physics and nuclear physics, and the nuclear physics component is studying rare isotopes—isotopes of the future, if you want to think of it that way.

The present cyclotrons, however, actually play a significant role in producing medical isotopes, so TRIUMF produces all of the PET isotopes for the British Columbia Cancer Agency for clinical use. We produce all of the isotopes for the Pacific Parkinson's Research Centre. We've had a 30-year manufacturing partnership with MDS Nordion where we produce 2.5 million patient doses of isotopes per year. We collaborate with the Cross Cancer Institute in Edmonton and with Sherbrooke. TRIUMF-designed cyclotrons are scattered around the world. They're in Taiwan, Korea, the U.S., and so on.

The point there is that TRIUMF designs the cyclotrons, which are used to make the isotopes. We're involved in the radio chemistry that's needed to attach molecules to those isotopes, and we have experts in PET imaging.

I'm here today to talk about an alternative method of producing moly-99, and that is using an accelerator. There are basically two ways to make moly-99. One is in a reactor, which you've heard about, and the other is in an accelerator. In our proposal we would use non-weapons grade uranium. We would use U-238, and I think this is a strength of what we're talking about. The result of irradiating U-238 with an electron beam, which we've proposed, is that in principle the final product should be identical to the product that comes out of the NRU.

We have recently signed an agreement with MDS Nordion, where on a time scale of 2012 we would like to irradiate a target and demonstrate this technology. What we expect to find is that the definition of moly-99, which comes from a drug master file, would be identical in the case of our radiation to the one from the NRU. If that is the case, then we think that within about a year and a half the private sector could take that, build an accelerator or accelerators, and produce moly-99 and have it in the production stream. In other words, four to five years from now, moly-99 could be in the supply chain from the private sector using an accelerator. This assumes that the five-year funding of TRIUMF, which is presently going through the Government of Canada via the National Research Council, which covers our funding from 2010 to 2015, is fully supported.

I know you are looking at moly-99 today, but in my opinion, the future of nuclear medicine is in PET cameras versus moly-99. PET does not use moly-99, as you probably know. So the fastest-growing component of nuclear medicine is PET imaging. Last year the sales of PET cameras in the U.S. exceeded the sales of SPECT cameras. SPECT cameras use moly-99. The medical revolution that you probably sense we're all part of, which is genomics plus molecular imaging—molecular imaging allows you to look inside the body and see metabolism, and nuclear medicine is a big part of molecular imaging—I see that as the future of health care around the world. I think we should be playing a big part in that.

Thank you.

● (1605)

The Chair: Thank you, Mr. Lockyer.

We have finished the presentations. Now we will go directly to the questioning from the official opposition for up to seven minutes. Please go ahead, Mr. Regan.

Hon. Geoff Regan (Halifax West, Lib.): Thank you very much, Mr. Chairman.

Through you to the witnesses, thank you all for coming today. You've given us a lot to chew on, and I'm sure we'd all like to have five hours to ask questions, but my colleagues will be pleased to know I'm not going to suggest we extend for that long.

First, let me ask Ms. Keen what your thoughts are in terms of what's happened in the intervening 18 months since the December 2006 shutdown of the NRU. The government has been telling us they were very prepared for all this, and I'm not sure I see that. For instance, a few weeks ago they said they were going to appoint a panel in response to all of this, and they still haven't named it. What is your sense, having been an observer of this and having been the president of the Canadian Nuclear Safety Commission for seven years and worked closely with this process?

Ms. Linda Keen: Thank you, Mr. Chairman, for the question.

First of all, if there was any tiny bit of a silver lining I felt when I got fired, it was that perhaps people were going to pay attention to this issue and would not ignore the issue anymore. I say that because it was really clear at the time that AECL, its board of directors, its upper management, and the government had just become so fascinated with the idea of new reactors that every conversation was about new reactors and a nuclear renaissance, and not about some of the bread-and-butter issues, including the NRU and waste management. I thought there was going to be a focus at that time and I thought there would be some work happening.

On the positive side, I think there was work that had happened on the health side with the nuclear medicine specialists. It was obvious in that the ad hoc committee came forward with a report, although one of their report recommendations was to keep MAPLE going, which didn't happen. But I think the Health Canada people did make some real efforts. They didn't develop a crisis management plan, but they had upped their connections with the provinces and the territories.

On the other side of it, which was working with the NRU, with MAPLE, and with alternatives, I was in fact quite shocked a year ago when the minister at the time announced that MAPLE was going to be closed. I knew it had problems, but there was no sense that they couldn't be solved. I was quite surprised.

Also, I was surprised not just that MAPLE was being shut down, but that there were really no alternatives. The alternative was, in my view, pressure on the regulator to agree to another licence. In seven years as a regulator, I never, ever heard a company or a licensee, including the licensees who are here with us today, tell me that their goal was to get a licence. It's to get a facility that's up and running and that meets or exceeds regulatory areas. It was very surprising for me to see that nothing had happened on the supply side, and I know that because I keep in contact with international colleagues, particularly in Europe.

I think it's a very sad type of report that I would give: nothing had happened, and in fact things had become worse in some areas, and there was no plan in place to look at this. As was said here, we know that it closes down for work every six weeks. There is no way you could be hoping to keep this going forever.

My final comment is that after 18 months, it's a bit interesting to hear that it's now a “very old reactor that's very unreliable”, and 18 months ago it was considered neither a very old reactor nor very unreliable. But it hasn't changed a bit. It's been that way for quite some time. It's sad that this had to happen to get the focus on this reactor.

I hope that answers your question.

● (1610)

Hon. Geoff Regan: Yes, thank you.

Let me ask you this. Dealing with AECL and the MAPLEs on a regular basis, as you would have been, when did it first appear that there were serious problems with the MAPLE reactors?

Ms. Linda Keen: This happened just in the last couple of years when it came to the point of commissioning. Clearly, AECL had significant issues before that, but really, they were issues to do with what we considered to be a poor quality of management—this is all recorded in the CNSC proceedings—poor management of contractors, and really a lack of focus, as well as a poor safety culture, etc.

But I'd say that from about 2006 on, when they started the commissioning process, this is when it really became clear that the positive coefficient of reactivity was going to be a problem and that they hadn't predicted it. They were dealing with it in-house. One of the commission members, Chris Barnes, said to them that maybe they should get some outside advice. They finally brought in the Idaho laboratory quite late in the day, and I wonder if that could have been helpful earlier.

But that wasn't really the role of the commission. It was the role of AECL and its management to look at it. It really became pretty clear at the end that there were some serious problems and they were going to have to justify it.

But MAPLE hadn't been taken off line when I was fired as the president. It was still a live project. We saw them often. We saw them every six months because they needed permission to work on it, so it's really just in that period of time that you knew things were really going bad.

Hon. Geoff Regan: Given the government's recent announcement in relation to privatizing AECL, what was your impression of what their focus was, whether it was privatization of AECL or keeping the NRU running and dealing with isotopes?

● (1615)

Ms. Linda Keen: Clearly it's the government's decision. I think the act, by the way, is going to have to come back to Parliament to be looked at with regard to the future of AECL. But clearly it's the government's prerogative what they wish to do in terms of suggesting changes to Parliament.

Speaking about the most important thing here today, which is the NRU, I say this as a former, long-time government person. Sometimes this idea of changing management and throwing out the old management and bringing in new management seems terribly worthwhile, but despite what I thought were the problems with the upper management of AECL, including the board and the direction of the presidents and the vice-presidents—and this is my opinion—I really actually felt, to be very honest, that the vice-president who was there when I was fired and who subsequently quit, Brian McGee, was actually trying to make changes. He was trying to work on the safety culture. When you make changes to an organization that has significant, in my view, culture issues and management issues, it takes a long time, and that's what would have had to be invested after the government found a new manager.

The Chair: Thank you, Ms. Keen. You've gone about a minute over time.

Thank you, Mr. Regan.

We go now to the Bloc Québécois and Madam Brunelle, for up to seven minutes. Go ahead, please.

[*Translation*]

Ms. Paule Brunelle: Good morning, madam, gentlemen. Thank you for being here.

Mr. Ryan and Ms. Keen, you said two things that are very similar. You told us that the NRU plays an important role as a research institute and that we need to preserve that scientific expertise and continue to invest in innovation.

Many other organizations, including Genome Canada, are having to deal with smaller research budgets. They're telling us that they're losing ground. It puts me in mind of what happened last year when we tried to sell the company that designed the celebrated CanadArm.

Taking that into account, I think your point of view is interesting. However, one question comes to mind. If we're not supposed to shut down the NRU, what are we supposed to do? In terms of safety, I have a ton of questions. If the reactor isn't safe, Mr. Ryan, how can we keep it?

[*English*]

Prof. Dominic Ryan: You can't keep the NRU going for much longer. That's for sure. It's old and its maintenance is going up as you keep this thing going. Like an old car, it's going to take more maintenance to keep it going.

What we have been proposing is replacing it entirely. You need to build a new multi-purpose research reactor that will support all of the missions that are currently going on at the NRU and be capable of supporting new missions as they become apparent. The NRU was built as a general purpose machine that would allow things to happen and develop around it, and the new facility has to be designed in the same way. It would then support commercial production of isotopes. It would support industrial research. It would support fundamental research. It would support reactor research for the next generation of nuclear reactors.

We're proposing keeping the NRU going not indefinitely but long enough so that you can get a new reactor in place to take over its functions. The idea of having McMaster as a backup is an extremely interesting one. I think that would take some of the pressure off the NRU operations while we get a new reactor in place.

Ms. Linda Keen: My answer will be a bit different. I think we actually don't know how big a hole there is going to be when the NRU is closed down as a research reactor. My view was that when we lost the position of chief science advisor—Arthur Carty had occupied that spot—we really lost the ability for all of Canada, including parliamentarians, to be able to ask the questions as to what we should be investing in and where we should be investing, and with complete respect to my fellow presenters today, I think there's a tendency for all institutions to look at their own institutions and to not have that broad picture.

The answer is I don't think we really know what the gaps are and how to solve them. For instance, the U.K. and the U.S. both have chief science advisors, and I think providing those has been really worth every penny. As a small country, we need that. I don't really think we know exactly what the answer will be.

In terms of its safety, the role of the Canadian Nuclear Safety Commission is to ensure that anything that happens in terms of the decommissioning happens safely, and I'm sure they will do that.

● (1620)

[*Translation*]

Ms. Paule Brunelle: My next question is for everyone.

We have heard many things in the course of this committee's proceedings. In an earlier meeting, we talked about the MAPLE 1 and MAPLE 2 reactors. The people at MDS Nordion told us that those reactors had to be reactivated. We know the cost was astronomical. I see that TRIUMF is offering another solution.

What do you think? Do we have to take the MAPLE reactor back to the drawing board? Could it eventually work?

[*English*]

The Chair: Who would like to answer that?

Mr. Lockyer.

Dr. Nigel Lockyer: I have a quick answer: I don't know how to answer that question.

The Chair: Mr. Ryan.

Prof. Dominic Ryan: I can give one comment.

The MAPLE reactors are only isotope production, so they address only part of the mission that is currently undertaken by NRU. If you want to maintain a presence in the nuclear power industry, if you want to be able to do engineering research, if you want to do fundamental research, you cannot do any of these at a MAPLE facility. The only way to replace NRU properly is with a full-scale research reactor that's multi-purpose in design.

The Chair: Ms. Keen.

Ms. Linda Keen: I think the thrust of the MAPLE 1 and 2 really made sense in that you had a dedicated set of reactors. One could back up the second reactor set. The vision was that it be owned by the private sector, and you would have a clear idea of how much it cost to produce them. I think that makes good sense. I think we just really don't know the cost structure of what goes on at the NRU to know whether it's a public good that we're investing in or not. As parliamentarians, I don't think you know that. Maybe you do, but I don't think you do.

In terms of what would happen, I'm too much of a scientist to say that it couldn't restart. I think there hasn't been an inordinate amount of international oversight. I think that has been a problem for us in Canada, that we haven't involved international experts enough in this. So I wouldn't say that it couldn't happen. I think you'd have to see a proposal as to what the costs were of the initial phase. It's a very specialized design, very unique.

Could something be done in terms of putting in other source materials or whatever? I don't know. I think it would be a very difficult process, from my knowledge of it. It's very specialized. Until you get those international experts in, I don't know if you would really know. And I don't know what that would cost.

The Chair: Thank you.

Go ahead, Mr. Valliant.

Dr. John Valliant (Director, Isotope Research, McMaster Nuclear Reactor, McMaster University): I think another important point on this is that the nuclear medicine and scientific communities are actually coming together to look at the future. When the MAPLEs were being designed and constructed, the field itself was going to progress forward, as it currently is. In this case, we're looking internally at the entire process and looking at new technologies. So universities like ours are working with TRIUMF; we're working across the country. Specialists are working together to look into the next generation of alternatives.

I think an important thing about the MAPLEs project is that when we're considering it, we should also consider what's coming down the line in terms of new technology, some of which you're hearing about. I think if you're going to decide about the MAPLEs project, that's a new angle that hasn't been considered in the past and is very important.

The Chair: Thank you, Mr. Valliant, *et merci, Madame Brunelle.*

We go now to the New Democratic Party, to Mr. Cullen, for up to seven minutes.

Mr. Nathan Cullen (Skeena—Bulkley Valley, NDP): Thank you, Chair.

Thank you to our witnesses for being here today.

Ms. Keen, is it fair to say that the nuclear industry is sensitive to its reputation in the public?

Ms. Linda Keen: That's an interesting question, actually. I think they're cognizant of what they could contribute. Are they very interested in transparency and trying to get people on their side? To a certain extent, yes, but in terms of a complete, full-court press in terms of being interested in that engagement, the answer would be that I'm not sure, actually. I don't think so.

● (1625)

Mr. Nathan Cullen: Let me rephrase it, then. Is their reputation important to the viability? Is the public perception important to how the nuclear industry goes forward?

Ms. Linda Keen: I think all the survey data, and the data not only in Canada but everywhere else, would say that yes, they can't survive without it. One of the operators calls it “the licence from the public”. Don't worry about the licence from the regulator; if you don't have the licence from the public and the community that you're in, you're not going to be able to survive.

Mr. Nathan Cullen: That's interesting.

There's a natural separation between the regulator and AECL. They're not meant to influence you. AECL is not meant to knock on your door and ask for a licence and put pressure on you publicly. Is that correct?

Ms. Linda Keen: I can only speak about the time that I was the regulator. One of the biggest challenges we had was to get both AECL and the government to understand that AECL was just another licensee and should be treated as such. They had to meet all the requirements. They didn't get any special pass because they were part of the portfolio.

Mr. Nathan Cullen: You say you had to say this several times. Were there some moments where you suspected AECL thought they deserved special treatment from the regulator, the watchdog?

Ms. Linda Keen: Yes. When my renewal came up in 2000, it was clear that AECL had tried to influence matters so that I wouldn't be renewed. I confronted the president at the time and asked what was going on. He said they didn't think I was friendly enough to them. As it turned out, the minister of the day, Mr. Efford, reappointed me for other reasons. That gives you a sense of the tension around the question of new reactors.

Mr. Nathan Cullen: In a sense, you're the referee for the game. You're meant to enforce the rules, and one of the teams didn't like it, so they accuse you of being biased or favouring one side or the other. I don't understand how public confidence in AECL and the nuclear industry could not have been eroded by the government's decision to fire you and then accuse you of partisanship.

Ms. Linda Keen: I have no survey data on the confidence of Canadians. I will say to you that I was absolutely blown away by the support I got from thousands of Canadians from all over Canada. For the majority of the licensees, it was important to have a strong, independent regulator that their communities could come to. I went to their communities to talk to them. We were in northern Saskatchewan and all over, talking to people about what they could count on from us.

Mr. Nathan Cullen: This was called a life-or-death situation by the minister of the day. There was an inordinate amount of pressure to reopen this facility and override the safety concerns. That was what was presented to Parliament. They had an Auditor General's report in hand, pointing out the problems that the minister had seen some months before. I find it strange that the government seemed to be surprised and created a crisis that required your firing to get this back online. Fast forward 18 months—you've said nothing has happened and things got worse. There was no plan put in place. Suddenly the reactor is being branded as old and unreliable, whereas only a few months ago you were the problem.

They can't fire the new person doing your job, so they're going to fire the reactor this time. Where did this come from? These problems did not arrive overnight. They didn't arrive with your report and the decision not to submit another licence. I think $600 million was the figure the Auditor General said was needed to restore the Chalk River facility. Is that right?

● (1630)

Ms. Linda Keen: I don't have those figures in front of me.

Mr. Nathan Cullen: I want to get back to the question of the confidence of this industry and the ability of Canada to step forward. Various panellists have said how important it is for Canada to continue to play a leading role in the development of isotope science. You folks all deal with international partners, I assume. You talk to colleagues in other countries that are doing similar work. What has the last 18 months meant to Canada's reputation as a leading radioisotope producer?

The Chair: Mr. Valliant, go ahead.

Dr. John Valliant: Thank you.

I just came from the Society of Nuclear Medicine meeting, which is the international group that really brings together the thought leaders in the field. What we have found is that, certainly, people are concerned about the issue. I think they come to Canadians to look for solutions. We had a number of discussions about this.

I would say that the issue is clear: people also have confidence that Canadians can help contribute and solve the problem. In fact, I would say that the eyes of the world are looking at us to help contribute. People are willing to step up and work with Canadians, but I do think they're going to ask Canadians to lead.

Mr. Nathan Cullen: Has our reputation improved because of what's happened in the last 18 months?

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

A very short answer.

Dr. John Valliant: I believe that the talent of Canadians' health care and scientists who are able to help has improved our reputation, yes.

The Chair: Thank you, Mr. Cullen and Mr. Valliant.

Mr. Anderson, for up to seven minutes.

Mr. David Anderson (Cypress Hills—Grasslands, CPC): Thank you, Mr. Chair.

It's good to have some presenters here with some alternatives and some options, and I want to come to that in a minute or two. But we talked a little bit about the MAPLEs and I'd like to go back to that for a second.

Ms. Keen, it's my understanding that the MAPLEs were authorized for testing. Were they ever licensed?

Ms. Linda Keen: This is going to be a bit of a technical answer, but what has to happen is that they have to be licensed to start the commissioning process. When they're in a safe state, they have one kind of licence that is really for while they're being built. Then they came back for six-month licences to allow them to start commissioning. So they would wrap up, percentage-wise, in terms of the power level.

Mr. David Anderson: And they could never get that licence to commission, is that right?

Ms. Linda Keen: I was fired before I know what happened to them in that area. They never asked for a final licence when I was there. They were still in the commissioning phase but having problems, in terms of that.

Mr. David Anderson: Okay. So there were technological problems with it. Were those problems being overcome, in your opinion?

We've heard from Dr. Waddington that there was a ton of issues with those things. They took a whole host of different approaches to try to solve that, including bringing in Idaho, including, I think, another national lab from the States, dozens of experts from around the world, all the AECL people, and they could not solve those problems even though they were trying some different things. Were those technological challenges being addressed and were they being dealt with, do you think, or were they at a stalemate?

Ms. Linda Keen: I heard Mr. Waddington's presentation, and certainly he was in the AECL advisory group at that time so he would have some sense of that.

From the viewpoint of the commission, Mr. Waddington was absolutely correct: there were lots of options being looked at, and the commission would hear that there are this many alternatives, we're down to X or Y, and we're looking at various kinds of issues.

When I was fired, there was still a sense that they were moving toward an alternative. There could have been a lot of international advisers; I don't know that. I do know that Idaho was part of that. Idaho was very much involved.

Mr. David Anderson: Those challenges hadn't been met at any point when you were there, is that right?

Ms. Linda Keen: No, not at all.

Mr. David Anderson: Okay.

I actually want to challenge you a bit on something you said. You left the impression that it was from 2006 on that these issues became clear, but three weeks ago, in an article in the *Globe and Mail*, you said:

> Ms. Keen said she was told the Maples had problems in 2001, when she arrived at the CNSC.

A quote from you:

> “One of my staff who has since retired said, ‘You know, we are going to be bringing out the cement machines to fill that in,’” she said.

And this is a quote again:

> "The fact that it took seven years to decide [to scrap it] and many millions of dollars is because the AECL engineers tried their hardest to make it work. But the CNSC had really great physicists–and still has, I believe–and the CNSC said, 'No, it is an inherently flawed design.'"

When did you say that?

● (1635)

Ms. Linda Keen: Well, I'll explain.

When I arrived in 2001, as I answered the earlier question, there were really serious problems with the MAPLEs, in terms of housekeeping and—

Mr. David Anderson: Can I just challenge you on that?

Hon. Geoff Regan: A point of order. Mr. Chairman, let the witness answer.

Ms. Linda Keen: Can I answer? There were two questions.

The Chair: Ms. Keen, we have a point of order.

Mr. Regan.

Hon. Geoff Regan: Mr. Chairman, I'd appreciate it if you would allow the.... Certainly when I ask questions, if I interrupt, you cut me off, and I appreciate that, and you should, so I'd appreciate if it you'd not allow Mr. Anderson to interrupt the witnesses.

The Chair: Mr. Regan, it all depends on how it's done and whether there's been an answer given.

Hon. Geoff Regan: Well, she's in the middle of giving her answer.

The Chair: Mr. Anderson, go ahead.

Mr. David Anderson: Well, I think you did say that it was commissioning issues of poor quality, management, contractors' lack of focus, but what you said here is "...it is an inherently flawed design". That has not to do with contracting; that's a design that apparently CNSC had made a decision would not function.

Ms. Linda Keen: That is the view of my staff in the last year. The person who retired was in the last year. That was their view. When I asked what happened to the MAPLE reactor in the end, they said it was an inherently flawed design and that it was going to be finished. It was going to be finished at that time. So those last two comments were in the last year.

Mr. David Anderson: I actually think you're stretching that a little bit, because I think clearly there were a number—

Ms. Linda Keen: Sir, I'm here as a private citizen. You could put me under oath and I would say exactly the same thing.

Mr. David Anderson: I'm sure you would. Thank you.

I want to go on to the other witnesses, actually, and talk about some of the positive things we've heard today. I want to go to Mr. Lockyer.

You said your product that you were talking about bringing online is similar to what's produced in the NRU. Is the product that you hope to produce at the end the same as what's being produced in the NRU right now?

Dr. Nigel Lockyer: The process we're talking about, which is photofission of U-238, should produce the same product as is produced in the NRU using U-235. So our demonstration that we're looking forward to in 2012 would actually show that to be true. Once you see that it's the same product, then you know that it could be part of the supply chain. So it's the demonstration that would show this.

Mr. David Anderson: McMaster, you said the same thing, right? Your product is similar, but you would have some issues in terms of the final approval of the product. Is that what you were saying?

Mr. Christopher Heysel: I think we've done it. We did in the 1970s; we can do it again. The product we made in the 1970s got into Canadian patients, so it's the exact same process that's done on the irradiation side at Chalk River; it's just a different geometry of target, so you'd have to recover the molybdenum in a different physical geometry.

Mr. David Anderson: Okay, and the reason you can't go 24/7 now I think you said was just because of people and resources. Is that the reason you're not able to go around the clock?

Mr. Christopher Heysel: That's correct. It's mostly people and fuel.

Mr. David Anderson: Okay. The 20% of North American demand, would that cover all of Canada? Our demand isn't 20% of North American demand, so could you supply enough to Canada?

Mr. Christopher Heysel: With these we could supply enough curies to address Canadian needs. The issue there is that the supply chain goes through the U.S., so the isotopes have to come back through that supply chain. But definitely, it's about four times the domestic need.

Mr. David Anderson: Okay. So in terms of quantity there's no issue at all.

You talked about $30 million, I think, that you thought you needed for your project. I'm just wondering if the other two gentlemen could talk about the kinds of resources they're asking for, and then I'd like all three of you to talk about how do you see government's role and how do you see private investment's role in the projects you're suggesting.

The Chair: Actually, there are only about 10 seconds left. Who did you direct it to first, Mr. Anderson?

Mr. David Anderson: It was to all three of them, but maybe we can come back to that later.

The Chair: Okay. Mr. Ryan, you look like you are prepared. Go ahead.

Prof. Dominic Ryan: I can quote the number that was quoted in the Senate 18 months ago, which was about $800 million to build a replacement research reactor that would be fully qualified to replace the functionality of NRU. That's a ballpark number. You need to do a proper engineering costing design before that would be possible.

The Chair: Thank you.

We go now to the second round, and we have from the Liberal Party, the official opposition, Mr. Tonks for up to five minutes.

Mr. Alan Tonks (York South—Weston, Lib.): Thank you, Mr. Chairman.

Thank you very much to all of you for being here. I have found this very enlightening, but please take the questions from a layperson. Other than Mr. Trost, I don't think there's anybody on this committee who has the degree of technological insight into the industry as you do.

So things past, things present, things future. Things past: the NRU was shut down and it appears, regardless of why or how, or whatever, on the basis of the inspections right now, it is leaking profusely around the core of the reactor. Is it possible to restart it or are we in a decommissioning mode?

Mr. Tucker, you were head of safety and security, and so on, at that particular time, so perhaps you'd be more inclined to respond to that.

● (1640)

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

Mr. Dave Tucker (Senior Health Physicist, Health Physics, McMaster University): Just to clarify, I was the person in charge of radiation safety for several facilities, including NRU. I have a great deal of confidence in my former colleagues at AECL to find the right answer to that question, and I'm afraid I don't have detailed technical insight of exactly what the situation is. I'm very confident that AECL will come to the right conclusion about when and how they can fix that problem.

Mr. Alan Tonks: Okay, but it appears it's going to be out of commission for a period of time.

Ms. Keen, with respect to the situation now, it has been indicated that 75% of medical isotopes are being provided for. Do you think that's a realistic assessment based on your understanding of the supply and demand?

Ms. Linda Keen: Mr. Chairman, I think the committee had the benefit of the advice of the experts from the Society of Nuclear Medicine. You also hear of the reports now from their conference in Toronto, illustrating their concerns. I have a lot of respect for them. I think their assessment process of what is needed is probably correct.

I think it isn't the same across the country; it has depended on where the supply chain has been. So I think it could be that some communities are quite affected and others are not.

Mr. Alan Tonks: Thank you.

The scenario, Mr. Ryan, that you've developed is reminiscent of the Avro Arrow and the loss of our aerospace infrastructure. You know the rest of the story.

You say that what we really need to do is to build for the future through the Neutron Beam Centre and expand Canada's industrial economic research capacity. I don't think you'd find anybody who is in disagreement with that. However, we have the Prime Minister and the minister indicating that Canada should vacate that particular role. Would you like to comment on that? I don't mean this in a partisan way. I think we're being bumped and nudged away from a huge value-added opportunity, and I'm afraid that partisanship might be helping this become more than a bump and a nudge. I think the committee would be very interested in hearing your response.

Mr. Lockyer, you indicated there is an additional opportunity with respect to the accelerator, PET imaging, and the cyclotron accelerator technology. Is one at the expense of the other, or are those kinds of strategic plans inclusive of a combination of responses?

Mr. Ryan, perhaps you can answer first.

Prof. Dominic Ryan: First, to be a little clearer about what has been said, I don't think the Prime Minister said they want to get out of nuclear stuff entirely; they want to get away from the business of subsidizing medical isotope production. I think that's what has been said. I think this is getting tangled up, and the meaning of one is being turned into the other. I don't think there's any real reason these are not compatible.

I think what we need to do, as you said, is to invest in our future. We need to build new research reactors, because they have impacts on so many different aspects of Canadian society—industry, nuclear power, research, medicine, they are all impacted by this facility. We've had 50 years of history at NRU. The cost of building a new reactor is a large number, but remember, it will be spread over many years of construction and then will pay back over the next 40 or 50 years of its life. If it's built to the same standards as NRU, you would have a long-term investment here for something that's going to keep paying back to Canadians for a very, very long time.

When you asked about the compatibility with TRIUMF, there is no way this is exclusive, because you are looking at new technologies and new radioisotopes. Neutron-rich isotopes are produced in reactors, and if you want to go to proton-rich isotopes for PET scanning, and so on, they will be made in accelerators; there's no other place you're going to get those isotopes from.

So doing one does not mean you should not do the other. A research reactor is central and cannot be replaced by the accelerator technology at TRIUMF, but there are aspects of medical isotope production and other research projects that can only be done at TRIUMF.

● (1645)

The Chair: Mr. Lockyer, go ahead, but as briefly as possible, please.

Dr. Nigel Lockyer: I was going to paint a bigger picture. The world relies on moly-99 now for most of its procedures, but there is growing interest in PET imaging, which Canada is already investing in. There are about a dozen medical centres around Canada that already have cyclotrons and PET imaging. They are going to double in the next couple of years. I'm just saying that's where the field is going. You are going to need moly-99 for a long time, but I see a crossover at some point where the newer technology will take over.

The Chair: Thank you, Mr. Tonks.

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

Mrs. Cheryl Gallant (Renfrew—Nipissing—Pembroke, CPC): Mr. Chairman, I was very pleased to hear that NRU has played such an important role in the nuclear reactor at McMaster University as well.

Professor Ryan, we know that in the June 9 issue of the *Ottawa Citizen* you recommended that the time is right to engage the National Research Council and to provide the mandate and funding to lead an inter-agency group with a deadline of six months from today to come forward with a plan for implementation of the new Canadian Neutron Centre.

Why did you pinpoint NRC as a suitable agency to be mandated with a leadership role in this matter?

Prof. Dominic Ryan: I would start by saying that NRC built NRX and NRU, so they have a pretty good track record on this issue of successful reactor projects and a long-term commitment to Canada.

The second thing I would say is that the NRC is ideally placed. It has most of the experts it would need to call on or else it can find them. It has the contacts and it can bring in all the experts it would need in order to bring this project forward.

The third thing I would say is that it fits very well with its mandate, which is to sit between industry and research and try to bridge those gaps and bring one to the other. It allows industry to understand what research is doing; it allows research to be transferred to an industrial environment. A new research reactor is exactly what that does. It's applied research, understanding chunks of steel, or it's fundamental research, understanding what's going on at the most fundamental level in materials. Or it's nuclear engineering. These are all very valuable products within Canada and it's right along the way that NRC operates.

Mrs. Cheryl Gallant: Professor Ryan, your presentation speaks of wide-ranging benefits to Canada of a multi-purpose neutron facility besides the generation of medical isotopes. You mentioned the automotive industry, which is now going through a transformation where everything has to be lighter and more fuel-efficient.

Given the urgency of today's isotope crisis, we would most appreciate your opinion on Canada's most cost-effective and most certain way to secure our supply of medical isotopes, both in the short term and for the coming decades.

Prof. Dominic Ryan: For the short term, I think you're probably looking at McMaster University to fill some gaps, and that's for the next few months while NRU is brought up.... I share the confidence of my colleagues here that the engineers at AECL will be able to bring NRU back into functioning. I have no doubt that those people know what they're doing and they will be able to make the needed repairs. They will make them for the long term. They're not going to just duct tape this thing. They are going to do a proper job. They want it to run through at least until 2016, so they have some time to build on a next-generation instrument, which is where we go after that. It has to be a new research reactor because you want to keep all the function that is present in NRU for the next 40 or 50 years. We have constantly used, upgraded, and added to what we can do there, and there's no sign that's stopping. Every major industrialized country has at least one research reactor facility. Some have multiple ones. In fact, China will be bringing its second one online in 2016, which is when we're actually going to shut down our only one. It doesn't seem to make sense that we should be falling behind in these things.

● (1650)

Mrs. Cheryl Gallant: Dr. Lockyer, it seems that various accelerator-based methods for production of moly-99 can be researched and evaluated. Also, new types of isotopes might be tested for clinical applications. All these tests will require time, years, and investment of capital—millions of dollars—with no guarantee of success.

In the meantime, would you advise Canada to hold off committing to investing in a new multi-purpose neutron facility like the Canadian neutron facility proposed by Professor Ryan until accelerator options have been evaluated?

Dr. Nigel Lockyer: I'm taking the position that you can use a very simple accelerator to produce moly-99. It's not an accelerator that's designed to produce neutrons. A neutron research facility is a completely different object. You're not going to do neutron research as he's talking about with the accelerator I'm talking about. I'm talking about a very focused, fairly small, fairly simple accelerator that you could literally buy today, for example, that would produce moly-99. It's focused on producing enough moly-99 for Canada. I think of it as being used to smooth out the supply. If the NRU is having problems, you always have a backup. As long as it's the same product, you can mix the two when they're both running, but when one goes down, the other one is there to back it up.

Mrs. Cheryl Gallant: We shouldn't hold off committing to a new NRU while we wait for the accelerator to come online.

Dr. Nigel Lockyer: I think the accelerator time scale is the medium time scale I've told you. So it's 2015.

Mrs. Cheryl Gallant: Thank you.

Mr. Heysel, you described your role in the isotope supply chain in the 1970s and stated in principle that you could supply 20% of the North American demand. What are the practical challenges that have risen between the 1970s and now that you need to address, and how long will it take before you can certainly deliver irradiated targets into the isotope supply chain?

Mr. Christopher Heysel: I think the major changes are availability of target material. That supply chain we used in the seventies no longer exists, so we've identified a replacement supply chain through France. The biggest challenge we have at the university would be to hire the staff and train them and qualify them to operate the facilities. We do need to work with AECL to ensure that the target we're delivering is compatible with their facilities so they can accept it physically and process it with the right chemistry there. When we put the proposal together about a year and a half ago we were proposing 18 months in an environment where NRU is running and everything is smooth and the supply chain is robust. Since the recent outage, we've started turning our mind to how we can shorten that. The next step to bring focus to that effort would be to get the stakeholders together to see which are the critical path items and where the most work and effort need to be placed.

The Chair: Thank you, Ms. Gallant.

We go now to the Bloc Québécois, Monsieur Malo, for up to seven minutes.

[*Translation*]

Mr. Luc Malo (Verchères—Les Patriotes, BQ): Thank you very much, Mr. Chair.

I would like to thank our witnesses for being here.

Mr. Chair, I'm going to direct my first question to the people from TRIUMF and McMaster University. They have proposed solutions for producing isotopes. Given the crisis we are in right now, I would like to hear them.

The MAPLE reactor was supposed to replace the NRU reactor when it reached the end of its useful life in order to produce isotopes. When the government decided to drop the MAPLE reactors, did a government official call you to tell you that new solutions had to be found immediately because the NRU reactor was at the end if its useful life and that might cause a crisis? Did anyone call you to discuss the solutions you were offering, to see if those measures were feasible and, if they were, whether implementation could be fast-tracked? Did the government make initial contact with you as soon as it announced the end of the MAPLE project?

● (1655)

[*English*]

The Chair: Dr. Lockyer, go ahead.

Dr. Nigel Lockyer: TRIUMF is a basic research facility. We normally do particle physics and nuclear physics and look toward the future. When the problems with the MAPLE reactor occurred, we were not thinking about producing moly-99. I don't think it's a natural place the government would call to ask if we could help them.

[*Translation*]

Mr. Luc Malo: And what did you do?

[*English*]

Dr. Nigel Lockyer: We don't produce moly-99 now, and it's not something we'd proposed to produce in the future until we realized there was a problem. So we put up our hand and said we were able to do it.

[*Translation*]

Mr. Luc Malo: And you were aware of that situation last week or two weeks ago?

[*English*]

Dr. Nigel Lockyer: No, but we did realize it after the MAPLE reactors were cancelled.

[*Translation*]

Mr. Luc Malo: When was it exactly? Did anyone call you? Was it you who made the call?

[*English*]

Dr. Nigel Lockyer: We realized that ourselves.

[*Translation*]

Mr. Luc Malo: What was your government's reaction? Did they say they wanted to fast-track the process so that it would be completed before 2014?

[*English*]

Dr. Nigel Lockyer: TRIUMF requested support to have a workshop with international experts to look at what we were considering. My colleagues here were part of it, and that was funded by Natural Resources Canada. So we did get some assistance, and we produced a report last November.

The Chair: Monsieur Malo?

[*Translation*]

Mr. Luc Malo: I think Mr. Heysel wants to answer.

[*English*]

The Chair: Mr. Heysel, go ahead.

Mr. Christopher Heysel: It's a little bit different from McMaster. During the 2007 outage, we were approached by our local MPs, who understood we produced isotopes on a commercial basis and asked what we could do. At that time, the three of us and other members of the university looked at what we had done in the seventies and put together a proposal to re-establish that production system.

[*Translation*]

Mr. Luc Malo: So it wasn't the government approaching you.

[*English*]

Mr. Christopher Heysel: It was a local member of government who asked the university what they could do to help, in fact, in 2007. It was as a result of that inquiry that we brought the proposal forward to the government. So when the decision came about the MAPLEs, we were already in contact with the government and were working back and forth on questions about our proposal.

[*Translation*]

Mr. Luc Malo: Given that this happened about a year ago, I would like to know why nothing was done.

[*English*]

Mr. Christopher Heysel: I think there has been a lot done since late 2007 or early 2008. We've been working with a number of different agencies in the government—NRCan, Health Canada, and the Department of Foreign Affairs—on moving the technical issues of our proposal forward.

[*Translation*]

Mr. Luc Malo: Are you producing more medical isotopes? Are you already producing molybdenum 99, for example?

[*English*]

Mr. Christopher Heysel: We're not making moly-99 yet. We haven't produced that. Certainly we're producing a lot more I-125 to help Canadian and international prostate cancer sufferers. Again, we've been working with the government for 18 months on this. We're waiting for the call to put this into high gear. We think we're ready. We just need the team, the leadership, and the mandate to take it forward.

[*Translation*]

Mr. Luc Malo: Ms. Keen, since the NRU reactor is old, I would like to know if, in your opinion, every effort has been made to ensure that it won't shut down all of a sudden and whether it could all be coordinated internationally.

[*English*]

Ms. Linda Keen: I think one of the problems that AECL management had was that the NRU wasn't top of mind. It was the new reactors that were top of mind. There was a lot of focus on what had to be done with the ACR-700 and then the ACR-1000, etc.

I think there was a feeling—I feel, and I can't point to a paper or whatever—that they just thought it would run forever, that it would just never break down. There was a lot of confidence in it.

I went to the hearing that AECL had on June 11 with the Canadian Nuclear Safety Commission. There was a sense of, well, we looked at the vessel in 2000, we looked at it, we looked at it this way, and there was nothing wrong so we didn't think we ever would need a new vessel.

I think there was a sense that it would go on forever and there would never be a problem. The MAPLEs were being looked at, but I don't think they ever thought it would break down.

● (1700)

[*Translation*]

Mr. Luc Malo: Was that line of thinking appropriate?

[*English*]

The Chair: *Merci, Monsieur Malo*. Your time is up.

Mr. Trost, for up to five minutes, please.

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

I just want to let Mr. Heysel finish up on what Cheryl was asking at the end of her questioning on what we need to do to speed up the process—or what you need to do—to get the Hamilton reactor going more quickly. Could you just finish elaborating on that? Are there things that we in government—I'm using that as sort of a broad term—could do to facilitate speeding that up? What do we need to do? Because who knows when the NRU is going to be back up, so the sooner Hamilton is running, the better, I guess.

Mr. Christopher Heysel: Certainly, I agree. I think if the NRU was back up, operating, and supplying the isotopes it does, it would be good for Canadians, for North America, and for the international community.

Because it's such a diverse group of people and stakeholders that have to come together, both within the federal government and crown corporations and within private industry, I think what we really need from the government on this is a leadership role. That is what is required. The government is elected to perform that leadership role. For this project, which would require multi-stakeholders coming together with a clear mandate, that's the first step I think we need to hear from the government.

Mr. Brad Trost: Specifically, do we need to get the CNSC to prioritize this? Do we need to get engineers moved from Chalk River to Hamilton, or who knows where else in the world? Give me some specifics.

Mr. Christopher Heysel: I think we need the government to tell CNSC, AECL, McMaster, and the Department of Foreign Affairs to start looking at this, because up to now there have been technical questions back and forth. These are all very busy organizations. CNSC people are very busy. The Department of Foreign Affairs and AECL both have their priorities. Those priorities are not going to be displaced to look at this until someone asks them to do that. To this point in time, no one has really asked them to take hold of this and get a handle on it.

Mr. Brad Trost: My personal view as an individual member of this committee is that we're largely in this mess because of a lack of foresight and because we have put all of our proverbial eggs in one basket; we have bet the farm on MAPLE and have not diversified our sources. We've had essentially NRU and then eventually MAPLE. We haven't diversified for the future.

I'm curious, has there been any other commentary about any other multiple sources? I'm really happy to hear about the TRIUMF proposal. We're hearing about a potential for a new reactor, but what else is there out there? I'm anticipating that the Japanese and the Americans are waking up to this problem too and realizing that they have no domestic supply. What other options are being looked at, both in Canada and abroad?

I see nodding over there, so you may as well take the first crack at answering.

The Chair: Mr. Valliant, go ahead.

Dr. John Valliant: The international community is certainly looking at positron emission tomography and PET isotopes, which tend to be produced regionally. In fact, Canada has come together. The institutions have created a pan-Canadian network to begin doing just that. I think the comment was made earlier that you can't make an immediate transition from one technology to another. They have to be properly evaluated. I think what you're going to see is a blending of the current approaches to isotope supply and then newer technologies as time goes on. That certainly was a theme that came across at the meeting we just came from. I think you're going to see a blending of positron emission tomography and the type of imaging using moly-99 and technetium.

● (1705)

Mr. Brad Trost: Does anyone else want to comment before I follow up on that?

The Chair: Mr. Lockyer.

Dr. Nigel Lockyer: I just want to say that there are ideas out there other than the one I just described. The National Research Council, along with the small company Mevex, for example, has proposed using moly-100 targets from which you can remove a neutron and make moly-99. There's another proposal by Advanced Applied Physics Solutions, which is a spinoff of TRIUMF, to add a neutron to moly-98 to make moly-99. You can put moly-98, which is the natural molybdenum, inside a reactor—this is done around the world now—but then you need to purify it. They're working on purifying it after it's been irradiated.

There are a number of ideas out there.

Mr. Brad Trost: I have a follow-up question for each of the gentlemen here, if I can get it in.

My long-term concern is that if the technology begins to change and we rebuild essentially the same old structure, will we be going where the puck was and not where the puck is going to be? Is that a concern in that respect?

The follow-up question to Dr. Lockyer, which he can take afterwards, is this: what sorts of timelines are we looking at? Are these conceptual or are these timeline ideas that would be even more long term than your TRIUMF proposals?

Dr. John Valliant: I'll try to be quite quick.

I think that is something we have to be concerned about. We have to be very cognizant of it. I think Dr. Sandy McEwan, who is appointed to be involved and to sort of coordinate this effort, will be able to provide a lot of feedback as to where the field is going on that side. I think your point is well taken in that we do have to be concerned. The impact of the current technology on medicine is very significant and will be for some time. We have to look at today and three years from now. As a community, we have to look out for the next 25 years.

The Chair: Mr. Lockyer.

Dr. Nigel Lockyer: I would say we're focused on the medium term, not on tomorrow but on four to five years.

Mr. Brad Trost: Would that be the same for the moly-100 and the other?

Dr. Nigel Lockyer: The moly-98-plus neutrons process is done already in the world. There's a lot of that made, but the generators are not of the quality that we use in North America. That's the purification scheme. I think the time scale for that is similar. For the moly-100, the removing of a neutron, I think that's on a similar time scale also. The technology for that is a little more in hand, but there are always things that take time.

Everything I mentioned is for the medium term. The other area I'd like to mention is that there will have to be a new generation of cyclotrons, I think, for PET imaging. I see smaller compact cyclotrons being designed and put in, say, every hospital in Canada, along with PET scanners on a five- to ten-year basis. That's yet another direction to go.

The Chair: Thank you, Mr. Trost.

We'll go now to the third round and the official opposition.

Mr. Regan.

Hon. Geoff Regan: Thank you, Mr. Chairman.

Mr. Heysel, how quickly could you get up and running producing technetium-99m?

Mr. Christopher Heysel: We were looking at 18 months. With a different environment and NRU operating at full capacity with no interruption, to give a concrete date to operation, I know it will be less than 18 months. I'm limited in commenting because this process involves a number of stakeholders and I need their input to give a new date that reflects the current environment where there is an acute shortage.

Hon. Geoff Regan: Let's go back to a year ago, when you learned the MAPLEs were cancelled and you put forward a proposal to the government. If you had received the green light then, would you be producing moly-99 now, in your view?

Mr. Christopher Heysel: It's quite possible we would be producing it. At the time it was a different environment. The government was looking at a very complicated problem and trying to find the best solution that deployed my tax dollars in the most responsible way. Right now it's easy for me and my colleagues to say that the crisis is here and we should have been on this 18 months ago, but that wasn't the environment then.

We're a Canadian institution, we believe our infrastructure is positioned to help Canadians, and we're here to help. If it's on our solution, that's great for McMaster and Hamilton. If it's on a B.C. solution or a McGill solution, we're willing to help on any technical solution we can. But we need direction at this time to really get our focus on this project and to expedite it.

● (1710)

Hon. Geoff Regan: You say it would have required the government to make this a priority for a number of departments. Clearly that did not happen in relation to what you proposed.

Let me go on to Ms. Keen and ask about the inspections and how they're done. How was it possible there was a significant amount of corrosion, as we've seen, without AECL noticing it sooner? How does that happen? What's your sense of that?

Ms. Linda Keen: First of all, the webcasts of the CNSC meeting of June 11 are still available on the net, so all of this is public knowledge.

There were a lot of questions by the commission members about how this happened over the period of time—the concentrations on the vessel itself, the corrosion of the vessel. The commission members asked a lot of questions. The first vessel was replaced after 20 years, so why wasn't the second one looked at in terms of a risk for that? There was a lot of discussion about that. There were a lot of questions by the commission members as to the way the inspection happened in 2000. It didn't provide a broad view.

Until AECL finishes this complete assessment of it—it was new knowledge that hadn't been available publicly before—it isn't absolutely clear how many corrosion sites there are, the depth of that corrosion, and what the answer is. So I think AECL is being fulsome now in saying that there's a problem.

The Chair: Mr. Regan.

Hon. Geoff Regan: I think my colleague Mr. Scarpaleggia has a question.

The Chair: Mr. Scarpaleggia, go ahead if you have a question.

Mr. Francis Scarpaleggia (Lac-Saint-Louis, Lib.): As a visitor to this committee who doesn't know much about nuclear technology.... Dr. Ryan, when you speak of building a new research reactor, I imagine you have in mind a reactor built with a particular kind of technology. How would this relate to MAPLE technology or CANDU technology?

If we had trouble creating a MAPLE reactor, does that mean we might have trouble building a new research reactor, or would we be using something more proven? I'm coming at it from the point of view of a layperson trying to understand all of this.

The Chair: Mr. Ryan, go ahead.

Prof. Dominic Ryan: I don't fully understand what went wrong in the design and production of the MAPLE reactor. There are MAPLE reactors in Korea that function, so I don't think it's inherent to the design. There is a long history of building research reactors around the world. A new one was just commissioned in Australia without too much trouble.

The difference between a research reactor and a power reactor is that they usually have higher flux cores, a different layout of the core, and they run at lower temperatures and lower pressure. So they're actually in some sense simpler to run and operate because you don't push the materials as hard. What you're using them for is an environment to test other materials or to draw off neutron beams. I don't think that once you put a proper team in place to do the design work that there will be any problem designing and building a nuclear reactor that would serve our purposes in Canada. I think the expertise is certainly there. I don't think I would have any hesitation in moving forward on that plan.

Remember, this is a multi-purpose facility we're talking about, so it serves many, many communities. One of the issues that came up from one of the members was whether we are going where the puck used to be, by building one of these facilities. When we built NRU we didn't even know what the game was. So that's a lot of vision. One thing I can be sure of is that when we build a replacement research reactor, it will not be doing the same jobs in 50 years that we built it for. That's for sure, because things will change. Things will move on. Different medical isotopes will be developed and be produced, and probably different techniques for studying engineering materials will have been developed and be used there. Different research techniques will be going on.

All we know is that if you build a flexible enough facility, people will find ways of using it in ways you didn't even imagine. That's what happened at NRU, and I believe that's what will continue to happen as we develop these new facilities.

● (1715)

The Chair: Thank you, Mr. Ryan. Thank you, Mr. Scarpaleggia.

To Mr. Allen, for up to five minutes.

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

I just want to pick up on one of the last questions Mr. Anderson asked with respect to private and public sector involvement in these projects. One of the comments you made early on, Mr. Ryan, was about subsidizing the treatment around the world. It's a good recognition, I think, of what is actually happening today with much of the isotope production coming out of Chalk River. Also, Mr. Heysel, you said that in the long term you're looking to develop the next generation of medical isotopes. It makes me wonder, in terms of that type of research, if you were producing the moly-99, how that is going to infringe on your ability to do the research to produce the next generation.

It just seems to me we have five of these reactors around the world, all of which are 45 years old or more, and we've put all our eggs around the world in this one basket. It seems to me that having a distributed system of many different technologies makes more sense. So I'd like to ask each of you if you believe a distributed system is better, and also tell me what your cost-recovery mechanism is under each of the technologies. I'm assuming that even if we had a major research reactor built for $800 million, somehow you'd want to separate the isotope production, that it's a truly commercial venture.

I would like each of you to comment on your technologies in terms of what your cost recovery will be—and specifically McMaster, because you had the proposal you were thinking about. Obviously it's not going to be to subsidize production around the world.

Mr. Christopher Heysel: Certainly, we're used to paying our own way. That's been the mandate in front of me at the university for the last eight years I've been there. We don't get any government operating funds, either federal or provincial. We're mandated to pay our salaries and our fuel and our equipment out of our operating budget, which comes from taking on commercial activities, including isotope sales. So we're used to balancing the books.

When we looked at the moly-99 proposal, to help on that one, it was clear from the government that they didn't want to support this long term. But they were also cognizant of the fact that if they wanted us to help, infrastructure and start-up funding would be a reasonable ask from the universities. So the money I talked about earlier would be the operating funds over five years, which is a lot of money, but still the goal of the university is and always has been to pay our own way coming out of this.

So I think you can do it, and I think we have proven that we've done it before. We hope to do it again.

Dr. John Valliant: You just made a comment about the impact on the research at the university. We're very fortunate. We have a centre of excellence in the next generation of probes and radiopharmaceuticals that works parallel with the reactor, and because of the design of the reactor, we're able to do multiple tasks in parallel. So in fact this initiative augments the broader scope of what we do.

Mr. Mike Allen: Are there other comments on the technology, specifically a distributed model whereby we're not relying on one technology going forward, but we have a whole batch of technologies that the private and public sectors can play a role in? Does that make sense, so that we don't have all our eggs in one basket?

The Chair: Mr. Lockyer.

Dr. Nigel Lockyer: I think that was the model I was using. I imagine the accelerators play a role of supporting the supply of molybdenum to Canada, so if you were relying on a reactor or a group of reactors—they could be U.S. reactors—then you would always have a fallback position with something that's able to supply Canada's needs. The accelerator proposal does not put Canada in a position where they would supply isotopes to the world. It's not intended to do that.

But you could, for example, put accelerators in the U.S. You could put them in Boston, you could put them in L.A., and do local regions that way. That's the model, really, with accelerators, because they're small.

● (1720)

Mr. Mike Allen: You commented about the accelerators, and you already have accelerators today that can produce moly-99. What is the price tag on some of these, as opposed to an $800-million research reactor?

Dr. Nigel Lockyer: For the machine we talk about, the accelerator itself—and you have to talk about the whole show, as you know—is about $50 million. You have to then have the facility for shielding and processing and all that. That's on top of it. But you need that for any facility, whatever you're using.

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

We'll go now to Mr. Anderson, for up to five minutes.

Mr. David Anderson: I actually could give my time to Mr. Allen if he still needs to follow up.

The Minister of Natural Resources announced an expert review panel that's being set up to review the options for producing medical isotopes. Do you folks think your technologies should be considered? Are you planning to make a proposal and be involved in that group?

I see the folks from McMaster saying yes. I'm just wondering about the others. Mr. Lockyer is saying the same thing. Good.

I'd like to go back to a couple of comments made by Ms. Keen. You said you wanted to try to get the issue of the MAPLEs into 2006 and later. You said it was from 2006 and on that it became clear there was a positive coefficient of reactivity.

I did some checking here. Idaho was in and did their analytical work in 2005, and they'd been in there prior to that as well. Were you not aware that they were working with AECL earlier on, in the mid-2000s?

Ms. Linda Keen: Any licensee is able to bring in whoever they wish at any time to advise them. What I was talking about is when it was clear that there was a problem at the commissioning phase. That's when we became aware of that. I'm not trying to make it 2006 or whatever; I'm just saying that it was really in the later stages that we had a clear issue in the commissioning. It was when it was commissioned that we really knew this was an extremely serious problem for everyone—in a hearing.

Mr. David Anderson: So you did have a design that had some flaws in it.

Are you telling me that the CNSC wasn't aware ahead of time that experts were being brought in from around the world to try to deal with the problems that you said...? You said you weren't aware of them in 2001; you thought there were other problems.

But are you saying that you didn't know there were problems in the design prior to 2006, when they came into commission?

Ms. Linda Keen: I think in terms of technological areas, the reactor is safe until it's started. The job at the CNSC is to make sure that whatever happens on that site is safe and that there's training, etc. The issue of the safety of a reactor becomes paramount for the CNSC when it starts to operate. We don't get involved in.... For example, these gentlemen here were also licensees when I was there, and I wouldn't have any idea if McMaster brought in specialists or not, or others, in terms of what was going on.

It was when it was commissioned. It's when it's at power that it's a serious safety and security issue.

Mr. David Anderson: So you were authorizing them to do tests. And from the testimony of other witnesses, it's clear that when they began doing those tests, they found there was a serious design flaw within the reactor. And you're telling me that you didn't know about that until it came time to commission?

Ms. Linda Keen: You test a reactor when it's commissioned. There is not a separation of the two. When we talk about testing the reactor, we're talking about the commissioning phase. Until that time when it was being commissioned, it was really in a safe state.

We looked at the licensing of the reactor—and this is all public information, in terms of those licences—and we were looking at giving a licence to AECL in terms of their ability to continue to design the reactor.

● (1725)

Mr. David Anderson: How did those folks, then, know through 2002, 2003, 2004, and 2005 that there were problems in the reactor, if you're saying that none of that showed up until they went to commission in 2006? There is something not adding up here.

Ms. Linda Keen: Well, it probably is a definition of trying to figure out exactly what looking at the reactor design.... I'll give you an example. At the very beginning, when I got there, there was an issue that the shut-off rods weren't falling all the time. Now, the shut-off rods are absolutely critical to the safety of the reactor. That wasn't because the reactor was operating; that was testing one component of the reactor, which was the shut-off rods. In that case it was what the nuclear community calls "housekeeping"—there was grime and whatever in the shut-off rods that prevented them from falling.

So when you're testing a component, you could be testing the staffing, you could be testing the ability of the components, or you could be testing the quality control systems. But it wasn't until the reactor was commissioned that, in my view, these issues became quite serious, and that was the positive coefficient.

Mr. David Anderson: So the reactor was first fired up in 2006. Is that what you're saying? It was up to the point that they understood there was a problem. It wasn't until 2006 that they fired the reactor up?

Ms. Linda Keen: I think you'd have to go back and look at the experiments that happened, but in terms of the licences that we gave, which were these very specific licences to look at bringing it up to power.... I don't have the schedule in front of me; they were the licences at the very end. That's why there was this optimism that the problems could be solved. It wasn't until it really hit the fan that we knew it wouldn't work.

I'd like to emphasize that this positive coefficient of reactivity, and the fact that it doesn't correspond with the projected performance of the reactor, is extremely serious. And it was treated seriously by everyone, including AECL.

Mr. David Anderson: So why would they—

The Chair: Thank you, Mr. Anderson. I'm sorry, your time is up.

Mr. Regan, for just two or three minutes.

Hon. Geoff Regan: Thank you, Mr. Chairman.

Ms. Keen, we know that AECL is taking the fuel rods out of the reactor and they're draining the reactor vessel. In view of that, is it your sense, based on your experience, that it is at all possible they could have it up and running again within three months of the shutdown beginning?

Ms. Linda Keen: From listening to the meeting of the Canadian Nuclear Safety Commission on June 11, I think there was no projected change. AECL was saying at least three months, but I think they agreed they were behind in terms of their initial work and hoped to make that up.

So I couldn't say how long.

Hon. Geoff Regan: Let me ask Dr. Ryan. What is your sense? Is it at all possible that could be up and running after a period of only three months?

Prof. Dominic Ryan: I honestly don't know. That's a technical issue for the interior of the reactor and the engineers who are working on it, so I really can't speak to that.

Hon. Geoff Regan: Sorry about that. I'll ask someone who's done safety there.

Mr. Tucker.

Mr. Dave Tucker: I just don't have the information to make an intelligent judgment. I'm sorry.

Hon. Geoff Regan: I guess it's not fair to ask TRIUMF either, then.

Dr. Nigel Lockyer: I could comment, but I don't know either.

Hon. Geoff Regan: I'll ask Mr. Tonks if he would like to fill in for the last minute.

Mr. Alan Tonks: I have just one last question, and it's an open-ended question. We were told that 100% of the NRU isotope production went down to Lantheus in the States and 10% came up for Canadian consumption.

If there were to be a crisis—and let's not use the term "crisis"—is part of the policy strategy for the future for Canada to develop its own national responsibility to meet that, or do you see the vision of the future as being much broader than that?

Mr. Lockyer.

● (1730)

Dr. Nigel Lockyer: I'll just make a comment. Canada has that capability now. MDS Nordion used to make generators for moly-99. So even though it goes to the U.S. now, that was a business decision, not a technology decision. They could start making them tomorrow, if you wanted.

The Chair: Yes, Mr. Anderson.

Mr. David Anderson: I have a question of clarification. I just want to ask Ms. Keen a question. Does she know that the positive power coefficient issue was an issue in 2003 and was known in 2003, because...?

Hon. Geoff Regan: Mr. Chairman, Mr. Anderson had his questions, and I think the time has expired. I know he's trying to advance his interests, Chair—

Mr. David Anderson: I'm confused by her testimony, because she seemed to indicate that it wasn't until 2006. Can she clarify that for us?

The Chair: That's not a point of order.

Mr. David Anderson: It's a point of clarification, Mr. Chair. I'm just wondering.

The Chair: We can't go back to you, Mr. Anderson. The bells are ringing.

I want to really thank all of you for coming today. This has been a fascinating meeting, with some very useful information for the committee. Thank you all very much.

The meeting is adjourned.

Published under the authority of the Speaker of the House of Commons

Publié en conformité de l'autorité du Président de la Chambre des communes

Also available on the Parliament of Canada Web Site at the following address:
Aussi disponible sur le site Web du Parlement du Canada à l’adresse suivante :
http://www.parl.gc.ca
