Canadian Nuclear Safety Commission

Public meeting

January 17th, 2013

Public Hearing Room
14th floor
280 Slater Street
Ottawa, Ontario

Commission Members present

Dr. Michael Binder
Dr. Moyra McDill
Mr. Dan Tolgyesi
Ms. Rumina Velshi
Dr. Ronald Barriault
Mr. André Harvey

Secretary:

Mr. Marc Leblanc

Senior General Counsel:

Mr. Jacques Lavoie

Commission canadienne de sûreté nucléaire

Réunion publique

Le 17 janvier 2013

Salle d'audiences publiques
14e étage
280, rue Slater
Ottawa (Ontario)

Commissaires présents

M. Michael Binder
Mme Moyra McDill
M. Dan Tolgyesi
Mme Rumina Velshi
M. Ronald Barriault
M. André Harvey

Secrétaire:

M. Marc Leblanc

Avocat général principal :

M. Jacques Lavoie

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Ottawa, Ontario

--- Upon commencing on Thursday, January 17, 2013 at 9:04 a.m./L'audience débute jeudi, le 17 janvier à 9h04

Opening remarks

MR. LEBLANC: Bonjour, Mesdames et Messieurs. Bienvenue à la continuation de la réunion publique de la Commission canadienne de sûreté nucléaire.

Mon nom est Marc Leblanc. Je suis le secrétaire de la Commission et j'aimerais aborder certains aspects touchant le déroulement de la réunion.

We have simultaneous translation. Please keep the pace of speech relatively slow so that the translators have a chance to keep up. Des appareils de traduction sont disponibles à la réception. La version française est au poste 3 and the English version is on Channel 2. Usually it's 2 and 1, so you may want to re-validate.

Please identify yourself before speaking so that the transcripts are as complete and clear as possible.

Et la transcription sera disponible sur le site web de la Commission dès la semaine prochaine.

I would also like to note that this proceeding is being video webcast and that archives of these proceedings will be available on our website for a three-month period following the closure of the proceedings.

Please silence your cell phones and other electronic devices.

Monsieur Binder, président et premier dirigeant de la CCSN, va présider la réunion publique d'aujourd'hui.

President Binder.

THE CHAIRMAN: Merci, Marc.

Good morning and welcome to the meeting of the Canadian Nuclear Safety Commission. Mon nom est Micheal Binder. Je suis le président de la Commission canadienne de sûreté nucléaire et je vous souhaite la beinvenue and welcome to all of you who are joining us via webcast.

I'd like to begin by introducing the Members of the Commission that are here with us today. On my right are Dr. Moyra McDill, Mr. Dan Tolgyesi; on my left Ms. Rumina Velshi, Dr. Ronald Barriault and Monsieur André Harvey.

We have heard from Marc, our Secretary. This is Marc Leblanc. And we also have with us Mr.

Jacques Lavoie, Senior General Counsel to the Commission.

MR. LEBLANC: The *Nuclear Safety and Control Act* authorizes the Commission to hold meetings for the conduct of its affairs. The agenda was approved yesterday. So the complete list of items we present today is on agenda 13-M2.A.

In addition to the written documents, CNSC staff will have an opportunity to make presentations and the Members will be afforded an opportunity to ask questions on the items before us.

THE CHAIRMAN: The first item on the agenda today is an update on the implementation of recommendations from the Tritium Studies Project Synthesis Report as outlined in CMD 13-M5.

And I understand that, Dr. Thompson, you will take us through this. The floor is yours.

7. Information Items

7.1 Update on the implementation of recommendations from the Tritium Studies Project Synthesis Report

13-M5

Oral presentation

by CNSC staff

DR. THOMPSON: Thank you and good morning.

Monsieur le président, Mesdames et Messieurs les commissaires, mon nom est Patsy Thompson. Je suis la directrice générale de la Direction de l'évaluation et de la protection environnementales et radiologiques.

With me today are Mr. Michael Binder -- sorry.

(LAUGHTER/RIRES)

THE CHAIRMAN: Yes, I am.

DR. THOMPSON: Perhaps you should join us. So let me start again.

So with me is Mr. Michael Rinker, and I should have said Mike and that way I wouldn't have gotten myself in this bind. So Mike Rinker, the Director of the Environmental Risk Assessment Division, Dr. Nana Kwamena, from the Environmental Assessment Division, Dr. Steve Mihok, an Environmental Risk Assessment Specialist, Dr. Nadereh St-Amant, who is a Radio-chemistry Specialist at the CNSC Laboratory, Monsieur Bertrand Thériault et Madame Pascale Reinhardt, de la Division de la radioprotection -- des sciences de radioprotection et de la santé.

The Tritium Studies Project was a series of research studies conducted by the CNSC to enhance the regulatory oversight of tritium processing and tritium releases in Canada.

The main conclusions from this work and the recommendations of the Tritium Studies Project were summarized in the synthesis report and presented to the Commission in June 2010.

The purpose of today’s presentation is to provide an update to the Commission on the progress in implementing the recommendations that were made in the synthesis report.

And at this point I will ask Dr. Kwamena to continue with the presentation.

DR. KWAMENA: Thank you. Good morning, Members of the Commission.

As previously mentioned, the purpose of this presentation is to provide the Commission with an update on the progress that has been made to date in implementing the recommendations of the Tritium Studies Project Synthesis Report.

To this end, a brief summary of the Tritium Studies Project along with the main conclusions and recommendations of the project will be provided before describing how CNSC staff are implementing the recommendations.

We will also be discussing other related activities CNSC staff are involved with.

In January 2007, the Commission directed CNSC staff to initiate research studies on tritium releases in Canada. This is documented in the Record f Proceedings, including Reasons for Decision for SRB Technologies' relicensing hearing for the renewal of a Class 1B operating licence.

Following this request, CNSC staff presented a project plan to the Commission in September 2007. The purpose of this project was to enhance the information available to guide the regulatory oversight of tritium processing and tritium releases in Canada.

The scope of the project included issues that are important to the protection of the health and safety of people and the environment.

Another important outcome of this project is the communication of findings of the Tritium Studies Project to the public through six CNSC info documents and two public information sessions. A seventh info document is currently being prepared for publication. In addition to the six info documents, an overall synthesis report was produced. The Tritium Studies Project Synthesis Report summarized the results, conclusions and recommendations of the research studies completed under the Tritium Studies

Project.

CNSC staff have also published two peer-reviewed scientific papers based on the results of the Tritium Studies Project and a third paper is in preparation.

In June 2010, the Tritium Studies Project Synthesis Report was presented to the Commission. The main conclusion of the Tritium Studies Project was that adequate provisions for the health and safety of Canadians against tritium have been made through existing regulatory mechanisms.

However, opportunities to enhance the regulatory oversight of tritium were identified from the Tritium Studies Project. As a result, CNSC staff made several recommendations in the Tritium Studies Project Synthesis Report. The Commission endorsed the synthesis report and accepted CNSC staff's recommendations.

The CNSC continues to play an active role in understanding the environmental behaviour of tritium because Canada is one of the few countries that still licenses tritium processing facilities. The research that CNSC funds enhances our ability to correctly and conservatively model public dose from tritium under various operating and environmental circumstances.

The behaviour of tritium in biological

systems such as plants is also of academic interest because of uncertainties in the metabolism of tritium.

The specific recommendations from the synthesis report address uncertainties in the existing framework in regulating tritium processing and tritium releases in Canada. The first recommendation included continuing to research the environmental behaviour of tritium and determining the resulting dose consequences in order to better understand the underlying mechanisms of tritium behaviour in the environment. Although regulatory requirements protected human health, these practices have not provided a sufficient level of protection for groundwater resources outside licence boundaries at several facilities.

Therefore, CNSC staff recommended that groundwater protection issues at Class 1 facilities be addressed.

Lastly, there’s considerable variation and uncertainty in the biological data used to compared the biological effects of tritium relative to gamma radiation.

CNSC staff recommended conducting additional research studies to reduce the uncertainty in the relative biological effectiveness of tritium.

The remainder of the presentation describes the steps that CNSC staffs have taken in implementing these recommendations.

Tritium is a radioactive isotope of hydrogen which emits low-energy beta radiation. It occurs naturally in the environment and is also produced in nuclear power plants. Tritium can pose a health risk if it's ingested through drinking water or food consumption, or if it is inhaled or absorbed through the skin in large quantities. Tritium occurs in the atmosphere in the same chemical forms as hydrogen. Once tritium is in the atmosphere it rapidly mixes with air moisture, as a result tritium easily forms water molecules known as tritiated water or HTO. After being released to the environment, HTO can mix with water and other environmental reservoirs such as soil, plants, and animals.

Organically bound tritium, or OBT, is another form of this radionuclide that is incorporated into organic compounds. OBT consists of a large group of compounds and it forms from the conversion of HTO in biological systems through different metabolic processes. The different forms of tritium can also be distinguished based on the time spent in the body. HTO clears from the body about four times faster than does OBT, consequently, OBT has a longer retention time which leads to greater dose consequences for OBT than HTO.

In 2008, CNSC staff issued a research

contract to the University of Ottawa to measure the concentration of tritiated water and organically bound tritium in air, soil, garden produce and natural vegetation samples over two growing seasons near four nuclear facilities in Canada. This work was undertaken to determine how tritium releases enter the biosphere and the human food supply. The partial results of the environmental fate of tritium in soil and vegetation study was presented to the Commission as part of the Tritium Studies Project Synthesis Report. The detailed analysis of the data is now complete. There have been no changes to the general conclusions of the study since the June 2010 presentation. The results of this study will soon be published on the CNSC website as the seventh info document of the Tritium Studies Project.

Most CNSC licence compliance programs for monitoring food focus on measuring HTO in garden produce or natural vegetation. In accordance with the Canadian Standards Association, Standard N288.1, an OBT to HTO ratio of about .8 is generally used to predict OBT levels based on measured and/or modelled HTO levels. Further, current environmental risk and public dose models rely on the assumption that OBT forms directly from HTO under equilibrium conditions.

The results of the environmental fate of tritium in soil and vegetation study revealed higher amounts of organically bound tritium relative to tritiated in some environmental samples. In general, the OBT to HTO ratios were greater than 1. The public dose from consuming produce near nuclear facilities is low and does not represent a health risk. The annual dose to public, assuming a person consumed locally grown produce with an OBT to HTO ratio greater than 10, still represents a very small fraction of the public dose limit of 1 millisievert per year.

To better understand the mechanisms responsible for the higher than expected OBT to HTO ratio, the CNSC has contracted the University of Ottawa to conduct an additional research project investigating the transfer of tritium from the air to the human food chain and the rate of formation of OBT in the terrestrial environment.

The research consists of one field season, which was completed in 2012, with the possibility of a second field season in 2013. This research project also provided an opportunity for capacity building at the CNSC laboratory and the analysis of OBT in environmental samples. Samples from the field campaign were split between the University of Ottawa and the CNSC laboratory for this purpose. The CNSC laboratory now has the capacity to analyze OBT in environmental samples. The laboratory also successfully participated in the first stage of the OBT method inter-comparison of standardized samples with Atomic Energy of Canada Limited and the University of Ottawa.

Further work, in collaboration with the Institut de Radioprotection et de Sureté Nucléaire, is being planned to begin in June 2013 and will involve fieldwork in both Canada and France.

Conventional active and passive diffusion air samples are used by CNSC licensees for measuring tritium in air. Conventional active sampling uses a pump to actively pull air over a collection device. In contrast, a passive diffusion air sampler allows chemicals to diffuse from the surrounding air to a liquid in a vial that absorbs the chemical. However, there are measurement variabilities with both types of samples. Results from passive air sampling can differ significantly from active sampling results. As a result, there are questions regarding the accuracy of the two methods. To illustrate, the table on this slide compared the tritium in air results using active and passive diffusion samplers near various facilities in Ontario. In general, the 2008 data suggests that the results from passive diffusion samplers are higher than the results from active samplers and provide conservative measurements for regulatory purposes. The public dose estimated with either the conventional active or the passive diffusion samplers are low. Consequently, there are no health and safety implications.

More precise measurements of tritium concentration in air with simple monitoring techniques is required to reduce the uncertainties in predicting the environmental concentrations of tritium from public dose estimates. In this regard, it was recommended that the CNSC undertake research to identify the factors that need to be taken into account to adequately calibrate active and passive air samplers for tritium. A comparison of conventional active and passive air samplers under different meteorological and operating conditions is included as part of the follow-up research project which was contracted to the University of Ottawa for 2012 and 2013.

One of the planned objectives of the collaboration with IRSN is an inter-comparison of Canadian and French active sampler designs.

The regulatory framework for groundwater protection in Canada, and other jurisdictions internationally, is based on how groundwater is used. For example, groundwater may be protected as either a source of drinking water, a source of irrigation, or a pathway to the surface environment. Most licensees have measures in place to protect groundwater from contamination from nuclear and hazardous substances; however, there are differences in the measures that are currently in place. Therefore, the CNSC is proposing to clarify and formalize the requirements for groundwater protection for licensees through regulatory and guidance documents. The proposed requirements would build on existing CNSC guidance and requirements. Measures for each site would be site-specific and would depend on the potential uses for ground water, the environmental characteristics of the site, and the characteristics of potential contaminants.

If groundwater has been identified as a potential source of drinking water, it must be protected to ensure that quality remains within drinking water standards. Most tritium drinking water standards are based on the internationally accepted radiation protection concepts of the International Commission on Radiological Protection and the World Health Organization. The World Health Organization guidelines for radionuclides in drinking water is based on an effective dose of .1 millisieverts per year. An effective dose of .1 millisieverts per year leads to a maximum acceptable concentration of radionuclides in water of 7,610 becquerels per litre. The World Health Organization rounded this value to 10,000 becquerels per litre. The guidelines for Canadian drinking water quality also uses an effective dose of 0.1 millisieverts per year, but rounded the value to 7,000 becquerels per litre.

The United States and the European Union do not use the same approach. The European Union uses 100 becquerels per litre as a screening parameter to indicate the possibility of harmful radiation. Exceeding this value triggers the need to determine which isotopes are present and to determine the dose to the indicator value of 0.1 millisieverts per year.

The United States adopted its drinking water standard in 1976. The standard was based on radiological concepts that differ from current ICRP and World Health Organization methodology. The United States continues to maintain this standard because legislation prevents raising the existing standard and because industry has been able to achieve it.

The current tritium activity in Canadian drinking water near nuclear power plants is orders of magnitude less than the Canadian guideline values. The current Canadian drinking water guideline protects the health and safety of Canadians. The value is based on a dose of approximately 0.1 millisieverts per year and no health effects are expected at this level.

The CNSC is proposing an effluent or an emission-designed objective for tritium in groundwater to enhance the approach for controlling releases to the environment. This designed objective protects ground water as a valued ecosystem component.

The proposed objective of 100 becquerels per litre is well below the drinking water standard and would represent a very small fraction of the regulatory dose to public. The proposed objective was selected on the basis of being technologically and economically achievable based on the performance at existing facilities.

In February 2012, CNSC staff released two discussion documents incorporating principles for ground water protection. The first paper discussed formalizing and clarifying the requirements of the CNSC with respect to groundwater protection. These requirements would ensure that all Class I nuclear facilities, uranium mines and mills, and nuclear waste management facilities have well-designed and robust groundwater protection programs.

The second discussion paper addresses establishing limits for releases of radionuclides and hazardous substances at nuclear facilities. The proposed emission-designed objectives of 100 becquerels per litre represents a commitment to pollution prevention since it is below levels that are considered to represent an unreasonable risk to human health.

The two discussion documents underwent an extensive public review. The CNSC What We Heard document summarizes the public comments that were received. This document is currently being finalized. The comments received on the protection of groundwater discussion paper emphasize that many nuclear facilities already have well-established groundwater monitoring programs in place. Many respondents did not want duplication of existing guidance, regulations and policies of other jurisdictions.

Further, the development of a new standard through the Canadian Standard Association was viewed as a good mechanism for developing formalized guidance to reduce any differences in the existing groundwater protection programs.

Comments related to the release limits as they relate to tritium focus on the Canadian drinking water standard of 7,000 becquerels per litre. Industry generally felt it was inappropriate to use a value less than the Canadian drinking water guideline as a regulatory tool while others expressed the belief that the drinking water level was too high and that 20 becquerels per litre should be used.

The Health Effects, Dosimetry and

Radiological Protection of Tritium research study conducted under the Tritium Studies Project included a comprehensive review and assessment of radiation protection principles and practices specific to tritium. Topics that were covered included the health effects of tritium, radiation from the laboratory and epidemiological studies and the relative biological effectiveness of tritium radiation.

Both the epidemiological and the laboratory studies revealed that adverse health effects due to tritium exposure at current exposure levels in Canada are unlikely. This suggests that any tritium specific risk is small and cannot be distinguished from the risk of similar health outcomes in the general population. However, few studies have directly measured tritium exposure or assessed the health risks of tritium alone.

The relative biological effectiveness, or RBE, is a concept used to compare different types of radiation in terms of the same biological effect. The health effect report focused on choosing an appropriate RBE value for tritium. More than fifty studies were reviewed but there was considerable variability and uncertainty in the available data. It is therefore difficult to specify a nominal RBE value for tritium because of the differences in the reference radiation that was used in the various studies.

In follow-up to the Health Effects, Dosimetry and Radiological Protection of Tritium info document that was published by the CNSC, CNSC staff recommended more studies investigating the health effects of tritium exposure. This four-year study, which started in 2012, will test for adverse health effects due to tritiated water exposure and calculate the relative biological effectiveness of tritium radiation in comparison to gamma radiation from Cobalt-60.

The specific objectives of these studies included investigating the adverse health effects of tritium compared to gamma rays in producing non-cancer health effects and tumors as well as the health effects from sub-chronic and chronic exposure to tritiated water and organically-bound tritium.

Scientists from Atomic Energy of Canada Ltd and IRSN are conducting the toxicological studies. CNSC staff are participating in the Scientific Steering Committee to ensure that CNSC objectives are being met. Experiments will be conducted over the next three years and a final report for this project is due to the CNSC in March 2015. Further, there are plans to publish the results in peer-reviewed journals.

The fate of tritium after it is released to the atmosphere is reasonably well understood. The long-term equilibrium concentrations of tritium can be predicted with conservatism using the CSA standard N288.1. However, as discussed in previous slides, there remains uncertainties in our knowledge of the environmental behaviour of tritium.

CNSC staff are participating in a number of international, national and bilateral initiatives that have been established to test and compare environmental assessment models. Participation in these initiatives provides CNSC staff with the opportunity to learn about research being conducted internationally and also provides staff with the opportunity to validate our models and tools.

The International Atomic Energy Agency's Modeling and Data for Radiological Impact Assessment, or MODARIA Program, is a four-year program which started in 2012. MODARIA is the successor to the IAEA's Environmental Modeling for Radiation Safety, or EMRAS Program. The MODARIA Program has been established to enhance the capabilities of radiological impact assessment for planned, emergency and routine releases of radionuclides.

CNSC staff are actively participating in the MODARIA working group that aims to develop, test and compare models for accidental and pulse tritium releases. These models are being developed to integrate tritium processes that have been absent from previous dynamic tritium models.

The CNSC's science-based regulatory approach has been provided a high level of protection to human health and the environment. The research activity that are being carried out based on the recommendations from the Tritium Studies Project Synthesis Report will continue to enhance our existing scientific understanding of tritium as well as contribute to the scientific literature on the subject.

Through funded research, the CNSC will continue to investigate the environmental behaviour of tritium and assess the consequences to public dose. In addition, the findings of the research projects will be published in the open scientific literature.

The comments received on the discussion documents will be evaluated by CNSC staff to determine the best path forward to strengthen the CNSC's regulatory framework for groundwater protection.

I will now pass the presentation back to Dr. Thompson.

DR. THOMPSON: Thank you. As you can see from the presentation, the recommendations of the Tritium

Studies Project Synthesis Report are being implemented by staff. The results from the current and planned research projects will enhance our scientific understanding of tritium behaviour in the environment and also our understanding of the health effects of tritium. CNSC staff are actively contributing to the science of tritium both nationally and internationally.

Finally, to reiterate, CNSC staff's work on the Tritium Synthesis Project has shown that the existing regulatory framework effectively protects the health and safety of Canadians against tritium.

Our continuing work will further enhance the scientific understanding of tritium health effects and of its behaviour in the environment, but we can be assured that, to date, the regulatory mechanisms in place, through ALARA effective control of tritium emissions, have resulted in very low doses to the public, and the public has been protected as a result of these practices and the CNSC's regulation of tritium in facilities.

This concludes our presentation and we are available to answer questions.

THE CHAIRMAN: Okay. Thank you. I would like to start the question session with Monsieur Tolgyesi.

MEMBER TOLGYESI: Merci, monsieur le président.

I'm going to ask you first, did I understand well when you were on slide 5, you said that Canada is one of the few countries regulating tritium emissions. Was that an appropriate understanding?

DR. THOMPSON: Patsy Thompson, for the record.

Not quite. There are facilities elsewhere, for example, nuclear power plants and reprocessing plants that do have releases of tritium, and those are being under regulation in other countries like France, for example.

What we've been finding is more unique to Canada is the tritium processing facilities, such as SRBT and Shield Source Incorporated. Those types of facilities are rare in the world and we're one of the few countries that regulate those types of facilities.

MEMBER TOLGYESI: Okay. Now, the objective of this groundwater protection is to measure -- ensure that Class 1 nuclear facilities, mines and mills and nuclear waste management, have well designed robust programs. What you are saying that many nuclear facilities already have well-established groundwater monitoring programs.

Could you provide some results of these monitoring programs and how they compare to this 100 becquerels per litre and how Canada compares, for instance, to U.S. or the other countries in this?

DR. THOMPSON: Patsy Thompson.

I will provide some background information and then I'll ask Mr. Michael Rinker to provide additional information.

These recommendations from the Tritium Studies Project are a direct outcome of the observations of very high levels of tritium in groundwater around initially the SRBT facility in Pembroke. What we found during those investigations, and then the Commission took regulatory action, is that because there is no -- the facility is a small facility, there is no zone around the facility that is under the control of the licensee. And essentially what we found with the nature of the releases was that there were very high levels of tritium, in the hundreds of thousands of becquerels per litre around the stack, essentially from entrainment of releases to the atmosphere that were being entrained to the ground.

This has also been observed, but to a much lesser extent at Shield Source. So it was those findings that triggered the work on groundwater protection, and I'll ask Mr. Rinker to provide more details in terms of the benchmarking CNSC staff did against what's being done either in Canada or internationally.

MR. RINKER: Mike Rinker for the record. I'm Director of the Environmental Risk Assessment Division.

So CNSC staff have conducted a project over, I guess, two or three years where we looked at other countries on how they regulate the protection of groundwater. What are best practices. I'm not simply in the nuclear cycle but also at provincial level, where there is groundwater protection for many other different types of facilities.

In general, the groundwater protection measures or how you evaluate safety for groundwater is based on what the use of that groundwater would be. So it could be simply a pathway if you're up in the north and groundwater is not a resource. It could be a source of drinking water.

So we've identified the need for the CNSC to have some sort of clear expectations for the protection of groundwater based on what we consider best practice.

Where we see some strengthening needed is, in part, on groundwater monitoring where the levels of -- certainly of tritium around nuclear facilities are low. We picked the number 100 becquerels per litre as a design objective because the nuclear facilities are protecting groundwater to that level. So it's technologically achievable now. There is occasional well that might be 114 one time but then lower than 100. So 100 seems to be the upper maximum. Generally, groundwater concentrations of tritium are 20, 30, 80 becquerels per litre. These are not sources of drinking water. These are groundwater monitoring locations. The municipal intakes around nuclear plants are well below 20 becquerels per litre but adjacent to the plant, farmers fields and so on, it's around 100 or less.

Now, to compare those values to internationally, you know the CANDU reactors do have more tritium than other types of reactors. So airborne emissions of tritium are higher for CANDU reactors than they are for other facilities.

So usually when we see groundwater tritium problems, say, in the news, for example, in the U.S., it's because there's been some sort of leak in the subsurface structure. So it's not routine emissions. It's an accident or malfunction.

But generally around other facilities around the world, groundwater monitoring is not picking up tritium, unless there's an issue. Whereas in Canada, the normal operation of a CANDU reactor leads to airborne emissions of tritium that get entrained and brought down into groundwater. But the groundwater monitoring shows it's generally below 100 becquerels per litre.

DR. THOMPSON: Patsy Thompson. If I could add something to your question.

There are two things in the document; one is in terms of what are our expectations in terms of actually putting measures in place to make sure that the groundwater is protected. And the next step is if there is a breakdown in containment, what are the expectations of the CNSC in terms of taking action to remediate the situation?

So both of those aspects are included in the discussion paper and, in preparing the discussion paper, we did benchmarking against what other organizations do in terms of requirements for containment and requirements for site specific assessments for clean up, for example, and remediation if there is a failure in containment systems.

MEMBER TOLGYESI: Ms. Thompson, you said that land -- the ground around the facilities is not under the control of licensee. What's the difference if it was under the control of licensee for emissions?

DR. THOMPSON: Patsy Thompson, for the record.

In effect, the level of contamination would have been the same but in terms of the licensee's ability to control the use of that land and the use of the groundwater would have been greater. In the case of the two facilities that are processing tritium, the land around their facility is not under the control of the licensee and so it became an issue of who is responsible for that contamination and who can actually control the use of that land and water, if it's not the licensee. So those were some of the issues that were discussed in front of the Commission when, if you recall, orders were issued for SRBT to cease operation for a while and then resume operation with very tight controls and limits -- and limitations in terms of when they could operate.

Over time they've actually managed to reduce their emissions significantly and we're seeing an improvement in groundwater quality as a result of improvements on facility management.

MEMBER TOLGYESI: My last question, Mr. President, is in the Slide number 9 you compare the ratio of organically bound tritium and HTO and you are saying that the CSA standards ratio is between .6 and .8 and what you find it's quite higher.

On what is based this standard? You know what is assumed -- this assuming of .6 to .8 where we measured much higher?

DR. THOMPSON: Patsy Thomson. I'll ask Dr.

Steve Mihok to respond to that question. He’s got information on the basis for the CSA Standards ratio.

DR. MIHOK: Steve Mihok; Environmental Risk Assessment Specialist within the Environmental Risk Assessment Division.

The basis of the number used in the CSA Standard is essentially about 20 years of scientific work and many experiments under controlled conditions where the numbers had actually been measured. The reason the number is so low is that the tritium atom is heavier, essentially, than the hydrogen atom, so it participates in chemical reactions slowly. So when water is essentially converted into fats, proteins, et cetera, tritium is not taken up as quickly and so it isn’t, essentially, at the same level in organically bound materials as it would be in water.

Now, that’s theory. That’s what happens essentially when you put a plant, for example, in an aquarium where the level of tritium in the air is absolutely stable, where the level of tritium in the soil water is stable. If you have plants in the environment, particularly in an area where you have a source from a nuclear power plant or a tritium processing facility where tritium is being emitted to the air during the daytime, during the night-time, sometimes more, sometimes less, the plant will respond in different ways and the organically bound tritium will be formed, sometimes when the tritium levels are high.

And that's what you will measure when you take a measurement in the field but when you measure the water, you will be measuring essentially the water in the plant that is reflecting the water in the air at about the time that you make the measurement. So this mismatch, essentially, in what the organically bound tritium represents in terms of time versus what the tritiated water, the HTO, represents in terms of time is the reason why we see strange numbers, numbers that we don't expect from theory under actual environmental conditions.

And it's largely because of the research funded by the CNSC that the scientific community has been made aware of some of these mismatches. They were starting to investigate these processes around the same time that we were in the last five years or so.

So there's a general consensus that the models are not quite right for some realistic conditions. They've been verified for many and what we're trying to do in the continuing research is essentially to truly pinpoint the processes that are responsible for these mismatches.

And when we know those processes well, as part of what typically happens on a, let's say a five-year cycle, CSA Standards and so on eventually reach a consensus on what the best numbers are, and at the moment it looks like we are headed in that direction, the direction of taking into account the actual measured values that we are observing and the mechanisms and making the models better for predicting public dose.

MEMBER TOLGYESI: How these plants could eventually eliminate the -- could they eliminate the tritium like human bodies eliminating by, I don't know, urinating and sweating, et cetera?

DR. THOMPSON: Patsy Thompson. Dr. Mihok can provide answers to that question as well.

DR. MIHOK: Steve Mihok again.

It's essentially the same process that would occur in a person so we heard before that the organically bound tritium in a human body is eliminated much slower than tritium in the form of water. In the case of humans it's a half-life of about 40 days. So half of the organically bound tritium is gone within about 40 days.

In plants it would depend very, very, much on the kind of material you are looking at. And I'm not a botanist so I don't have a lot of these numbers just in my head but you can imagine yourself that when you form a fruit like an apple it's essentially something that is not metabolically active; it's not actually doing anything, it's simply being formed and then it falls off the tree.

And so that organically bound tritium will not cycle the same way as it would, let's say, in the stem of a plant or if the material is actually growing, where a lot of water is actually moving in and out, where air itself is moving into the interstitial spaces of the cells and so on.

So without knowing the numbers off the top of my head in a very general way I can just say that the organically bound tritium will persist in some of the things that are important to us, things that we eat, fruits and berries and so on.

In other things that are much more dynamic, the leafy vegetables that we eat and so on, the numbers might vary tremendously from one week to the next and that literally is exactly what we're finding in the ongoing research from this summer in the experimental garden that we have set up at Pembroke near SRBT Technologies with the University of Ottawa.

These are very dynamic processes and it's important for us to understand when the extreme numbers occur and whether they have any impacts on the dose calculations that we make.

THE CHAIRMAN: Before we leave this I'm not sure I understood exactly -- I'm still looking at Slide 9. Let me tell you how I get concerned about reading it, okay?

So I see a reference number and then I see a cucumber way, way above reference number and I see milk way, way, way above reference number. Conclusion: We're way, way, way above reference number. Conclusion: Is there a health issue? I'm always looking what -- is it safe to eat this cucumber? You know, that's where a reference level -- and I guess there are so many definitions of so many -- we'll get into what is an objective and what is design and a limit, et cetera.

There's so many kind of definitions that require explanation because the only question that really matters to people outside is the impact on health.

DR. THOMPSON: Patsy Thompson, for the record.

If you would like details in terms of how the numbers were calculated, Dr. Kwamena can provide those. But just for perspective on Slide 9 what we called a reference is the reference CSA Standard ratio of .8 and the dose that is provided is 0.001 millisievert per year and that's in comparison to the 1 millisievert per year public dose limit of the CNSC.

The public dose limit represents a safe level of radiation and so the very, very low doses from tritium, regardless of the numbers -- it goes from .001 to .005 -- it’s still considerably below the pubic dose limit.

THE CHAIRMAN: But this public dose is external. Is there a public dose for internal consumption?

DR. THOMPSON: The public dose limit represents an effective dose including the external and internal radiation.

THE CHAIRMAN: But isn’t there a big debate that the internal limits are not estimated properly, are required to be revised, are not equivalent to the external?

DR. THOMPSON: Patsy Thompson, for the record.

Two components to the answer, and perhaps Bertrand Thériault can provide more information if needed.

The -- in the case of tritium, some of the debate and some of the uncertainties that are being raised are relative to the OBT/HTO ratio.

When we started this work after the 2007 Commission meeting, the Commission hearing on relicensing of SRB, a lot of members of the public were raising issues with the environmental persistence of tritium around in Pembroke, raising issues about the radiological, biological effectiveness of tritium. And those are the reasons we undertook that work; to be able to provide information both to the Commission and to the public as to what the state of the science is.

In terms of what is presented on Slide 9 and documented in information documents, the OBT to HTO ratio is higher than what is expected and what is the basis for the CSA Standard, but putting it in a context of very, very low doses there are no health consequences.

In terms of the RBE ratio for tritium there is a debate in terms of the, you know, the dose contribut -- the internal dose contribution and health effects related to tritium. That's why we've undertaken the research project that we have done. But even with a very conservative assessment of RBE, much higher than what is currently being used, we're still talking about microsievert doses to members of the public.

THE CHAIRMAN: So ---

DR. THOMPSON: So the health consequences are negligible but we want to be able to understand the science and be able to provide the best science basis for our regulations.

THE CHAIRMAN: So back to the terminology of reference. So the CSA reference was the original model that estimated what the ratio should be for plant, like cucumber and milk? So they are way, way off. So are you telling me that whole CSA Standard and the reference will have to be changed?

DR. THOMPSON: Patsy Thompson, for the record.

This is essentially what Dr. Mihok explained. The ratio is based on experimental controlled data. The work that we have done, that the French have done, and others in Canada have done, indicate that the OBT to HTO ratio is higher. What we are doing with the additional work, the compilation of the data, we have a draft paper we are working on, there is other literature that points to the same factors. And so at the next review of the CSA Standard, those are some of the science that we will bring forward to get the CSA to consider changing the OBT to HTO ratio. But we need to confirm and understand the basis for those numbers so that if the CSA Standard is changed there’s actually a good scientific basis for changing.

But in the interim what the CNSC staff does is we -- when we receive annual reports, monitoring reports from licensees, for example, we look at public doses using the CSA Standard value but we also use higher

OBT to HTO ratio to be able to provide a sense of what it means.

THE CHAIRMAN: It’s just that it seems so strange that there’s a huge, at least two, order of magnitude between .6, .8 to 45. So I -- you know, the original calculation of the reference really way off, if I understand what your findings are.

DR. THOMPSON: Patsy Thompson, for the record.

And perhaps Dr. Mihok can provide additional information.

THE CHAIRMAN: Go ahead.

DR. THOMPSON: One of the things we can say is that, you know, the drivers for doing experiments and additional scientific work are not always based on where the greatest uncertainties are. Certainly up until now, you know, everybody has been happy with, you know, the value of .6 to .8. In our case, we started looking more carefully at it when members of the public started asking questions and we were always going back to, “Well, the CSA Standard says this” and, you know -- but we had no site-specific information that we could actually tell people, “This is what we are finding in your environment.”

When we started doing that we’ve actually found higher values. Dr. Kwamena just reminded me that what we’ve put on the slide are the highest values that we’ve monitored around the sites. A lot of the other numbers are lower but essentially until we have more information, more data these are the numbers we have and we are working to refine them and have a biological explanation for what we’re finding.

THE CHAIRMAN: Anybody else want to add something?

MEMBER McDILL: Can you give us some other numbers? Like, I think that table would be, what’s left ---

DR. MIHOK: I can do that, Steve Mihok.

MEMBER McDILL: --- so what’s lettuce? Is there lettuce in the garden?

DR. MIHOK: Yeah, a general answer first. The purpose of the slide was to show you the worst case to give you a certain comfort level that even with the highest number ever found, the actual dose is still very small. And so in the end it boils down to more a scientific academic issue that we doctors love to discuss and perhaps not of such great practical significance. But when you take all the data -- and there is an awful lot data now from work done in Canada by others, from work done in France and so on -- and you look at the average number, which is different from the number we expected, that average number is going to fall out somewhere probably around two. So instead of .8 it looks like the real number in actual conditions where tritium is released and regulated around the world might be around two. So it isn't such a huge discrepancy but it's enough to disturb scientists and get us to really understand what is wrong about theory. Why does it work perfectly in an aquarium and it doesn't work perfectly outdoors? And it looks like from the research that is going on that the explanation might be simpler than we think. It's this pulse pattern of release of tritium; sometimes during the daytime when plants are forming organically bound tritium and then very little tritium in the air at night-time when plants are not forming organically bound tritium. And that may explain this odd ratio. And some of our colleagues who have yet to publish their work feel confident that they have actually already explained what is happening and they have better models, and they will simply propose those models to the scientific community through activities like the IAEA MODARIA project, and by consensus I fully expect within a few years that we will change the standards that are actually used whether, you know, for CSA and other purposes or, you know, in the scientific literature.

THE CHAIRMAN: Go ahead.

DR. THOMPSON: Patsy Thompson.

Dr. Kwamena has some values for the vegetables that were monitored and she’ll be able to provide the numbers and the ranges.

DR. KWAMENA: Nana Kwamena, for the record.

So in general the average OBT to HTO ratios for the four sites were between .9 and 11. This is an average value. The emphasis in this study for -- which took place over the years 2008 and 2009 focused on above and below ground fruit, so -- and vegetables. So things like apples, carrots, potatoes, cucumbers. There weren’t any really leafy vegetables as you questioned, lettuce leafs but I can give you some example values. For example a tomato at about -- had an OBT to HTO ratio of about 4. Corn on the cob had an OBT to HTO ratio of about 2. So as you can see the range is not as high as the values that are illustrated on Slide 9.

DR. THOMPSON: And perhaps to add -- Patsy Thompson -- the highest, very highest values that we found were for milk and beef. So it seems that in animals the values may be higher but we have very limited data for animal products.

MEMBER McDILL: The reason I’m asking is, is not because I don’t think that -- I think the table is right. The table is reflecting what you got. But this is a document which the public is going to read and the public around these facilities is sensitized, sensitive, for good reason I think. So what you put here is scientifically correct; the dose is still low but it’s not going to reassure the community around the plant. It will reassure scientists perhaps but not ---

DR. THOMPSON: Well, Patsy -- no, I agree.

We essentially wanted to present the, you know, the extreme values to indicate what -- because people have questioned, well, what does it mean? So with the extreme values we see that the doses are still very, very small. But in terms of providing all of the information and the interpretations in a public document, Dr. Kwamena indicated that the last information document on this work is -- the English version is almost final. It’s been sent to translation so it should be published shortly on our CNSC website.

THE CHAIRMAN: Look, I think the Commission message is we like science. We, in fact, we ask you to go ahead and do all those studies. We want the facts. But when you present the findings. You've got to bring it down to the public conclusion. And what's missing in here is the conclusion we just heard, that regardless of those high numbers, the dosage is low and therefore, there's no impact and you would eat those apples and drink this milk. That's what missing here. It's the conclusion about what is the meaning of those high numbers.

You will have, I understand, to modify the actual CSA standard because you're way -- there's significant differences that you're finding. And if you're right, you will have to propose and I assume it will be accepted.

But the health impact on the public, the bottom line is something that whenever we issue such tables, I think there should be a statement about what does it all mean. Which you said publicly, but it's not in the written documents.

DR. THOMPSON: Okay. Patsy Thompson.

Your point is noted. On slide 9, we had put the statements that doses from OBT and HTO are low and represent a small fraction of the public dose limit, but I guess they didn't stand out enough. So ---

THE CHAIRMAN: Because of the reference. You know, like the reference to me and to the public is this is what is the original accepted kind of level that anything above it is kind of breaking some sort of regulatory issue. That's the way it's normally read. Dr. Barriault?

MEMBER BARRIAULT: Just briefly, Mr. Chairman.

The concern that I have, and what we've

been hearing from interveners, is that the levels are going up in the atmosphere. And this supports this. What this is telling us, really, is that the standards that have been established are too low because now they're higher. Now, were they okay at the beginning, I don't know. And I've got no proof that they were. But that's what we're hearing, that the standards now are going up, they're too low. So we increase in this year, increase again in ten years, we contaminate the planet, what's going on here? I guess -- and that's the explanation that I'd like to have, if I may.

DR. THOMPSON: Patsy Thompson for the record. I've been with the CNSC and the AECB long enough to know that there's a lot of public concerns about radiological releases to the environment and what it means. What we have seen, though, over the -- you know, I've been here since 1993, so over almost 20 years -- the actual releases from nuclear facilities have gone down. The CNSC has tightly regulated facilities, the operators are responsible, they have put in place ALARA programs, they've brought improvements, some have been pushed into making improvements because of the Commission's actions and the science and the work that the CNSC staff is doing.

MEMBER BARRIAULT: I'm not questioning ---

DR. THOMPSON: And so, the bottom line is releases have gone down, the actual levels of tritium and other radionuclides in the environment have gone down, but are there uncertainties in science? Yes. Are there improvements and should we continue? Yes. Will standards change over time? Likely. But will they change to the point that, you know, what we consider safe now will not be safe later? I don't believe so.

What we're doing now is refining our understanding, but as you can see, even with a very, very high ratio, the consequences on those are still at the microsievert level.

THE CHAIRMAN: Okay. We're going to move to Monsieur Harvey.

MEMBER HARVEY: Merci, Monsieur le Président.

Je voudrais d'abord féliciter le personnel pour les efforts et la ténacité à poursuivre les études dans un domaine qui est important même si les conclusions et les résultats qu'on a semblent très faibles et que les effets sur l'environnement et sur le public semblent aussi très faibles. Mais c'est important, je pense, de continuer à raffiner ne serait-ce que pour, on l'a vu tantôt, nous faire mieux comprendre, puis faire aussi mieux comprendre le public de tout ce qui entoure le tritium.

Ceci étant dit, j'ai juste quelques petites questions. À la slide -- page numéro 11, vous parlez d'améliorer l'efficacité des données, des échantillons. Juste dans cette page, on peut voir que pour Darlington et Pickering, entre l'“active” et le “passive sampling”, le “passive” est plus haut. Il est à peu près deux fois plus haut à Pickering et à Darlington et c'est plus bas à Bruce Power. Est-ce qu'il y a une explication à ça? Ça semble un peu -- ça ne sera pas facile d'avoir des échantillons continus ou une étude continue si on a des phénomènes comme ça.

DR. THOMPSON: Patsy Thompson. Il y a un des rapports qui fait partie de la série des info-documents qu'on a produits qui fait la comparaison des données obtenues avec les deux types d'échantillonneurs puis aussi la comparaison avec les données dans l'air, les données dans l'eau, dans les plantes pour voir si ces données-là se tiennent.

Cette information-là, en prenant compte des données qui sont présentées sur ce tableau-là, mais d'autres aussi, montraient que en général, si on prend toutes les données ensemble, les échantillonneurs passifs représentent des données conservatrices. Donc les valeurs sont plus élevées et sont -- protègent le public.

Par contre, quand on regarde, comme vous avez fait, les différences entre Darlington, Pickering, puis Bruce, ce qu'on voit -- puis c'est ce que l'industrie voit aussi -- c'est qu'en utilisant les mêmes -- le même type d'échantillonneur, on peut avoir des données différentes. Puis un travail que l'industrie a commencé, c'est de regarder les facteurs qui sont utilisés pour calibrer les échantillonneurs. Ils travaillent avec leurs consultants pour mieux comprendre et développer une norme pour calibrer ces échantillonneurs-là.

Donc ce travail-là est en train d'être fait par l'industrie. Et de notre côté, avec le travail qu'on a fait l'été passé, on a commencé à regarder aussi la différence dans les deux types d'échantillonneurs pour voir quels facteurs on doit tenir en compte pour mieux calibrer les échantillonneurs.

Puis aussi, comme Dr. Kwamena a mentionné plus tôt, on a un projet qui va commencer avec l'IRSN en France. Il y a une campagne de terrain qui est prévue pour le mois de juin-juillet 2013 où on va utiliser les échantillonneurs canadiens actifs, le modèle français. Et avec une campagne où les deux organisations vont faire l'échantillonnage en même temps, on va pouvoir vraiment comparer les deux types d'échantillonneurs pour mieux comprendre le comportement du tritium à l'intérieur des cartouches.

MEMBER HARVEY: Vous trouvez pas ça surprenant qu'il y a une telle différence entre Bruce et les deux autres; que ce soit l'inverse, dans le fond? Que les échantillonneurs réagissent de façon complètement différente? Parce que si je regarde à Bruce, c'est continu, c'est toujours plus faible dans le passif, et ailleurs, c'est toujours plus haut dans le passif. Est-ce que simplement régler l'échantillonneur fait une telle différence?

DR. THOMPSON: Patsy Thompson. L'information que j'ai de l'industrie et du projet qu'ils ont avec leurs consultants, c'est que il y a beaucoup de différences dans la façon dont les échantillonneurs sont mis en place, sont entretenus et sont calibrés et ça peut expliquer ces différences-là.

Puis l'industrie est en train de standardiser ces pratiques-là pour s'assurer qu'un échantillon qui est pris à un endroit va être représentatif et pourrait être -- dans le fond, s'assurer qu'on a les mêmes valeurs, peu importe qui les mesurent.

De notre côté, comme vous savez, on a commencé un programme d'échantillonnage indépendant. On ne fait pas encore d'échantillonnage de l'air, mais c'est quelque chose qu'on est en train de s'équiper au laboratoire et de s'assurer aussi que, la journée où on va commencer à le faire, on va le faire de façon appropriée. Le travail l'été prochain avec l'IRSN est une première étape dans ce sens-là.

THE CHAIRMAN: Again, you know, in a slide like this, it would be useful to know whether the variation is important. So what is the limit? What is the limit and if those numbers are way, way, way below the regulatory limit, so is the variation that important? So what is the becquerel per metre cube that we insist on? Anybody?

DR. THOMPSON: Patsy Thompson. I don't have that exact value but you will recall from the Darlington hearing, for example, and other hearings on NPPs where the total dose to the public is a few microsieverts per year and error is only one of the components of that dose. And so those levels are not a health concern. That’s why we’ve put it as a research initiative and ---

THE CHAIRMAN: No, I know, but ---

DR. THOMPSON: --- we’re satisfied ---

THE CHAIRMAN: --- I mean -- but even the valuation -- even the difference between active and passive, if we -- it could be viewed as academic if those limits have so much low percentage of the actual regulatory limit. You see what I’m saying here?

DR. THOMPSON: That’s correct.

THE CHAIRMAN: It’s not the time here now for us to get into this analysis, but it’s always -- in every one of those slides, I always -- I plead for putting what is the regulatory limit and say what you just said. There is -- this is a research study, but even if they use a valuation between active and passive, there is no impact on the public; particularly now that we know in certain facilities that error in measurement became a real big public issue. We need this explanation, the bottom-line qualification on some of those slides.

DR. THOMPSON: Point noted. We will, in the future, put more context information on our slides.

THE CHAIRMAN: Monsieur Harvey? Barriault?

MEMBER BARRIAULT: Thank you, Mr. Chair. Merci Monsieur Président.

My question is on the same slide and I guess the question and perhaps you’ve explained it, but why are the levels so much higher at Pickering compared to Darlington? Is it because of the sampling methods that have been established or are they contaminating more with tritium? What’s happening here?

DR. THOMPSON: Patsy Thompson.

We don’t have the -- this is essentially representative of the Environmental Monitoring Program of each facility. One of the things is the -- you know, the -- probably the location of the monitors in relation to the source, but I -- we don't have that information with us.

MEMBER BARRIAULT: Okay. I think my next question really is on slide 15; basically what it says is that the current Canadian drinking water guidelines for 7,000 becquerels per litre is safe and explain why. Do we have the same amount of data for organically bound tritium? Is there a standard for that I guess is what I'm asking?

DR. THOMPSON: Patsy Thompson.

I'll ask Bertrand Theriault to explain the -- how tritium behaves in the human body and what components of tritium taken with water ---

MEMBER BARRIAULT: Water.

DR. THOMPSON: --- how it will contribute to the dose, but one point I'd like to make is the 7,000 becquerels per litre is based on the assumption that someone drinks 2 litres a day every day of the year ---

MEMBER BARRIAULT: Drinks a lot of water.

DR. THOMPSON: --- and it's part 1 millisievert -- the public dose limit is 1 millisievert, so it does represent a safe standard, but I'll ask Monsieur Theriault to provide the explanation.

MEMBER BARRIAULT: Thank you.

MR. THERIAULT: Thank you. Bertrand Theriault, for the record.

Yes, so as an example of the contribution of organically bound tritium compared to tritiated water to public dose, I could take the example, for example, of the 2011 public dose at the Darlington site which was 0.6 microsieverts and about 42 per cent of that dose results from -- resulted from tritiated water, but only 2 per cent from organically bound tritium. So I -- and the .6 microsieverts per year of course is quite low. For example, to put it in context, a dental x-ray once film will give about 5 microsieverts.

MEMBER BARRIAULT: Thank you. I'd like to finish off by saying I really appreciate the work that's being done on this. I think it's wonderful and I'm anxious to see the outcome of the studies review, but they're coming. I think it will help us really better understand what is going on with tritium. Thank you.

Thank you, Mr. Chair.

THE CHAIRMAN: Thank you.

Dr. McDill?

MEMBER McDILL: Thank you. I think we got the one -- I was going to ask for some more data for 9, so I think we've got that page 9; we've got that done now.

In terms of -- on page 10 or slide 10, one of the comments that you made, Dr. Thompson, was that -- or maybe it was next door, but one of the comments that was made was that the CNSC now has the capability to do some of these measurements itself.

Since there is a feeling sometimes in our intervenors that -- is a request for third party; there's frequently a request for a third party. Do you expect that you will eventually take on all of this research and if so, what are the ramifications in terms of the public's need for what they usually say is, you know, independent third party research?

DR. THOMPSON: What I would say is that as early as, you know, I think around probably '95-'96, members of the public used to come to the Commission and ask for the AECB or the CNSC to carry out our own environmental monitoring around nuclear facilities and our response at the time used to be we review and approve licensee monitoring programs, we do inspections and audits and review annual reports and we're happy with the quality of the work being done.

There has continued to be that type of request and the CNSC, about three years ago now, decided to invest a lot of resources into modernizing and upgrading the CNSC lab in terms of equipment, but also in terms of -- I wouldn't say modernizing staff, but bringing in expert scientific staff to the lab. Dr. Nadereh sitting behind me is one of the new -- well, not so new anymore, but new recruits to the CNSC.

The CNSC has done always measurements of tritiated water, HTO, and samples when we were provided samples. The work that Dr. St-Amant has been doing has given us the capabilities of measuring OBT.

We have also made a commitment to implement an independent monitoring program around nuclear facilities. We have been, last year and this fiscal year, doing a pilot project to see where and what types of samples we should be collecting and we have made a commitment that next fall we will be in a position to implement fully that independent monitoring program.

Along with the monitoring program comes a commitment to put information on our website and so we have done benchmarking with other regulators in other countries to see what type of information they put on their website, how to put that information so that it's useful for the public.

You will recall that some non-government organizations ask for detailed data, others would like to have, you know, summaries and what the data means, so we're trying to meet the needs of everybody.

We are working with our communications and information management group to put this forward.

THE CHAIRMAN: I'd like to piggy back on this. In a lot of the work that's being done, you know, your contract, for example, University of Ottawa, and I know that you've been publishing; I saw the two publication. I just don't think there's enough publication. I don't understand why you don't insist that every time University of Ottawa does anything -- university academic et cetera -- automatically at the end of the -- once you get paid, this would be peer review research outside.

I think there's enough material here for all kind of papers. Why is there no more? You've done six studies. I thought it could be a lot more kind of a discussion on some of these things we've just been talking about.

DR. THOMPSON: Perhaps -- Patsy Thompson -- to sort of provide an overview, some of the work that was done, we're essentially reviewing practices. For example, there's one report on mitigation measures for tritium processing facilities. So some of that work is not really conducive to publication in the open scientific literature.

The work that we were able to publish -- we have, as you say, two papers that have been done. A third paper is under preparation with the OBT in the -- around four nuclear facilities and different environmental compartments. One of the issues or problems with the University of Ottawa is that when -- the first contracts that were given to the University of Ottawa, there was a lot of information, a lot of data, a lot of samples to analyze, and it was difficult to get the deliverables that we had contracted them for. And at some point we were able to get all of the data so that we could analyze it.

There were essentially difficulties in resource availability and other issues. We have other research contracts, with McMaster University for example, that -- where the work is being done, is being published in the open scientific literature. The same thing with the research project being done at the AECL Chalk River animal care facility funded by IRSN and ourselves and COG where all of the work is being done and will be published in the open scientific literature. So this is sort of a an oddity in terms of what we normally do for research and support contracts.

And perhaps to add, one of the things that we wanted to do as well, there was a lot of challenges in terms of the CNSC’s scientific credibility. And one of the benefits of actively interpreting and publishing the information is also to establish the staff's scientific credibility.

THE CHAIRMAN: Oh, absolutely. It's not ideal at all. It's both. And I think there's a lot of fertile ground for research here that should -- there should be a flurry of papers coming out under the CNSC's sponsorship, I would argue.

DR. THOMPSON: Patsy Thompson.

I agree, and we are working with -- I'm working with my staff to sort of establish a realistic schedule for publishing work because as you know, we have other day jobs. So it's something that would -- that we want to do but we'll plan it and do the high-priority papers first.

THE CHAIRMAN: Okay. Dr. McDill.

MEMBER McDILL: I think it's a matter of making sure that staff is regarded as an independent entity. The lab is regarded in particular as an independent entity from, say, industry.

DR. THOMPSON: Patsy Thompson.

I know there is a lot of perception that the CNSC and industry are one and the same. I've always disagreed with that comment and -- but I know it's a perception. And the perception has often been because we review and approve programs. And the perception of the public is we always approve everything. I think what they don’t see in the background is sometimes it will take weeks and months and often sometimes longer before we actually get an acceptable product.

And so -- but that back and forth and that discussion and the obligation of meeting our requirements is not seen when we come to the Commission; usually those issues have been resolved.

In terms of the -- you know, the perception of independence, certainly we take samples where we want, when we want. Also the -- there’s a plan in place to get the CNSC laboratory accredited by a third party. This will ensure the quality of the work being done and the credibility of the data coming out of the lab.

MEMBER McDILL: Thank you.

On Slide 14, if memory serves, California sits in there with a kind of recommendation around 20. Why was it not included?

DR. THOMPSON: The California recommendation is 14.5. It’s an oversight. It would be -- the California number is not a drinking water standard. It’s a -- it’s an objective to reach for. So it’s 14.5, so just slightly above 10.

MEMBER McDILL: Somebody’s 20. Who’s 20?

DR. THOMPSON: Patsy Thompson.

Twenty (20) is the recommendation from the Ontario Advisory Committee.

MEMBER McDILL: Those would be good things to have on here because I think it completes the picture, particularly when the title given as a -- you know, I like -- the screening parameter clearly looks different than a quality drinking -- drinking water quality standards. So I think it -- for the public it shows when the engineers come and say, well so-and-so says 20. It’s -- if the picture has already said this is a suggested action level or something as opposed to a standard, I think it’s helpful.

So 14.5 is California. Thank you.

I’m going to go to page 15 and the drinking of two litres of water a day for one year. I understand the annual dose is .1 millisieverts per annum. Anyone who has a been a parent -- forgive me -- of a teenage boy will tell you two litres of milk in one day is not an issue. You might very easily go to 10 litres a day. One litre can be downed in about 15 seconds at the side of the fridge.

So you know, parents in these communities who may see two litres as not very much; an athlete could well go over that, a soldier certainly does. So comments?

I realize you have to multiply it by 10 to get to -- to 1 millisievert per annum.

DR. THOMPSON: Patsy Thompson, for the record.

Essentially the World Health Organization recommendation of basing drinking water standards on 0.1 millisievert per year is to leave room for other exposure pathways. And thereby ensuring that 1 millisievert per year is not exceeded. And that’s in line with the ICRP recommendations.

One of the things that you mentioned is in terms of milk and essentially produce from around NPPs. But taking into consideration actual values in the environment the -- you know, the doses are, you know, less than 10 microsieverts around all -- most if not all of our nuclear facilities, in terms of tritium exposures. And so even drinking very large amounts of liquids, including milk, would not be a health issue. But recognizing as well that drinking water standards are not something you aim for. And certainly, you know, the CNSC regulation for facilities would, you know, prevent any of these values ever being reached under normal operating conditions.

MEMBER McDILL: If a member of the public were to look at the milk on -- with the 45, the ratio OBT/HTO 45 and then the two litres on the .1, where do you think the average member of the public is going to land when they read that? Are they going to think there's a risk, you know, from excessive milk consumption? Probably there's no vegetables, so we don't have to worry about vegetables. But I think that 45 and this two litres of milk is going to make -- concern some people. I think we need to have a good single paragraph kind of explanation.

DR. THOMPSON: Patsy Thompson.

What I'm taking from your comments and other Commission Members' comments, is when we finalize our information documents -- document on this data, we have to make sure that we have sections that not only present, you know, the scientific merit of the work and the OBT/HTO ratios but we actually very carefully describe what it means in terms of doses to members of the public around the four nuclear facilities that we have done the work.

MEMBER McDILL: Thank you.

That's all. Mr. Chair.

THE CHAIRMAN: Okay. Thank you. Ms. Velshi.

MEMBER VELSHI: Thank you, Mr. President.

This is probably a very stupid question. When one inhales tritium HTO does it change to OBT within the body? I mean, does the metabolism lend itself to that?

DR. THOMPSON: Patsy Thompson, for the record. Bertrand Theriault can best answer your question.

MR. THERIAULT: Thank you. Yes, the answer is yes. A small fraction of the inhaled or ingested treated water is converted to organically bound tritium, generally around 3 percent. And that is taken into account in the dose, when you calculate dose from HTO.

MEMBER VELSHI: Okay. But there is no question that that ratio within the body is suspect like we're seeing in the air, in the environment? I'm thinking from, say, an occupational dose perspective where we're assuming, you know, the biological -- I mean the effective half-life of 10 days, and should it really be higher than that?

MR. THERIAULT: Yes. No, that is not an issue. In fact the ICRP model for tritiated water intakes recommends a fraction of 3 percent of tritium becoming OBT but actual studies of workers who were exposed to tritiated water found that it was less than that, it was generally about .5 percent. So the 3 percent is conservative.

MEMBER VELSHI: Thank you. So Slide 15 again, please, tritium in groundwater, where you're proposing this design requirement for, I think it is just for NEW Class 1, nuclear facilities, and where the basis for all the regulation is science, I heard a lot more here that the drive was because it's technologically and economically achievable, and I'm wondering how do you balance that with the drinking water, and I know we've got a standard, but is there perhaps a room for an operating requirement or a design requirement for drinking water so that where, you know, you've got groundwater at 100 but the drinking water just has a standard right now of 7,000 and there is no design objective or an operating, you know, objective or something of that front.

So two parts to the question; one is why not just leave it at science and say, "Hey, you know, even 7000 is fine for groundwater" as opposed to be driven by technologically and economically achievable. And the second part of the question then is, if we are going with this, then why not have something similar for drinking water?

DR. THOMPSON: Patsy Thompson, for the record.

Essentially, the recommendation came from an analysis of level of tritium in water that could be used for drinking water purposes. We did review the data for all the drinking water supply plants around all the facilities that the CNSC regulates, and we also reviewed the data from groundwater where there is a potential end use as a drinking water. What we found is that around the nuclear facilities, when the releases -- a tritium release to water, the levels in drinking water are generally below 18 becquerels per litre and so the current CNSC regulatory regime effectively protected drinking water supply plants at well below 7,000, the values are below 18 generally.

And so, from our perspective, when we looked at the Ontario Advisory Committee recommendation of 10 becquerels per litre, that's not where we saw the issue as being because what we were -- what the CNSC does in terms of regulation, effectively protects groundwater resources.

What we did look at was, because tritium released through the atmosphere also ends up being entrained to the ground, that there were areas where the groundwater could be contaminated to higher levels than the Advisory Committee recommendations. The Advisory Committee recommendations of 20 becquerels per litre was based on a lifetime risk of 1 in a -- the lifetime cancer risk of 1 in a million.

The .1 millisieverts year, 7,000 becquerels per litre, is significantly higher than 1 in a million cancer risk lifetime and so we try to look at the intent and the public concern around 7,000 becquerels per litre and the seemingly higher cancer risk that we were accepting for radiation compared to other chemicals.

We also took into consideration not just the *Nuclear Safety and Control Act* but also the *Canadian Environmental Protection Act* that states that, as a national policy, we should be aiming at pollution prevention and the best environmental quality in terms of regulation. So taking that into consideration, looking at what could be achievable around nuclear facilities in terms of groundwater protection we felt that 100 becquerels per litre met both the objective of a good environmental standard, the objectives of pollution prevention enacted in the *Canadian Environmental Protection Act*, and also corresponded to a very low cancer risk.

So we thought that that met the public objectives of having a low cancer risk associated with radionuclide in the environment was achievable and was something that could be seen as an improvement over the 7,000 becquerels per litre, but it's also something over which the CNSC has control over. We don't have control over the National Drinking Water Guidelines or the Provincial Drinking Water Standards but we have control over design objectives and practices at nuclear facilities.

MEMBER VELSHI: And it really is the latter

I’m getting at. I don’t have as long a history as my colleagues have around this table on the public concerns around tritium but I certainly, in the last year, have heard enough on that to say that you know the 7,000 becquerels per litre drinking water standard, but is there perhaps not room for an operating guideline? And I know that the facilities are well within that but that, you know, that just happened it’s not as -- it’s not that happening; I mean they have ALARA programs, I’m just wondering is there not, just for the very same reasons you’ve told me about groundwater that has an end use of becoming drinking water, that we maybe have room for introducing some kind of a guideline around drinking water, not the standard? Does that make sense?

DR. THOMPSON: Patsy Thompson, for the record.

Yes, it does. At the time we did the review it was for the purpose of in part making recommendations to the Ontario Ministry of the Environment who will also be making recommendations to the Minister. Because the Minister of the Environment in Ontario gets advice from their Advisory Committee, advice from their staff and then at some point the process calls for a public review of whatever decision or recommendation the Minister would make. And we felt that, you know, for drinking water supply plants, it wasn’t an issue, but your point is taken.

We have action levels in place that are based on the fraction of public dose limit. That’s perhaps something that the CNSC staff can look at in terms of what in our regulatory framework could be put in place to provide the same level of assurance that the CNSC would take action if something out of -- would result in a level of drinking water of above 100 becquerels per litre. It’s something that -- it certainly can be done and looked at.

MEMBER VELSHI: And similarly, is there a design objective, say, for new nuclear facilities for drinking water?

DR. THOMPSON: Patsy Thompson, for the record.

My recollection is that the CNSC regulatory document for the design of new nuclear power reactors has a design objective of 10 microsieverts per year for members of the public that would be from all pathways. I don’t think there’s a actual design objective for drinking water per se because we need to control all exposure pathways.

MEMBER VELSHI: Yeah, I know, it’s just that we’ve put one in for effluent, for groundwater, so why wouldn’t it be for drinking water. Are we proposing one for groundwater?

DR. THOMPSON: Patsy Thompson, for the record.

We're proposing one for tritium because of the tritium behaves differently from other radionuclides in terms of being entrained with rain and snow, so we didn't feel there was a need to put a similar objective for other radionuclides.

MEMBER VELSHI: Move to another one, for each of the areas of research, whether it is the passive/active sampling or whether it's OBT/HTO or RBE or whatever, you've said even in the worst case in each of these, public doses were well within the limit. Have you looked at, if you combined all of these, because it says, "Yeah, well okay, for this one I'm still, you know, from .01 percent to .05, but if I edit this and then this were to happen and this were to happen, but maybe collectively I'm much closer to those limit." Has that been put together?

DR. THOMPSON: Patsy Thompson, for the record.

We did present this to the Commission, I believe in June 2010, where we included doses to an infant, for example, assuming consumption of soil with a high OBT level. We looked at the influence of the RBE

Factor, so my recollection is that was done, but it's certainly something that we can bring forward and see what the built-in uncertainties would -- would result in, but it would still be in the microsievert range, so it's -- the safety margin between, you know, these built-in uncertainties and the public dose limit is still quite -- quite important.

MEMBER VELSHI: And my last question, where we have results from active and passive samples, what -- what gets reported as the official result?

DR. THOMPSON: Patsy Thompson, for the record.

My colleagues are telling me that both get reported, the highest value is used for the -- for the public dose.

MEMBER VELSHI: Thank you.

THE CHAIRMAN: Anybody?

Let's go back to -- first of all I think I've asked this question before and it may even be posted in our web, what is the natural concentration of tritium in groundwater across Canada or across the world? What's the range; anybody knows?

MR. RINKER: Mike Rinker, for the record.

It is -- it's a little bit variable, but it's in the range of 2 to 5 becquerels per litre.

THE CHAIRMAN: Okay, I think somewhere along the line, I should remember, it exists; it's in there. We're drinking it all the time. It's not zero, okay, because I've heard that many times, that without nuclear it would be zero; right?

Secondly, I still come back to the difference between us as regulator and the health community. I'm always preoccupied with the health community and I still go back to your Slide 14 and always -- it's been a struggle for me to always understand the different definition of what we mean by this, the word, "standards"; even the word, "standard," here that we're mixing all kind of, I assume, health standard, operating standard, objectives, design standard, you know, there's action level. There is now a kind of -- I'm trying to understand, for example, when you talk about objective design, design objective, they are 100 becquerels per litre, is that the same thing as the European? Is it the trigger for regulatory concern or is it something else?

MR. RINKER: Mike Rinker, for the record.

The 100 becquerels per litre in Europe is set so that if you did find tritium that exceeded 100 becquerels per litre there may be cause to investigate because there could be other sources of contamination, so it's a -- it's a monitoring yellow flag, whereas ---

THE CHAIRMAN: Okay, so then let's assume it is tritium; so what is their health limit?

MR. RINKER: Their health limit would still remain at 7,000 becquerels per litre. They're not concerned about tritium at 100 becquerels per litre. What they're concerned about much in the U.S. is tritium may be the leading edge of a plume with more dangerous things following it. So, yes, tritium is above 100 becquerels per litre. They do not have concerns with the health -- for health with that. What they have concern is, perhaps there's strontium coming behind it or there's some other radioisotope that could be more dangerous.

THE CHAIRMAN: But do they, in their health records, do they have the WHO number that -- the 10,000 or the 7,000 as the health limit just like Health Canada? Do they have a health limit?

MR. RINKER: Mike Rinker, for the record.

It's expressed in terms of millisieverts and it's .1 millisievert.

THE CHAIRMAN: So, okay. That never comes up in any of the -- in any of the thing when we compare kind of a thing, it's -- so we always use the European 100 becquerels per litre right at then the equivalent of the 7,000 that Health Canada is using.

MR. RINKER: But if -- if I could, the second half of that answer is in Europe that 100 becquerels per litre is used as a monitoring guide where here we're saying it's a design objective, where we're saying, if you're going to build a new plant, build it in a way that you -- or design it in a way that you would not exceed that.

THE CHAIRMAN: I know, but I'm just saying, my point here is that in my mind, I differentiate between health and a regulatory limit. Somebody correct me if I'm saying something wrong here. All the -- anything below the 7,000 or the 10,000 is something else. It's not a health limit and I think, what I'm trying to understand now is, is there anybody in the medical side of radiation that are now thinking about reviewing the proper -- whether that limit is proper? In other words, is the World Health Organization, Health Canada, all of those health authorities are rethinking that level? Because it was very interesting you said that the drinking water analysis is based on one in a million. The 7,000 becquerels is one in -- it's not one in a million I guess.

DR. THOMPSON: No, it's, we -- we can have that number, it's a few per hundred thousand. So it's considerably higher. I -- Patsy Thompson for the record.

I just wanted to indicate that we have as, in a series of the information documents, Info 0766, that presents all the basis for the drinking -- the standards and guidelines for drinking, for tritium in drinking water. It presents all the numbers for the countries that have numbers for tritium and how they're used, whether they're legally enforceable or not. The information is in that document. Apparently not a lot of people have actually bothered to look at what 100 becquerels per litre means. We've said it on a number of occasions. It's written in this document, but people keep referring to it as a -- as a standard.

THE CHAIRMAN: Well, you're -- you see -- okay. But you see, here's my point. I know; I actually read this document.

DR. THOMPSON: Oh, I know you did.

THE CHAIRMAN: And, but your title of this is Safety in Drinking Water Standards and to a lot of people, that's where Dr. McDill asked about the 14.5, how many times did we hear that 14.5 was the drinking water standard for California? It's in the same slide that says standards in plural, so everybody is looking at these as standards and that's really where the confusion comes in. We got to be absolutely clear what is it we are talking about and whether we will tinker with the health standard. I don't think we as regulators here are subject to the medical community telling us what the health standard is;

right? Anything below that, we're applying the ALARA principle and the precautionary principle to try to come up with a standard the makes sense using the precautionary principle. That's the way I try to understand what is it we're trying to do.

DR. THOMPSON: You're correct in describing what we're trying to do. We're looking at, essentially, pollution prevention principles, ALARA principles to put in place regulatory controls on facilities because it's the right thing to do.

THE CHAIRMAN: So I'm coming back to my question to the medical community and they actually (inaudible) why would they not consider revising the 7,000 if you are going to be more conservative about one in whatever the number is cancer probabilities?

DR. THOMPSON: Patsy Thompson, for the record.

It's a scientific debate, a policy debate that has been going on for a long, long time. Essentially, the ICRP and the radiation protection community started looking at protecting workers, initially, and then members of the public later on, from the effects of radiation. The ICRP has both the ability and they do look at the science, but they also look at the policy implications of the standards they put in place, and they combine both the science and the policy in making their recommendations for radiation protection limits for workers and members of the public, recognizing that the epidemiological evidence is for increases in cancer risk at -- with the data we have at doses about 100 millisieverts.

In terms of the chemical carcinogen community, it’s a different scientific community. It was developed more recently and the standard of one in a million lifetime cancer risk came from debates in the U.S. in relation to pesticides and organic contaminants -- and it even went to court at one point -- and the standard of one in a million has become a practice where the risk assessments are done on the basis of one in a million, and that’s the science, and then it’s somebody else’s job to take the science and make decisions based on economic and technological feasibility.

For example, in Canada for the drinking water standards for radionuclides, they’re all derived on the basis of .1 millisievert because that’s what ICRP WHO does for radionuclides.

For chemicals they look at the risk. They essentially derive a number based on one in a million lifetime cancer risk, and then they do surveys of drinking water supply plants in Canada. Looking at drinking water quality for, you know, whatever chemical they're looking at, and then they will look at, you know, what the range of contamination is, or levels are in relation to that one in a million level. They will look at, you know, if the majority of drinking water supply plants are below then they will set the standard at one in a million. If a lot of drinking water supply plants in Canada are above, they will look at the cost of treating, treatability, and they will adjust the drinking water standard or guideline to minimize the cancer risk, but also make it, you know, cost effective for communities to provide good quality drinking water.

And so it's two different frameworks that have arisen separately and it's very difficult to get the two communities to talk and agree on things, and that's the difference. But when I joined the AECB I was involved in a Federal-Provincial working group looking at this issue, because the advisory committee in Ontario had made a recommendation to decrease the standard and it was very hard.

I come from the chemical community, so I had a hard time adjusting to the radiation protection community, and vice versa. And after 23 versions of a report, we agreed that we would document what was being done. But it was very difficult to get agreement on the different approach.

But what we did document is that even though the standards are different, the actual water quality that people drink represents the same level of risk. So it’s a very, very low risk because there are no levels of tritium in drinking water that are near 7,000 becquerels per litre, and it’s the same for other radionuclides. And so the actual concentrations represent, you know, a very little health risk, regardless of the chemical, but the actual standard is higher.

So essentially for chemicals they set, you know, a number very low, and with economic analysis they adjust it upwards. With radiation protection you set the level, that .1 millisievert and then with ALARA you adjust your practices going down, and so it’s two different approaches. But the bottom line is that in all cases the public is protected.

THE CHAIRMAN: Actually, I like you’re -- the way of explaining it. I think it was a critical explanation about the two methodologies and in the same kind of process where the driver is the impact of health on the public, at the end of the day.

So all I’m trying to understand is whether the health standard is going to be changed internationally, by Health Canada, et cetera? Because if not we have to operate within that framework and then deal with whatever we think is an operating standard, or triggering standard, or regulatory standard; however you want to define it. But it's different than the health standard.

DR. THOMPSON: So the World Health Organization and Health Canada have both decided to keep the standard approach for radionuclides using .1 millisievert per year. My understanding from the last two or three years is that there's no intention to change that framework because it has worked and it has effectively protected the public. And that's why we're going with the recommendations we've made, it is to actually look at something that the CNSC can do with how we regulate facilities and how we look at designing and operation.

THE CHAIRMAN: Okay, thank you for that.

Anybody has a final, final question? Well, when are you going to come back to us for another round of this? When would be -- make sense to come back with some results?

DR. THOMPSON: Patsy Thompson, for the record.

Could I suggest that the work being done on the mice is going to run until 2015 and so I think it would make sense probably around 2016 to come back. So we would have the results of the environmental stuff, but also the health studies.

MEMBER McDILL: But if there's something neat in the meantime ---

THE CHAIRMAN: Oh, yeah.

DR. THOMPSON: Yeah, we would. And also, we do put information on an ongoing basis on our CNSC website and so the papers get posted, our presentations. Anything that we would find that would question how the CNSC operates we would bring to the attention of the Commission.

THE CHAIRMAN: Thank you. Thank you very much. We will take -- 11:15; we'll be back here at 11:15.

--- Upon recessing at 11:02 a.m.

--- Upon resuming at 11:15 a.m.

THE CHAIRMAN: Okay. We're back and the next item on the agenda is an update on the Regulatory Document RD-336 for *Accounting and Reporting of Nuclear Material*. I understand that Mr. Awad will be making the presentation. Please proceed.

7.3 Update on Regulatory Document RD-336, *Accounting And Reporting of Nuclear Material*

12-M57 / 12-57.A

Oral Presentation by

CNSC staff

MR. AWAD: Bonjour, Monsieur le président, Mesdames et Messieurs les commissaires.

My name is Raoul Awad; I am the Director General of the Directorate of Security and Safeguards. With me today, Mrs. Karen Owen-Whitred, Director of International Safeguards Division; and Mr. Wayne Gibson, our Senior Safeguard Accountancy Advisor; and we are supported by Mr. Hugh Robertson, the Director General of Information Management Technology Directorate and Mrs. Brenda Brulotte, Director of Management Office Division to answer any related IT questions.

This presentation follow -- is the follow-up on the approval of Regulatory Document RD-336, *Accounting and Reporting of Nuclear Material*, which was granted by the Commission on January 13, 2010. In addition to proving an update on RD-336, we are also providing information on the project aimed to enabling licensees to report safeguard accountancy information to the CNSC in electronic form, which referred to eSubmission project.

I will now pass the microphone to Mrs. Owen-Witred to deliver the presentation.

MS. OWEN-WITRED: Thank you.

Good morning, Mr. President, Members of the Commission. For the record my name is Karen Owen-Witred.

In order to provide context for what follows, this presentation will begin with a brief overview of the safeguard system in general and basic safeguards accounting principles specifically. This will be followed by a status update on the implementation of Regulatory Document RD-336, *Accounting and Reporting of Nuclear Materials*. Finally, the presentation will describe the eSubmissions project as requested by the Commission during the meeting of January 13, 2010.

As laid out in article 3 (b) of the *Nuclear Safety and Control Act*, one of the purposes of the Commission is to implement measures related to the non-proliferation of nuclear weapons. This includes the implementation of the Safeguard System. Through the NSCA, the CNSC was designated by the Government of Canada to act as the Canadian regulatory authority in the area of safeguards.

But, what is the Safeguard System? In brief, safeguard measures are aimed at keeping track of nuclear material. The aim is to ensure that this material is used only for peaceful purposes and is not diverted for use in a nuclear weapon.

I would also just note here that in safeguards terminology, “nuclear materials” refers only to uranium, plutonium, and thorium. In other words, the three materials that can be used as fuel for a nuclear weapon.

The Safeguard System is administered worldwide by the International Atomic Energy Agency, or IAEA. IAEA personnel then work with the designated authorities in each member state to implement the safeguard measures for that state. As mentioned earlier, the CNSC is the state's safeguard authority for Canada.

At a high level, the IAEA works to answer two questions for every safeguard at stake. First, has all declared nuclear material been accounted for? And second, is there any reason to believe that there are undeclared nuclear materials or activities in the country? If both pieces of this puzzle come together, the IAEA can then conclude that all nuclear material in the country remains in peaceful uses.

As you can imagine, reaching this broad conclusion requires an extensive compliance and evaluation program made up of many steps. For the purpose of this presentation, however, I will focus only on one aspect of that program: nuclear material accountancy.

Nuclear material accountancy is the foundation of safeguards. It involves keeping track of nuclear material: inventories and movements within a facility and throughout the nuclear field cycle.

In describing the basic principles of safeguard accountancy, it's useful to use the analogy of a bank account. Imagine that you would like to keep track of money in your account over the course of one year. You begin the year with a starting balance; in other words, how much money is in your account on Day 1. You keep track of all daily increases and decreases to your account and you update your bank book with a running balance at the end of every month. At the end of the year, you have a closing balance as recorded in your book. However, you want to verify this number by actually counting your money; ideally, this physical amount is equal to your calculated amount. However, in case of any difference between these two numbers, you would investigate the cause with the end goal of balancing your bank book with the final verified amount. This closing number then becomes the opening balance for the next year. And the cycle starts again.

In terms of nuclear material accountancy, these steps are essentially identical. Licensees are required to import -- report any changes in their nuclear material inventory to the CNSC throughout the year as incurred as well as submit monthly ledgers that report a running balance. Once per year, licensees must then physically count all nuclear material on-site and provide comprehensive inventory listings to the CNSC which allows the book values to be reconciled with the physical inventories.

In order to comply with its international safeguard obligations, the CNSC then uses this licensee data to generate state reports that it submits to the IAEA. State reports are simply the official reports sent on behalf of Canada. There are three types of state reports, as show on this slide. First, Inventory Change reports, which are submitted monthly and list all inventory increases or decreases for each safeguarded facility; second, Physical Inventory listings submitted annually which list the physically counted nuclear material at each facility; and third, Material Balance reports also submitted annually which take the information from the first two reports and provide the final big picture for the year: the opening balance; a summary of all increases and decreases; the ending or calculated book balance; and finally, the physical or measured balance; and then, the final reconciled closing balance. This closing balance then becomes the opening balance for the next year.

Again, I would mention that these reports are provided for each safeguarded facility in Canada.

This slide gives a sense of the amount information and effort involved in Canada's nuclear material accounting system. In a typical year, the CNSC receives over ten thousand accounting reports from safeguarded licensees. This number is comprised primarily of the reports indicating changes in inventory of which there can be approximately seven hundred in any given month. The CNSC then submits approximately four hundred and fifty state reports to the IAEA annually made up of over twelve thousand line entries.

Now that I've provided an overview of nuclear material accountancy in general, I'd like to turn to an update on regulatory document RD-336 *Reporting and Accounting of Nuclear Material*.

RD-336 lays out the safeguards accountancy requirements for licensees that I have just reviewed with further explanations provided in the associated guidance document GD-336.

RD-336 replaced the former accounting requirements document that had last been revised in 1988. For the most part, RD-336 simply updated and modernized the requirements of this older document. However, it did also introduce some new accounting requirements mostly related to standardizing licensee reporting as well as better enabling Canada's compliance with its non-proliferation obligations.

RD-336 was approved by the Commission on January 13, 2010, with an effective date of January 1st, 2011. As part of licensee outreach for this regulatory document, the CNSC then agreed to an additional 18-month transition period for the power reactor licensees. This transition period gave licensees time to modify their accountancy systems and procedures in order to come into compliance with the new accounting requirements introduced by RD-336. This transition period ended on July 1st, 2012.

CNSC staff have been reviewing licensees' submissions over the past months with an additional targeted assessment of power reactor submissions since July 1st. Based on these reviews, CNSC staff is satisfied that all effective licensees have in place the necessary measures to comply with RD-336.

There are still minor errors evident in licensee reports, but these are being dealt with through outreach and compliance promotion activities carried out by CNSC staff.

At the same time that it approved RD-336, the Commission instructed CNSC staff to consider online, electronic reporting of accounting information by licensees as a high priority. In response to this action, CNSC launched a project called eSubmissions in October 2010.

I will now turn to an overview and status update of the eSubmissions project.

The underlying goals of the eSubmissions project are to improve both the quality and the timeliness of safeguards accountancy by moving from an essentially manual system to one based on automated processing of machine-readable data. The currently estimated completion date for the eSubmissions project is the 3rd Quarter of 2013.

In brief, the eSubmissions concept is based on a secured, online portal. This slide shows a schematic of this concept.

The orange line represents the reports uploaded by the licensees to this secured CNSC website and, as a point of clarification, the acronyms associated with this line are for the two types of machine-readable reports to be submitted by licensees: ICD stands for Inventory Change Document and PKMPIS stands for Physical Key Measurement Point Inventory Summary.

The green lines in this schematic indicate automated actions to be carried out by the system, including automated error messages sent back to the licensee in case the upload is unsuccessful, automatic savings of reports into the CNSC's archiving system and the automatic loading of incoming reports into the CNSC's Nuclear Material Accounting System or NMAS.

Finally, the blue dash lines show the manual audit of data that will be carried out by CNSC staff, and the communication between staff and licensees in case of any questions.

This slide shows the timeline for the e-submissions project from the perspective of IT development and programming. At this point, we are in the codes development stage. User acceptance testing of this system is expected to take place in spring 2013 with the capability for electronic reporting to be in place for fall of 2013.

This date reflects the impact of a number of factors that have affected the project over the past two years, such as the need to first upgrade the CNSC's electronic nuclear material accounting system. These factors are described in more detail in CMD 12-M57.

I would furthermore note that the projected completion date is dependent upon the availability of key resources and on the resolution of some questions on project scope that are currently under discussion at the working level.

With respect to the project timeline, I would also mention that we have held discussions with licensees regarding the e-submission concept over the past years. We will furthermore be holding three large outreach sessions on this topic in February.

To date, the feedback from licensees appears positive. We expect more detailed technical questions on the project in the outreach sessions, but CNSC staff is confident that we can resolve any issues that may arise.

In conclusion, with respect to the implementation of regulatory document RD-336, CNSC staff are satisfied that licensees have put in place the necessary measures to comply with their safeguards reporting and accounting requirements.

Looking to the future of nuclear material accountancy, staff recognize the importance of a truly electronic system. We are currently working to implement electronic reporting of safeguards accountancy information by licensees with an expected completion date of the third quarter of 2013. Thank you.

THE CHAIRMAN: Thank you.

MR. AWAD: Thank you very much. That concludes our presentation, and we are ready to take any questions.

THE CHAIRMAN: Thank you. Let me start with Dr. McDill.

MEMBER McDILL: I think it's great. Could you show me slide 11 on the screen please?

Okay, that's better. The printout I have has a blue and green line NMAS dated and copied the submission. So I was trying to figure out what the solid blue meant, not dotted blue but the screen here, which is clear. So that's good.

THE CHAIRMAN: Could you repeat again what "PKNP" stands for?

MS. OWEN-WHITRED: Yes. Karen Owen-Whitred for the record. PKNPIS is a physical key measurement point inventory summary but basically it's just I was talking about reports that talk about changes in inventory and reports that talk about actual inventory amounts, and this report is the latter. It's a summary of actual physical inventory at a certain point in the facility.

THE CHAIRMAN: Okay.

MEMBER McDILL: Thank you. I think you could stick a little secondary legend on there, but I'm -- it's okay. Physical key measurement point information summary is fine.

What about people who -- I realize the -- most of the natural world uses Excel but what if someone is using some other database? You've got Excel and XML here as possibilities. Are you requiring that your users switch if they're using ---

MR. ROBERTSON: Hugh Robertson, for the record.

Generally speaking, Excel is what we recognize as the standard for taking these.

MEMBER McDILL: Okay.

MR. ROBERTSON: By having the extended or XML extended mark-up language, which is a common web based format for larger organizations, they can actually design their systems to be able to send it that way. But Excel really is the default format. In some of our other online applications, that is the default and we haven't had any issues with that so far. Thank you.

MEMBER McDILL: So there are no users in your stable at this point in time that are using any of the other spreadsheet formats that you are aware of?

MR. ROBERTSON: None that have come forward or that have not been able to use this format.

MEMBER McDILL: These are relatively simple tables, so it's not a huge effort if you are in one of the other standards to save as an Excel file? I'm just wondering.

MR. ROBERTSON: It depends on the licensee. I mean some of them can be more complex but by and large, the more complex ones will have a system in place and will be using the XML format, not the Excel. The Excel really is more for the simple formats and the smaller organizations.

MEMBER McDILL: And your E-Access repository then will be largely spreadsheets converted to some other format?

MR. ROBERTSON: Hugh Robertson, for the record.

We accept all those formats. E-Access is essentially an electronic repository that we have here at the CNSC to hold all our records of reference related to licensing material and other important documents. So we accept all those formats.

MEMBER McDILL: Thank you. I look forward to seeing how it goes.

THE CHAIRMAN: Monsieur Harvey.

MEMBRE HARVEY: Merci, monsieur le président.

J'imagine que parmi votre clientèle dont vous nous avez sûrement déjà dit le nombre de détenteurs de licences, mais 10,000 rapports. Dans ces détenteurs de licence, j'imagine que certains ont des mouvements beaucoup plus importants de matériel que dans d'autres. Donc, il doit y avoir une variabilité entre votre clientèle, de petits clients puis de très gros clients.

Pouvez-vous juste nous donner une idée des gros clients et des petits clients et comment ces gros et ces petits vont s'adapter au nouveau système?

Mme OWEN-WHITRED: Oui, on a plusieurs clients, plusieurs détenteurs qui ont -- il se peut qu'ils n'ont pas de mouvement de matériel même dans une année, même dans plusieurs années. Puis ceux qui sont plus grands sont probablement AECL Chalk River et aussi les détenteurs de Cameco qui ont beaucoup de mouvements de matériel. Et parmi eux, il se peut qu'ils ont dans les centaines de mouvements pendant un mois. Alors c'est ---

MEMBRE HARVEY: C'est la variabilité.

Mme OWEN-WHITRED: Oui.

MEMBRE HARVEY: Mais est-ce que ceux, par exemple, qui ont -- donc, qui n'ont pas de mouvement de matériel soient exemptés pendant une certaine période ou ils vont devoir quand même, tous les mois, soumettre leur rapport?

Mme OWEN-WHITRED: Alors, il y a un certain type de rapport qui est seulement soumis s'il y a un changement de matériel. Alors, pour eux qui n'en ont pas, c'est pas nécessaire de soumettre ce rapport.

Mais le "General Ledger," qui est le sommaire de tous les changements de matériel pendant un mois, oui, c'est nécessaire de l'envoyer et c'est seulement un "Nul Ledger" qui démontre qu'il y a zéro changement pendant un mois.

Alors, même les petits qui n'ont pas de changement, c'est nécessaire de soumettre ce "Nul Ledger".

MEMBER HARVEY: Merci.

THE CHAIRMAN: Let's get to the more specific. How many licensees have to submit? And this is not a small mom-and-pop shop we're talking about. Anybody who is in the nuclear business in material like that better -- it's not a small, little organization. They're pretty sophisticated, I understand.

MS. OWEN-WHITRED: Karen Owen-Whitred, for the record.

I'll provide just an overview but I'll ask Wayne Gibson to provide the actual numbers. We have on the order of 30 to 40 licensees who actually require to report this type of information under Safeguards.

We, in Safeguards, use an accounting unit called the Material Balance Area. For the most part, that maps one to one to CNSC licensees, but we do have cases, a good case in point is AECL Chalk River labs where that's a single licensee for the CNSC, but it comprises something like 16 material balance areas. So I'll ask Mr. Gibson to provide the actual numbers.

MR. GIBSON: Yes, Wayne Gibson.

Out of the 37 or so licensees who have uranium, thorium, plutonium, in Canada, they are submitting reports. As Karen mentioned, some of them have multiple material reporting areas. We call them "material balance areas."

So we have a total in Canada of 51 material balance areas reporting, plus mines and mills, so we have approximately another 11 locations facilities which are reporting concentrates movements around Canada, and imports-exports, but 51 who are doing the full accounting and reporting to RD-336.

THE CHAIRMAN: Okay, thank you. Mr. Tolgyesi?

MEMBER TOLGYESI: Thank you for asking the question. I was looking for that one.

On page 5 of your report, "status and timeline", you are talking about -- one, two -- third and fourth bullet. You are talking about changes in project scopes. The third bullet is saying that this change in a project scope resulted in a delay to August 31st. And the next bullet, it's another one, change the project scope required. It's the same? Because the second one is talking about delaying that to even to the third quarter. So it's the same change to the project scope, or it's different?

MS. OWEN-WHITRED: Karen Owen-Whitred.

So the bullet that you're referring to, the change in project scope that resulted in a delay of project delivery to August, 2012 ---

MR. TOLGYESI: Yes.

MS. OWEN-WHITRED: --- that was actually -- as you'll see earlier in that page, we explain that the original project was split into two. The first phase, it was recognized that we had to first upgrade our internal electronic nuclear material accounting system, and on the second phase is the e-submissions project that we're discussing here today.

So last August there was a chance in the project scope to the first phase, the en masse upgrade, and that resulted in the delay to the first phase of the project to be completed later, but since the two projects are linked sequentially, a delay in the first phase of course causes a delay in the second.

The other bullet that you were referring to, a change in project scope, that's something that we're dealing with currently, with the e-submissions project.

So, yes, they are -- there were two different changes in projects copes for two different phases of the project.

MR. TOLGYESI: You know, when you're talking about this 10,650 accounting reports, it says it's 37 licensees and 51 multiple sites, material balance sites, and mines and mills. But this kind of balance, I think the companies they have -- because they have a material balance, they have a warehouse as well. They have a balance, and they do that every -- every day, probably, and every month, at least once a month, so it should be no problem to have the data.

And large companies, like I'm talking about Cameco, they have a kind of common accounting system, so it's not difficult. Probably it's a little bit more complicated with other, I don't know how many -- thirty smaller ones, although Mr. President said that everybody who is here is big -- so they're supposed to have also a kind of systems which are easy to -- easy to report and communicate.

MR. AWAD: Raoul Awad, for the record.

All the major licensees have a system to track all the changes in their inventory, but when we talk about a point where you have to verify the books, what you are tracking in the system and what you have physically, what physical inventory of this material, and this varies from facility to facility. Usually they do it yearly to match the books on their physical inventory.

MR. TOLGYESI: So the licensee is doing his physical accounting, verification. Are you doing that also? Once in a while you're going to the site and physically, you say how many of this and that you should have here, and how much you have?

MR. AWAD: Raoul Awad, for the record.

Each facility, they have annual physical inventory. Our Staff participate in this inventory and AIEA inspectors participate in this inventory.

MR. TOLGYESI: And last is just a short comment: I presume your department was not involved in the inventory control of the low-radiation source used for demonstration? Because if you were there, I mean, we are in deep trouble.

MR. AWAD: Under the scope of the nuclear material accountancy, it's not considered a nuclear material. Because, when we talk about nuclear material in this context, it's uranium, plutonium and thorium only.

MR. TOLGYESI: I'm going back to these small samples. If you add them together, it's not a kind of accounting which should be taking an account because it’s a cumulative volume of radioactive material?

MR. AWAD: To go back to the -- sorry, Raoul Awad, for the record.

To go back to the context, those -- you talk about the check sources, those are not uranium, are not plutonium, then it’s -- it doesn’t -- it doesn’t tracked by this kind of system.

MR. TOLGYESI: So any size or any volume of this uranium, plutonium, it’s what you should -- what you account, it’s counted as no threshold limit? Below that we will not consider that?

MR. AWAD: Raoul Awad, for the record.

You are correct. You know, we track only uranium, plutonium and thorium, but those other radioactive sources, there is other system to track them which is not in the scope of this safeguard. But, for uranium and thorium, if there is a threshold, a minimum quantity, to be tracked, and I’ll let Karen to explain it.

MS. OWEN-WHITRED: Karen Owen-Whitred.

I’ll just clarify; there is no de minimis quantity for tracking of nuclear materials under safeguards.

THE CHAIRMAN: Okay, thank you. Ms. Velshi?

MEMBER VELSHI: Thank you, Mr. President.

If you can turn to slide 12 on the timeline, please? And I wanted to get a sense of your confidence in this timeline. When you were schedule to come in front of us, I think in November, the go live date was I think June, and it slipped to August, and in your presentation you said there's still some key risks to this August 2013, where there was a key resource being available, or any changes in scope. So what is your confidence level in the August 2013 date?

MR. ROBERTSON: Hugh Robertson, for the record.

I think we're fairly confident at this point. We've made good progress, even since November. While there are some -- as we referred to, some scope changes, the mitigation factors in place for those I think are fairly robust, and that we're going to stick to that August timeline. If there are some things that maybe have to be adjusted, or there's a release following quickly after that, that may be some of our options, but that August timeline, to actually have the system up and going live, we're fairly confident at this point. Thank you.

MS. VELSHI: Thank you. My second question is, so one of the key drivers for these e-submissions you said was to improve the quality and timeliness of submissions, or of the reports, the end reports. So what are the issues with regards to quality and timeliness right now, and what kind of improvements are you anticipating?

MS. OWEN-WHITRED: Karen Owen-Whitred, for the record, and I'll leave it open as well for Mr. Gibson, if he has anything to add.

Largely, the issues with quality relate to the fact that we have two data administrators who have to manually transcribe the incoming reports and enter that -- those data into our internal database.

So as with any case when you have manual transcription, it's possible that errors creep in and it requires a very time intensive, line by line, double and triple checking of what was put into the system against what we received from licensees.

So, of course as with any case, if you have a machine taking over and have automatic electronic entry of the data, flow of data, coming from the licensees into the system the expectation is that those unavoidable human errors would be largely eliminated.

MR. GIBSON: Yes, Wayne Gibson for the record. Just to expand or elaborate, the area -- the timeline's improvements that we would expect to see due to electronic submissions is mainly fewer reports being submitted late to the IAEA. In other words I'm talking the state reports that Canada submits to the agency.

We do have time limits of 30 days passed the end of the month and so on, various time limits on various reports. Occasionally, due to difficulties with the licensee providing the correct data that we need, if we determine some errors in our auditing, then we must correct those with the licensee first. And so, that may delay us sometimes in getting our official reports out to the IAEA.

So that has been drastically improved with RD-336 primarily. Now we're going to make another improvement with electronic data automatically populating the system, fewer errors and so on.

So the quality reports again, RD, was largely -- has made a huge improvement in the quality of the information being submitted by licensees. We've also done a lot of training and outreach, but in addition to that the electronic reporting will formalize their data, the data formats and things like missing information or misquoted codes, reporting codes and things, this will largely be somewhat automated by them submitting electronically to us. So that's where we look for the improvements.

MEMBER VELSHI: Thank you and I suspect then this also means that there will be less human resource required at your end as far as the inputting then. And I don't know how significant a number that is.

MR. GIBSON: Wayne Gibson. We don't -- initially what we see happening is, yes, we should be having to spend fewer -- less time as, on fewer errors and correcting reports and instructing licensees. That part will reduce, but we do plan on, with our existing work staff of three, basically three of us right now in the accounting area, is to put that time into inputting more data that we currently don't have time to do right now.

So right now we've been focusing on making sure Canada gets its official reports to the IAEA on time and that is consuming most of our time so we plan to spend the extra time on inputting, as I mentioned, these concentrates moving around Canada, tracking those more.

Little things like exempting materials for sending samples off site and so on. Those can be tracked and monitored in Canada much more. Right now we don't have the time to track that information and we will be getting on to that type of work.

THE CHAIRMAN: Thank you. Dr. Barriault?

MEMBER BARRIAULT: Thank you Mr. Chairman. Just, I guess, a few brief questions. Most of it has been asked already.

With regards to firewalls in the system, how comfortable are you against cyber-attacks of any form?

MR. ROBERTSON: Keith Robertson for the record. We are actually using a new Government of Canada -- it's called GCKEY which is an authentication process that all governments have just switched to. In fact we now have some experience. We've recently rolled out two new systems, a sealed source tracking system and our annual compliance report online which is leveraging this. So we actually have a web portal where all our online applications will be passed through so we're quite confident in this.

It's been -- it's proven. In fact we'll be using a third party validation through some of the banks, et cetera. So it's quite robust. We have a DMZ or if you call firewall demilitarized zone, in the middle to separate our actual infrastructure from the outside world. So it's been well tested and we're confident with that.

MEMBER BARRIAULT: And this will be upgraded regularly I would imagine?

DR. ROBERTSON: Yes and this is part of, if you're aware, of the new shared services Canada so it really is a common government hosted solution that we're participating in.

MEMBER BARRIAULT: One of the areas that you mention on your slide, I guess 9, was the fact of errors that were committed in a data entry when it was going through an intermediate process in manual entry. How extensive was the error, I guess volume, in the data entry from the licensee, through CNSC, through the IAEA?

MS. OWEN-WHITRED: Karen Owen-Whitred for the record. The minor errors that we referenced on slide 9, that was specifically referring to the fact that although staff is satisfied that licensees are complying with RD-336, there's always in any submission from licenses, there could be a code mis-entered on their -- on their accounting reports, that type of thing.

So those errors are still encountered, not with the large frequency, but we're dealing with them that way. But I'm not sure if your question was getting at something else.

MEMBER BARRIAULT: Well on the electronic system, do you have a means of reconciliation that right there and then, in other words if the licensee doesn't enter all the information that automatically they will be flagged and say "listen we need this"?

MS. OWEN-WHITRED: Yes, our electronic database is setup to provide error messages if certain codes or pieces of information aren't entered properly and then in addition we have two administrators who are manually reviewing the information as well.

So in other words, once the system and the people are satisfied, then the reports are sent to the IAEA so there is very, very low rate of errors in the state reports from Canada from the CNSC to the IAEA.

MEMBER BARRIAULT: Next question really is in regards to the FTE's full time equivalent staff that was doing the data entry through the CNSC here. You mentioned earlier that you're not going to see any change or savings from FTE's, but they will be given other assignments. Does that mean that some tracking was not being done at this time?

MR. AWAD: What we are not doing now and we need to do in the future -- sorry, it's Raoul Awad for the record - is the statistical analysis for those data, which is something that we would like to do because the accuracy and the quality of the data, it's one of the concerns of the relation between us and IAEA.

And these resources, or the remaining resources, will be shifted to do some more work in hiring the quality of the data and presenting to IAEA a full statistical analysis of the data. Thank you.

MEMBER BARRIAULT: Thank you Mr Chairman.

THE CHAIRMAN: Thank you. Mister Tolgyesi.

MEMBER TOLGYESI: On page 4 you are saying that the licensees are also required to submit these reports simultaneously to IAEA. It's a kind of double reporting, you know. Do you think you will eliminate one?

MS. OWEN-WHITRED: Karen Owen-Whitred for the record. There's actually two reasons why licensees have to submit their, if you want to call it source data to the IAEA. One is that under safeguards, yes the IAEA is looking at state reports that Canada sends and they are performing an audit on those state reports, but they also compare our state reports against the incoming licensee or source data. So that is built into the safeguard system, that double check between the state and the licensees.

The second reason that we are at present, we have the licensees submitting certain types of information directly to the IAEA, is more of a lower level, kind of working level arrangement that we have with the IAEA. When they have -- when they are able to receive in near real time a picture of the flow of information around the Canadian nuclear fuel cycle, that enables them to improve the efficiency of their verification of that information.

So traditionally, we had a very high number of IAEA inspections at Canadian facilities. What we have done is instituted this near real time flow of information from licensees to the IAEA and that has enabled the IAEA to instead change to a smaller number of randomized inspections.

So if they have the big picture of what's going on they can show up at any time, any place, and verify that what's happening is as declared and that has resulted in savings and efficiencies for licensees and Canada as a whole.

THE CHAIRMAN: Okay, anybody else?

Well, first of all, congratulation for bringing this nuclear industry into the 21st century. OK, to me it's mindboggling that the so-called hi-tech nuclear is still, I mean, practically all other departments that don't any other filling, electronic filling. Secondly, are we first or is there other many other countries are now doing this?

MR. AWAD: Actually, a year -- first submitting to a year, I think we'll be the first submitting in this format directly.

THE CHAIRMAN: And they're competent enough to accept it electronically and ---

MR. AWAD: We had some consultation with them when we started the project and we gave them a presentation about the project and they were very very pleased to have this e-submission done.

THE CHAIRMAN: So on slide -- the second point is, of course, our licencees, this is going to be mandatory and there’s none of this -- I see nobody said “boo”, yet about whether there will be a requirement or not?

MR. AWAD: Raoul Awad for the record.

Actually, almost all of our licencees are very pleased to go directly to the web and upload the information instead of having it by e-mail and then so on ---

THE CHAIRMAN: If there’s any FT saving, forget about us, I’d say it’s gonna be over there and this should -- this should find a little of saving over the other side. So I expect that to go well, everybody will accept that and over to the system challenges -- other system challenges -- but I go back to fundamental in slide 7.

So this is Canada and we’ve given a lot more work for IAEA to do; why the hell do they want a monthly report from Canada? While them away, rely on the regulator to make sure that annually they do the reconciliation and any differences will reconcile annually? So back to the question, Mr. Tolgyesi said: What is this? Yeah I know we’ve been doing it, it's the same question, we’ve been doing it like this for ever, it’s not a reason to continue to do it.

MRS. OWEN-WHITRED: The requirement for monthly reporting, but also the requirement for all safeguard accountancy, is laid out in the safeguard agreement that the Government of Canada signed with the IAEA back in the ’70, that’s where these requirements come from. The Canadian agreement is based on the model agreement and that is the standard approach that is used for any member state, any signatory to these types of agreements between the IAEA and then whatever signatory country.

Broadly speaking, safeguard in general is based on non-discrimination, so in other words, and certainly traditionally, it was whatever is done in one country is what is done everywhere.

THE CHAIRMAN: Now I’m shaking .. now I’m shaking now.

MRS. OWEN-WHITRED: Now we have discussed most recently, the IAEA has recognized a need to better use its resources, more efficiently and effectively, and it has introduced a certain amount of variability that’s not discrimination, but it’s the ability to tailor its safeguard measures to a particular state based on the realities that all of the, you know, political, social but also technical realities of that particular country.

That being said, nuclear material accountancy is always seen as king of the fundamental cornerstone, the non-changing aspect of safeguards. It is still a legal requirement on Canada as within any other signatory with a safeguard agreement to declare how the IAEA choses to treat or to verify that information as –- now they are able to change that, to vary that, and they have changed that drastically in Canada’s case.

THE CHAIRMAN: I’m just arguing, and I know it’s not gonna happen overnight, but just to listen to you is you remember those deal we signed in the 70’s, that's before we had those –- the internet, computers and all that stuff. It’s time to reassess, because I'd rather then look at the analysis and start looking at the global traffic than worry about every country kind of integrity and the concern is that they are not becoming more efficient in analysis – we’re all gonna suffer at the end of the day.

So it’s not that I’m not for accounting, it’s just doing it smartly, most smartly, smarter.

MR. AWAD: Raoul Awad for the record.

Actually, the accounting system is a small part of the new direction of IAEA to go to what we call information driven safeguard. Then they will collect all the information about the country, about all the movement of nuclear material, and then they will tailor the intervention of IAEA in this country accordingly and we are pushing the IAEA very hard and working with them to implement this concept because that means IAEA will be able to take their resources and put them where the problematic area in world that make a concern to IAEA from that perspective and leave this other country, like Canada, with the appropriate amount of effort needed to continue to have the full conclusion ---

THE CHAIRMAN: That's following their own guideline of risk informal, risk based analysis, right?

Anyhow, I know I’m being rhetorical here.

Thank you for all of this. We’re looking forward to the success story at the end of this year. Right? You’re gonna come back and tell us how wonderful, successful it’s been. Right? Nobody said anything.

MR. ROBERTSON: Correct.

MR. AWAD: And maybe with the collaboration with my colleague, we can make live demonstration for you.

THE CHAIRMAN: Ok. Thank you, thank you very much.

I think this concludes the public meeting of the Commission.

Thank all of you for your participation and patience.

Thank you.

--- Upon adjourning at 12:07 p.m./

L’audience est levée à 12h07