Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

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(ORIGINAL/ORIGINAL)

CMD: 12-M23

Date signed/Signé le : 2012-03-02

CNSC Staff Action Plan

Plan d'action du personnel de la CCSN

Public Meeting

Scheduled for:

May 3, 2012

Information regarding:

Actions required by the CNSC, licensees and affected stakeholders to address the Task Force recommendations and outcome of the public consultation on the *CNSC Fukushima Task Force Report* and *CNSC Management Response*

Réunion publique

Prévue pour le :

03 mai 2012

Information relative aux :

Mesures requises de la part de la CCSN, des titulaires de permis et des parties intéressées en cause pour donner suite aux recommandations du Groupe de travail et aux résultats de la consultation publique sur le *Rapport du Groupe de travail de la CCSN sur Fukushima* et la *Réponse de la direction aux recommandations.*

Submitted by:
CNSC staff

Soumise par :
Le personnel de la CCSN

Canada

Summary

The purpose of this CMD is to present to the Commission the:

- *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations* including site-specific measures undertaken by CNSC staff
- disposition of comments received from the public on the *CNSC Fukushima Task Force Report* and the *CNSC Management Response*
- disposition of comments received from the public on the draft *CNSC Staff Action Plan*

Résumé

Le présent CMD a pour objet de présenter à la Commission :

- le *Plan d'action du personnel de la CCSN résultant des recommandations du Groupe de travail de la CCSN sur Fukushima* et les mesures de vérification de la conformité de base propres aux sites prises par le personnel de la CCSN;
- la suite donnée aux commentaires du public sur le *Rapport du Groupe de travail de la CCSN sur Fukushima* et la *Réponse de la direction aux recommandations;*
- la suite donnée aux commentaires du public sur le *Plan d'action du personnel de la CCSN*,

Signed/signé le

2012-03-02

Greg Rzentkowski, Ph.D.

Director General

Directorate of Power Reactor Regulation

Directeur général de la

Direction de la réglementation des centrales nucléaires

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Executive Summary

On March 11, 2011, a magnitude 9.0 earthquake, followed by a devastating tsunami, struck Japan. The combined impact of the earthquake and tsunami on the Fukushima Daiichi nuclear power plant caused a severe nuclear accident. In response to these events, the Canadian Nuclear Safety Commission (CNSC) established the *CNSC Fukushima Task Force* in April 2011 to review licensees' responses to the CNSC order, under subsection 12(2) of the *General Nuclear Safety and Control Regulations*, to re-examine the safety cases of their nuclear power plants.

CNSC staff provided updates to the Commission on two separate occasions, at the March 30 and June 8, 2011 public meetings.

On September 30, 2011, the Task Force completed its review and presented its findings and recommendations in the *CNSC Fukushima Task Force Report*. The Task Force concluded that Canadian nuclear power plants are safe and pose a very small risk to the health and safety of Canadians and the environment. The Task Force made 13 recommendations to further enhance the safety of nuclear power plants in Canada.

On October 28, 2011, the CNSC posted the *CNSC Fukushima Task Force Report* and its accompanying *CNSC Management Response* on its Web site for review and comment by the public and stakeholders. The *CNSC Management Response* outlined the basis upon which the Task Force recommendations would be implemented in a timely and transparent manner.

The draft *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations* was made public for the purposes of a second round of consultation with the public and was posted on the CNSC Web site from December 21, 2011 to February 3, 2012. In addition, international experts of the International Atomic Energy Agency Integrated Regulatory Review Service (IRRS) Team follow-up mission in Canada evaluated the CNSC response to the Fukushima nuclear accident. The Team concluded that the CNSC response was robust and comprehensive and had an "effective and pragmatic framework" in place to implement the lessons learned from the accident.

This CMD elaborates on the two consultations with the public and on the compliance measures taken by the CNSC, including:

- the disposition of comments from the first round of consultation on the *CNSC Fukushima Task Force Report* and *CNSC Management Response*
- the disposition of comments from the second round of consultation on the draft *CNSC Staff Action Plan*
- the site-specific compliance measures initiated by CNSC staff to discharge each action specified in the *CNSC Staff Action Plan*

The *CNSC Staff Action Plan* will be implemented through:

- existing licensing and compliance regulatory oversight programs for items relating to design and operational enhancements
- the CNSC Harmonized Plan for items relating to regulatory framework improvements

Progress on the implementation of the *CNSC Staff Action Plan* will be reported annually to the Commission as part of the *CNSC Staff Integrated Safety Assessment of Canadian Nuclear Power Plants.*

The measures undertaken to date by the CNSC in its response to the Fukushima Daiichi nuclear accident are consistent with its policy of openness, transparency and effectiveness.

1.0 Introduction

The *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations*[1] describes specific actions to be implemented by licensees, CNSC staff, and affected federal and provincial authorities to strengthen the defence in depth, emergency preparedness and regulatory oversight of nuclear power plants in Canada. The draft *CNSC Staff Action Plan* took into consideration all comments from the public review of the *CNSC Fukushima Task Force Report*[2] and *CNSC Management Response*[3].

In addition, the International Atomic Energy Agency Integrated Regulatory Review Service (IRRS) mission of international experts was in Canada from November 28 to December 9, 2011. This IRRS follow-up mission evaluated the CNSC's response to the Fukushima nuclear accident and commended the CNSC for having an "effective and pragmatic framework" in place to follow up the accident.

The *CNSC Staff Action Plan* will be implemented by licensees through existing regulatory oversight programs for initiatives that pertain to design and operational enhancements, and by the CNSC under Harmonized Plan initiatives for those actions that fall under regulatory framework improvements.

2.0 Background

On March 11, 2011, a magnitude 9.0 earthquake, followed by a devastating tsunami, struck Japan. The combined impact of the earthquake and tsunami on the Fukushima Daiichi nuclear power plant caused a severe nuclear accident. In response to these events, the CNSC established the CNSC Fukushima Task Force in April 2011 to review licensees' responses to the CNSC order, under subsection 12(2) of the *General Nuclear Safety and Control Regulations*, to re-examine the safety cases of their nuclear power plants.

CNSC staff provided updates to the Commission on two separate occasions, at the March 30 and June 8, 2011, public meetings.

The CNSC Fukushima Task Force monitored the approaches of several international task forces, including the Western European Nuclear Regulators' Association (WENRA) "stress tests", to validate the approach taken. The *CNSC Fukushima Task Force Report* constitutes the Canadian "stress test" applied to Canadian operating nuclear reactors.

On September 30, 2011, the Task Force completed its review and presented the public with the findings and recommendations in the *CNSC Fukushima Task Force Report*. The Task Force concluded that Canadian nuclear power plants are safe and pose a very small risk to the health

[1] *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations*, CNSC INFO-0828, December 2011, draft available at nuclearsafety.gc.ca/eng/mediacentre/releases/news_release.cfm?news_release_id=398; (the current version is in Appendix A to this CMD)

[2] *CNSC Fukushima Task Force Report*, CNSC INFO-0824, October 2011, available at nuclearsafety.gc.ca/pubs_catalogue/uploads/October-2011-CNSC-Fukushima-Task-Force-Report_e.pdf

[3] *CNSC Management Response to CNSC Fukushima Task Force Recommendations*, CNSC INFO-0825, October 2011, available at nuclearsafety.gc.ca/pubs_catalogue/uploads/October-2011-Management-Response-to-Fukushima-Task-Force-Report_e.pdf

and safety of Canadians and the environment. The Task Force made 13 recommendations to further enhance the safety of nuclear power plants in Canada.

On October 28, 2011, the CNSC posted the *CNSC Fukushima Task Force Report* and its accompanying *CNSC Management Response* on its Web site for review and comment by the public and stakeholders. The *CNSC Management Response* outlined the framework for stakeholders to follow in order to implement the Task Force recommendations in a timely and transparent manner. The major milestones of the framework consisted of the following:

October 28, 2011 – December 1, 2011 (completed)
Posting of the *CNSC Fukushima Task Force Report* and *CNSC Management Response* for public and stakeholder review

December 21, 2011 – February 3, 2012 (completed)
Posting of the draft *CNSC Staff Action Plan* and disposition of comments received on the Task Force Report for public and stakeholder review

February 3, 2012 – March 3, 2012 (completed)
Disposition of comments received from the public and stakeholders and revision of the *CNSC Staff Action Plan* as required

February 17, 2012
Notification by the CNSC to licensees of site-specific Fukushima action items (FAIs)

March 2, 2012 – April 3, 2012 (tentative)
Posting of Commission member document (CMD) for public comment on the:
- *CNSC Staff Action Plan*
- Disposition Report of comments received from the public and stakeholder review of the draft *CNSC Staff Action Plan*

May 3, 2012 (planned)
Commission public meeting on the revised *CNSC Staff Action Plan*

3.0 Consultations

The following sections provide a brief overview of the two consultations undertaken with the public and their impact on the *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations.*

3.1 *CNSC Fukushima Task Force Report* and *CNSC Management Response*

On October 28, 2011, the CNSC posted, on its Web site, the *CNSC Fukushima Task Force Report* and accompanying *CNSC Management Response* for review and comment by the public until December 1, 2011. Twelve responses were received from members of the public, the nuclear industry, and non-government organizations.

Comments received were general in nature, and in a number of instances were found to be out-of-scope. Nevertheless, CNSC staff responded to all pertinent issues raised and provided comments to address the concerns identified. A summary of the comments and their disposition is included in appendix B of CMD 12-M23.

There were no changes made to the *CNSC Fukushima Task Force Report* as a result of these comments.

3.2 *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations*

During the period from December 21, 2011 to February 3, 2012, the CNSC posted the draft *CNSC Staff Action Plan* for review by the public and stakeholders of the CNSC's proposed measures for addressing the *CNSC Fukushima Task Force* recommendations. Thirteen responses were received from members of the public, the nuclear industry, and non-government organizations.

A number of comments received during this second consultation were related to concerns raised in the first round, to legacy issues previously dealt with by the Commission in prior decisions, or to matters currently before the Commission pending licensing decisions. Several of these were deemed out of scope but were nevertheless dispositioned by CNSC staff.

There were four submissions from industry that provided general comments on the *CNSC Staff Action Plan* and a comprehensive response to each action in the plan that impacted their operations. Though generally accepting of the actions intended by the CNSC, a number of concerns were expressed about the proposed solutions, particularly with respect to the specificity of each site (e.g., location, single-unit vs. multi-unit operation), differing reactor technology, and planned refurbishment activities. CNSC staff considered all licensee comments and, where practicable, amended the *CNSC Staff Action Plan* to address the concerns or deficiencies identified.

A summary of all the comments from the public and industry and their disposition for this second round of consultation is included at Appendix C of CMD 12-M23.

There were no changes of a technical nature made to the actions or deliverables contained in the *CNSC Staff Action Plan* as a result of the second round of consultations.

3.3 Revisions to the CNSC Staff Action Plan

There were no amendments of a technical nature made to the actions or deliverables contained in the *CNSC Staff Action Plan* as a result of the second round of consultations.

The major changes to the *CNSC Staff Action Plan* are editorial in nature and consist of:

- removal of Appendix B – Comments Disposition Table with appropriate editing of the main text to indicate that this appendix has now been inserted in this CMD
- revisions to section 3 to elaborate on the outcome of the two public consultations
- revisions to section 5 to indicate that the *CNSC Staff Action Plan* has now progressed to the implementation phase

4.0 Implementation

The *CNSC Staff Action Plan* will be implemented through:

- existing licensing and compliance regulatory oversight programs for items relating to design and operational enhancements
- CNSC regulatory framework for items relating to regulatory framework.

4.1 Actions on licensees

On February 17, 2012, CNSC staff informed licensees in writing that staff had initiated 36 site-specific Fukushima Action Items (FAIs) to address the CNSC Fukushima Task Force recommendations. The "Fukushima Action Items – Matrix of Applicability to Stations and Status", derived from each of the deliverables identified in the *CNSC Staff Action Plan*, is attached as appendix D to this CMD. The matrix describes the 36 FAIs applicable to each station and identifies whether an FAI is "open" or "closed", based on staff's current assessment.

It should be noted that some FAIs depend on the outcome of others; these are shown in the matrix as "to be determined" (tbd). The regulatory oversight and closure of the FAIs will be based on the following general criteria:

- FAIs have been opened for each station to address the deliverables directed in the *CNSC Staff Action Plan* and will only be closed once all stations have produced the required deliverables for that FAI, and when CNSC staff have accepted them.
- Additional station-specific action items will be opened, in some cases, to achieve the original intent of the Action.
- Progress on the FAIs will be monitored by staff every six months.

4.2 Actions on the CNSC

4.2.1 Emergency preparedness

As identified in the *CNSC Fukushima Task Force Report* and IAEA IRRS recommendations,[4] CNSC staff were to meet with their provincial and other federal counterparts to ensure their understanding of the recommendations and findings stemming from the *CNSC Fukushima Task Force Report*.

As a result, CNSC staff participated in several meetings and workshops with various stakeholders, to discuss the response capabilities available in Canada for radiological and/or nuclear emergencies. These meetings were held with the Candu Owner's Group (COG); the Federal Provincial Territorial Radiological and Nuclear Emergency Management Coordinating Committee (FPT RNEMCC); and the Safety Commissioner of Ontario, Emergency Management Ontario (EMO) and Durham Region. As well, separate meetings were held with the Chief Administrative Officers (CAOs) of both the City of Pickering and Durham Region and with Ontario Power Generation (OPG) to discuss how response to a beyond-design-basis accident would be managed.

Other meetings and activities have been planned. They include a one-day workshop to discuss offsite arrangements in place with provinces where nuclear power plants are located, with the main focus being on harmonization and coordination with their supporting organizations.

[4] For details refer to the Fukushima module of the IRRS Report included as appendix E to this CMD.

They also include severe accident and multi-unit accident exercises to take place in the spring and fall of 2012. These exercises are expected to involve federal and provincial components and will test response capabilities, coordination and efforts at all levels.

With regard to CNSC regulatory framework and oversight measures, CNSC staff are currently working on strengthening and converting CNSC emergency management guidance documentation into a regulatory document/guidance document (RD/GD). This new document, now in progress, will provide CNSC staff with better and more comprehensive regulatory tools to ensure licensees are not only prepared for design-basis accidents, but also beyond-design-basis events or accidents. The document will also incorporate the expectations and requirements for offsite response. This work will be brought before the Commission under a separate CMD for direction at a later date.

The CNSC is committed to participating and cooperating with both provincial and federal authorities to ensure emergency planning and preparedness at both levels of government, both onsite and offsite, is sufficient and up-to-date, and to ensure there is a well-planned, practised and integrated response capability available in Canada to deal with radiological or nuclear emergencies.

4.2.2 Regulatory framework

CNSC staff have initiated projects to modernize the CNSC's regulatory framework to take into account lessons from the Fukushima nuclear accident, as described in appendix A of the *CNSC Staff Action Plan*, recommendations 7, 8 and 9.

Besides developing a new RD/GD document as described above, CNSC staff are developing other new documents on accident management and emergency management and making amendments to existing documents impacted by the recommendations of the CNSC Fukushima Task Force. In addition, work is proceeding on amendments to the *Class I Nuclear Facilities Regulations* and the *Radiation Protection Regulations* to address the CNSC Fukushima Task Force recommendations.

As this work progresses, stakeholders will be engaged through public consultation on any proposed changes to the regulatory framework. The outcome of this work will be brought to the Commission for approval to publish.

In the *CNSC Staff Action Plan*, staff have committed to complete the work to modernize the CNSC's regulatory framework in response to the lessons learned from the Fukushima nuclear accident, as identified by the CNSC Fukushima Task Force, by December 2013. CNSC staff are on track to meet this commitment.

The *CNSC Staff Action Plan* will be implemented by licensees through existing regulatory oversight programs and under the CNSC Harmonized Plan for the initiatives that fall under regulatory framework improvements.

5.0 Conclusions

The *CNSC Staff Action Plan* identifies all the necessary measures required by stakeholders to address the technical and operational recommendations of the CNSC Fukushima Task Force that pertain to enhancements to strengthen reactor defence in depth and technical cooperation at the

international level. In addition, the *CNSC Staff Action Plan* provides added actions for the CNSC to undertake that enhance the regulatory framework and processes.

Progress on the implementation of the *CNSC Fukushima Task Force* recommendations will be reported annually to the Commission until full implementation of the *CNSC Staff Action Plan*. The annual report to the Commission will be tabled in August of each year as part of the *CNSC Staff Integrated Safety Assessment of Canadian Nuclear Power Plants*. Annual reports provide further opportunities for the public to comment on the implementation of the *CNSC Staff Action Plan.*

The measures undertaken by the CNSC in its response to the Fukushima Daiichi nuclear accident are consistent with its policy of openness, transparency and effectiveness.

6.0 Recommendations

CNSC staff recommend that the Commission endorse the *CNSC Staff Action Plan on the Task Force Recommendations* as presented in this CMD.

CNSC staff recommend that the Commission endorse the modernization of the CNSC regulatory framework outlined in this CMD with projected completion date of December 13, 2013 for:

- revisions to regulatory documents and regulatory guides
- amendments to the *Class I Nuclear Facilities Regulations* and the *Radiation Protection Regulations*

CNSC staff recommend that the Commission endorse the offsite streamlining of emergency preparedness between federal, provincial and municipal emergency management authorities as described in this CMD.

Appendix A – INFO-828 *CNSC Staff Action Plan*

Canada's Nuclear Regulator

CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations

INFO-0828

March 2012

Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire

Canada

CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations
Canadian Nuclear Safety Commission (CNSC)
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Canadian Nuclear Safety Commission
280 Slater Street
P.O. Box 1046, Station B
Ottawa, Ontario K1P 5S9
CANADA

Tel.: 613-995-5894 or 1-800-668-5284 (in Canada only)
Facsimile: 613-995-5086
Email: info@cnsc-ccsn.gc.ca
Web site: nuclearsafety.gc.ca

CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations

INFO-0828

March 2012

Preface

The *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations* sets out the strategy and timeline upon which stakeholders will develop their implementation plans to address the *CNSC Fukushima Task Force Report* recommendations.

Comments received from the public and stakeholders on the *CNSC Fukushima Task Force Report* and *Management Response* following the October 28, 2011 posting on the CNSC Web site were taken into consideration during the development of this *CNSC Staff Action Plan* together with those received during the second round of consultation beginning on December 21, 2011. Comments received and their dispositions by CNSC staff are included in appendices B and C to CMD 12-M23.

In addition, this *CNSC Staff Action Plan* includes the preliminary conclusions made by the International Atomic Energy Agency (IAEA) Integrated Regulatory Review Service (IRRS) follow-up mission, in Ottawa from November 28 to December 9, 2011, in its review of the CNSC's response on the implications of the Fukushima nuclear event for Canadian nuclear power plants.

Message from the Executive Vice-President and Chief Regulatory Operations Officer

The *CNSC Staff Action Plan* describes specific actions to be implemented by staff, licensees and affected federal and provincial authorities, in response to the *CNSC Fukushima Task Force Report* recommendations, to strengthen defence in depth, emergency preparedness and the regulatory oversight of nuclear power plants in Canada.

The CNSC is committed to being open and transparent. The comments received from the public and stakeholders during the first round of consultation on the *CNSC Fukushima Task Force Report* together with those received during the second round on the draft *CNSC Staff Action Plan* are dispositioned in appendices B and C of CMD 12-M23.

The *CNSC Fukushima Task Force Report* confirmed that Canadian nuclear power plants are safe and rely on multiple layers of defence. CNSC management endorsed the findings and recommendations of the Task Force Report and is committed to addressing each recommendation through the actions outlined in the *CNSC Staff Action Plan*. The basis of the recommendations, along with a clear mapping of all the recommendations to each finding, is included in appendix D of the *CNSC Fukushima Task Force Report*.

In addition, the *CNSC Staff Action Plan* includes the preliminary findings from the recent International Atomic Energy Agency (IAEA) Integrated Regulatory Review Service (IRRS) follow-up mission, which reviewed the CNSC's response to the Fukushima nuclear event and its implications for Canadian nuclear power plants. The IRRS Team acknowledged that the CNSC has an effective and pragmatic regulatory framework in place to continue the follow-up of the Fukushima Daiichi nuclear accident and to ensure the continued safety of Canadian nuclear facilities. The IRRS Team did not raise any concerns or make any observations that impacted this *CNSC Staff Action Plan*.

Ramzi Jammal
Executive Vice-President and
Chief Regulatory Operations Officer
Canadian Nuclear Safety Commission

Executive Summary

On March 11, 2011, a magnitude 9.0 earthquake, followed by a devastating tsunami, struck Japan. The combined impact of the earthquake and tsunami on the Fukushima Daiichi nuclear power plant caused a severe nuclear accident. In response to these events, the Canadian Nuclear Safety Commission (CNSC) established the CNSC Fukushima Task Force in April 2011 to review licensees' responses to the CNSC request to re-examine the safety cases of their nuclear power plants. On September 30, 2011, the Task Force completed its review and documented its findings and recommendations in the *CNSC Fukushima Task Force Report* (Task Force Report).

On October 28, 2011, the CNSC posted, on its Web site, the *Fukushima Task Force Report* and its accompanying *CNSC Management Response* to the report recommendations, for review and comment by the public until December 1, 2011. Twelve responses were received from stakeholders, including members of the public, nuclear industry, and non-government organizations. These comments were considered in the preparation of the draft *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations*.

The *CNSC Staff Action Plan* outlined in appendix A of this report sets out the strategy and expectations upon which stakeholders will formulate their respective implementation schedules and plan to discharge each recommendation within the short-, medium- or long-term timeline established in the *CNSC Management Response*. The measures and actions required of stakeholders outlined in this *CNSC Staff Action Plan* were subjected to review and comment by the public and stakeholders until February 3, 2012. Thirteen responses were received from stakeholders, including members of the public, nuclear industry, and non-government organizations. Comments from this second round of consultations, together with the revised *CNSC Staff Action Plan*, are discussed in CMD 12-M23, which will be presented to the Commission for endorsement at a public meeting on May 3, 2012.

From November 28, 2011 to December 9, 2011, the CNSC hosted an international team of experts for a follow-up IAEA Integrated Regulatory Review Service (IRRS) mission that encompassed a review dedicated to CNSC actions on the regulatory implications of the Fukushima Daiichi nuclear accident for Canadian nuclear power plants.

The IRRS report findings indicated that CNSC actions and responses to the nuclear accident were prompt, comprehensive and robust. Specifically, the IRRS Team rated the CNSC response to the Fukushima accident as a good practice, indicating that the CNSC had systematically and thoroughly reviewed the lessons learned from the accident and had made full use of available information, including the review of actions taken by other international regulators.

The IRRS Team also acknowledged that the CNSC has an effective and pragmatic regulatory framework in place to continue follow-up to the Fukushima Daiichi nuclear accident. The IRRS Team did not raise any concerns or make any observations that impacted the *CNSC Staff Action Plan*.

Progress on the implementation of the *CNSC Staff Action Plan* will be reported to the Commission in August of each year as part of the *CNSC Staff Integrated Safety Assessment of Canadian Nuclear Power Plants.*

Finally, it is important to understand that the Canadian nuclear power plants were found to be safe and pose a very small risk to the health and safety of Canadians and the environment. This *CNSC Staff Action Plan* is designed to enhance the safety of these facilities.

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1.0 Overview

On March 11, 2011, a magnitude 9.0 earthquake, followed by a devastating tsunami, struck Japan. The combined impact of the earthquake and tsunami on the Fukushima Daiichi nuclear power plant caused a severe nuclear accident. In response to these events, the Canadian Nuclear Safety Commission (CNSC) issued a request to Class I nuclear facilities, under subsection 12(2) of the *General Nuclear Safety and Control Regulations*, to re-examine the safety cases of their nuclear power plants. In April 2011, the CNSC established the CNSC Fukushima Task Force to review licensees' responses to the request.

On September 30, 2011, the Task Force completed its review and presented its findings and recommendations in the *CNSC Fukushima Task Force Report* (Task Force Report)[1]. The report particularly emphasizes:

- the capability of Canadian nuclear power plants to withstand conditions similar to those that triggered the Fukushima nuclear accident
- emergency preparedness and response in Canada
- the effectiveness of the CNSC regulatory framework

The Task Force concluded that Canadian nuclear power plants are safe and pose a very small risk to the health and safety of Canadians and the environment. Nevertheless, the Task Force made 13 recommendations to further enhance the safety of nuclear power plants in Canada. These are presented in section 10 of the *CNSC Fukushima Task Force Report*. CNSC management also provided its response to the recommendations.

On October 28, 2011, the CNSC posted on its Web site the *Task Force Report* and its accompanying *CNSC Management Response*[2] for review and comment by the public until December 1, 2011. Twelve responses were received from stakeholders, including members of the public, the nuclear industry, and non-government organizations. These are dispositioned in appendix B of CMD 12-M23.

On December 21, 2011, the CNSC posted on its Web site the draft *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations* and the comments received from the public and stakeholders during the first round of consultation on the *CNSC Fukushima Task Force Report* for a second round of public consultation. Thirteen responses were received from stakeholders, including members of the public, the nuclear industry, and non-government organizations.

Comments from these two rounds of consultations, together with the revised *CNSC Staff Action Plan* are discussed in CMD 12-M23 and will be presented to the Commission for endorsement at a public meeting on May 3, 2012.

[1] *CNSC Fukushima Task Force Report*, CNSC INFO-0824, October 2011, available at nuclearsafety.gc.ca/pubs_catalogue/uploads/October-2011-CNSC-Fukushima-Task-Force-Report_e.pdf

[2] *CNSC Management Response to CNSC Fukushima Task Force Recommendations*, CNSC INFO-0825, October 2011, available at nuclearsafety.gc.ca/pubs_catalogue/uploads/October-2011-Management-Response-to-Fukushima-Task-Force-Report_e.pdf

2.0 CNSC Staff Action Plan Objectives and Implementation

2.1 Objective

The *CNSC Staff Action Plan* (appendix A) is intended to enhance the existing regulatory oversight programs and sets out the specific actions needed to address the Task Force recommendations which are to be implemented by staff, licensees and affected federal and provincial authorities to strengthen defence in depth, emergency preparedness and the regulatory oversight of nuclear power plants in Canada.

The implementation of a final *CNSC Staff Action Plan* will give rise to site-specific and CNSC schedules and plans and will ensure tracking and completion of each action.

The *CNSC Staff Action Plan* identifies 33 actions that address the 13 Task Force Report recommendations. All actions are listed in appendix A and grouped in the following three categories:

Part 1 – Strengthening reactor defence in depth
Part 2 – Enhancing emergency response
Part 3 – Improving regulatory framework and processes

2.2 Implementation plan

The final *CNSC Staff Action Plan* will be implemented through existing regulatory oversight programs and internally by the CNSC staff for the initiatives that fall under regulatory framework improvements.

The Task Force recommendations in the *CNSC Management Response* have been categorized in this *CNSC Staff Action Plan* as follows:

- **Technical and operational recommendations**, which pertain to design and operational enhancements to strengthen reactor defence in depth and technical cooperation at the international level to be implemented through existing regulatory oversight operations.

- **Regulatory recommendations**, which require Commission approval to amend the regulatory framework and Commission approval and direction to enhance emergency preparedness. Implementation will be through revised priorities by CNSC staff.

The assignment of the 13 recommendations to each category and their associated short-, medium- and long-term completion date is shown in the following table.

Table – Task Force recommendations

Recommendations	Implementation timeline		
	Short term (Dec 2012)	**Medium term (Dec 2013)**	**Long term (Dec 2015)**
Technical and operational recommendations for CNSC staff and licensee actions			
Recommendation 1	**x**	**x**	**x**
Recommendation 2		**x**	
Recommendation 3		**x**	
Recommendation 4	**x**		
Recommendation 5	**x**		
Recommendation 12	**x**		
Recommendation 13	**x**		
Regulatory recommendations for Commission approval			
Recommendation 6*		**x**	
Recommendation 7		**x**	
Recommendation 8		**x**	
Recommendation 9	**x**	**x**	
Recommendation 10	**x**		
Recommendation 11	**x**		

* to be referred to the Commission for consideration.

The actions outlined in this *CNSC Staff Action Plan* set out the requirements upon which stakeholders will formulate their respective schedules and plans to implement each recommendation within the timelines prescribed in the *CNSC Management Response*:

- Short term (**12 months**) – for all actions currently underway that can be accelerated within this period
- Medium term (**24 months**) – for all measures requiring further analysis and engineering design, or regulatory development
- Long term (**48 months**) – for all actions initiated in the previous periods that will require station retrofits and/or prolonged outages

The implementation of the technical and operational recommendations will consist of action items that are site specific and which take into consideration differences in reactor designs and locations. The regulatory recommendations that deal with amendments to existing licences, CNSC regulations or regulatory documents will be referred to the Commission.

The *CNSC Staff Action Plan* recognizes that many recommendations have already been implemented or are ongoing through normal regulatory oversight activities by the CNSC. These activities will be considered by all regulatory program divisions in their development of site-specific compliance action items and closure criteria.

The *CNSC Staff Action Plan* also acknowledges that in some instances the complexity of certain technical requirements, site-specific planned outages or refurbishment activities may impact the implementation timeline of the required action. In this light, the *CNSC Staff Action Plan* provides for alternative measures, where appropriate, such as the development of plans and schedules that will establish the licensee's commitment and timeline to full resolution of the action.

3.0 Public Consultations

The following sections provide a brief overview of the two consultations undertaken with the public and their impact on the *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations.*

3.1 *CNSC Fukushima Task Force Report* and *CNSC Management Response*

On October 28, 2011, the CNSC posted, on its Web site, the *CNSC Fukushima Task Force Report* and accompanying *CNSC Management Response* for review and comment by the public until December 1, 2011. Twelve responses were received from members of the public, the nuclear industry, and non-government organizations.

Comments received were general in nature, and in a number of instances were found to be out-of-scope. Nevertheless, CNSC staff responded to all pertinent issues raised and provided comments to address the concerns identified. A summary of the comments and their disposition is included in appendix B of CMD 12-M23.

There were no changes made to the *CNSC Fukushima Task Force Report* as a result of these comments.

3.2 *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations*

During the period from December 21, 2011 to February 3, 2012, the CNSC posted the draft *CNSC Staff Action Plan* for review by the public and stakeholders of the CNSC's proposed measures for addressing the *CNSC Fukushima Task Force* recommendations. Thirteen responses were received from members of the public, the nuclear industry, and non-government organizations.

A number of comments received during this second consultation were related to concerns raised in the first round, to legacy issues previously dealt with by the Commission in prior decisions, or to matters currently before the Commission pending licensing decisions. Several of these were deemed out of scope but were nevertheless dispositioned by CNSC staff.

There were four submissions from industry that provided general comments on the *CNSC Staff Action Plan* and a comprehensive response to each action in the plan that impacted their operations. Though generally accepting of the actions intended by the CNSC, a number of concerns were expressed about the proposed solutions, particularly with respect to the specificity of each site (e.g., location, single-unit vs. multi-unit operation), differing reactor technology, and planned refurbishment activities. CNSC staff considered all licensee comments and, where practicable, amended the *CNSC Staff Action Plan* to address the concerns or deficiencies identified.

A summary of all the comments from the public and industry and their disposition for this second round of consultation is included at appendix C of CMD 12-M23.

There were no changes of a technical nature made to the actions or deliverables contained in the *CNSC Staff Action Plan* as a result of the second round of consultations.

4.0 IAEA IRRS Follow-up Mission

From November 28, 2011 to December 9, 2011, the CNSC hosted an international team of experts for a follow-up IAEA Integrated Regulatory Review Service (IRRS) mission. One of the reviewed focus areas was the regulatory implications of the Fukushima Daiichi nuclear accident as they relate to Canadian nuclear power plants. A dedicated team of international experts conducted the review of actions taken by the CNSC against international requirements.

The IRRS Team commended the CNSC for its efforts in managing its response to the Fukushima nuclear accident, concluding that the regulatory response was prompt, robust and comprehensive. At its exit meeting, the IRRS Team rated the CNSC response as a good practice, indicating that the CNSC had systematically and thoroughly reviewed the lessons learned from the accident and had made full use of available information, including the review of actions taken by other international regulators, in its review. The IRRS Team commented favourably on the fact that the CNSC had drafted a *CNSC Staff Action Plan* for addressing the findings and recommendations resulting from the CNSC Fukushima Task Force's review and expressed its appreciation that the report was publicly available.

The specific findings in the IRRS review report were well aligned with the *CNSC Fukushima Task Force Report*. The IRRS Team did not raise any concerns or make any suggestions or recommendations that impacted the draft *CNSC Staff Action Plan.*

5.0 Implementation

The *CNSC Staff Action Plan* will be implemented through existing regulatory oversight programs and will be updated every six months, by licensees, for initiatives that pertain to design and operational enhancements, or by the CNSC under Harmonized Plan initiatives for those actions that fall under regulatory framework improvements.

Progress on the implementation of the Task Force Report recommendations will be reported to the Commission in August of each year, in the publicly posted *CNSC Staff Integrated Safety Assessment of Canadian Nuclear Power Plants* report, until full implementation of the *CNSC Staff Action Plan*. This will also provide the public with further opportunities to comment on the progress of implementation of the *CNSC Staff Action Plan.*

6.0 Conclusion

The *CNSC Fukushima Task Force Report* confirmed that Canadian nuclear power plants are safe and have a robust design that relies on multiple layers of defence. CNSC management has endorsed the findings and recommendations of the Task Force and is committed to addressing each recommendation through the actions outlined in the *CNSC Staff Action Plan*.

This *CNSC Staff Action Plan* describes 33 specific actions that are needed by staff, licensees and affected federal and provincial authorities to strengthen defence in depth, emergency preparedness and the regulatory oversight of nuclear power plants in Canada.

CNSC staff recognize that some actions are currently underway and may be completed well ahead of the stated dates, or that others may extend beyond their timeline, in part due to their complexity or other factors such as additional research or development, analysis, scheduled refurbishment activities, or extended outages.

The IRRS Team acknowledged that the CNSC has an effective and pragmatic framework in place to continue follow-up to the Fukushima Daiichi nuclear accident and to ensure the continued safety of Canadian nuclear facilities. The IRRS Team did not raise any concerns or make any observations that impacted the *CNSC Staff Action Plan.*

The CNSC is committed to being open and transparent. Comments from these two rounds of consultations, together with the revised *CNSC Staff Action Plan* are discussed in CMD 12-M23 and will be presented to the Commission for endorsement at a public meeting on May 3, 2012.

Appendix A – CNSC Staff Action Plan

Part 1 – Strengthening reactor defence in depth

The CNSC Task Force confirmed that Canadian NPPs are safe and have a robust design that relies on multiple layers of defence. The design ensures that there will be no impact on the public from external events that are regarded as credible. The design also offers protection against more severe external events that are much less likely to occur. Nevertheless, the CNSC Task Force recommended strengthening each layer of defence built into the Canadian NPP design and licensing philosophy. In particular, certain design enhancements for severe accident management – such as containment performance to prevent unfiltered releases of radioactive products, control capabilities for hydrogen and other combustible gases, and adequacy and survivability of equipment and instrumentation – will be evaluated and implemented wherever practicable. Some have already been implemented. The following sections describe those actions that are needed to strengthen each layer of defence in depth.

Responsibility: Directorate of Power Reactor Regulation
Directorate of Assessment and Analysis

CNSC staff will develop site-specific action items detailing the implementation measures and closure criteria for each recommendation required of licensees to strengthen reactor defence in depth. The implementation of these actions will be prioritized, on a risk-informed basis, commensurate with short-, medium- or long-term completion dates established for each action below. Cost-benefit implications may be included in the rationalization of each action but will be subject to CNSC review and acceptance. Site-specific actions will be developed, by the respective Regulatory Program Division, taking into consideration differences in reactor designs and locations.

Recommendation 1

1.0 Licensees should systematically verify the effectiveness of, and supplement where appropriate, the existing plant design capabilities in beyond-design-basis accident and severe accident conditions, including:

a) overpressure response of the main systems and components **(Short Term)**
b) containment performance to prevent unfiltered releases of radioactive products **(Long Term)**
c) control capabilities for hydrogen and other combustible gases **(Medium Term)**:
   i) accelerate installation of the hydrogen management capability and sampling provisions
   ii) include spent fuel bays and any other areas where hydrogen accumulation cannot be precluded
d) make-up capabilities for the steam generators, primary heat transport system and connected systems, moderator, shield tank and spent fuel bays **(Medium Term)**
e) design requirements for the self-sufficiency of a plant site such as availability and survivability of equipment and instrumentation following a sustained loss of power and capacity to remove heat from a reactor **(Short Term)**
f) control facilities for personnel involved in management of the accident **(Long Term)**
g) emergency mitigating equipment and resources that could be stored offsite and brought onsite if needed **(Short Term)**

1.1 Action:
Licensees should submit additional evidence (e.g., test results) that provide confidence in the bleed condenser / degasser condenser relief capacity.

Deliverables:
1. An updated evaluation of the capability of bleed condenser / degasser condenser relief valves providing additional evidence that the valves have sufficient capacity.
2. If required, a plan and schedule either for confirmatory testing of installation or provision for additional relief capacity.

Applicable to: All sites

Timeline: Completion by end of December 2012.

1.2 Action:
Licensees should re-examine the capability of the shield tank / calandria vault relief to discharge steam produced in a severe accident. The benefits of sustainability of shield tank heat sink during accident conditions should also be re-examined.

Deliverables:
1. An assessment of the capability of shield tank / calandria vault relief.
2. If relief capacity is inadequate, an assessment of the benefit available from adequate relief capacity and the practicability of providing additional relief.
3. If additional relief is beneficial and practicable, a plan and schedule for provision of additional relief.

Applicable to: All sites

Timeline: Completion by end of December 2013.

1.3 Action:
Licensees should evaluate the means to prevent the failure of the containment systems and, to the extent practicable, unfiltered releases of radioactive products in beyond-design-basis accidents including severe accidents. If unfiltered releases of radioactive products in beyond-design-basis accidents including severe accidents cannot be precluded, then additional mitigation should be provided.

Deliverables:
1. Assessments of adequacy of the existing means to protect containment integrity and prevent uncontrolled release in beyond-design-basis accidents including severe accidents.
2. Where the existing means to protect containment integrity and prevent uncontrolled releases of radioactive products in beyond-design-basis accidents including severe accidents are found inadequate, a plan and schedule for design enhancements to control long-term radiological releases and, to the extent practicable, unfiltered releases.

Applicable to: All sites

Timeline: Completion by end of December 2015.

1.4 Action:
Licensees should complete the installation of passive autocatalytic recombiners (PARs) as quickly as possible.

Deliverable:
A plan and schedule for the installation of PARs as quickly as possible.

Applicable to: All sites

Timeline: Completion by end of December 2012.

1.5 Action:
If draining of the irradiated fuel bay (IFB) following a beyond-design-basis event cannot be precluded, the need for hydrogen mitigation should be evaluated.

Deliverable:
An evaluation of the potential for hydrogen generation in the IFB area and the need for hydrogen mitigation.

Applicable to: All sites

Timeline: Completion by end of December 2013.

1.6 Action:
Licensees should evaluate the structural integrity of the IFB at temperatures in excess of the design temperature limit. If structural failure cannot be precluded, then additional mitigation (e.g., high capacity make-up or sprays) should be provided. Consequences of the loss of shielding should be evaluated.

Deliverables:
1. An evaluation of the structural response of the IFB structure to temperatures in excess of the design temperature, including an assessment of the maximum credible leak rate following any predicted structural damage.
2. A plan and schedule for deployment of any additional mitigating measures shown to be necessary by the evaluation of structural integrity.

Applicable to: All sites

Timeline: Completion by end of December 2013.

1.7 Action:
Licensees should evaluate means to provide coolant make-up to the primary heat transport system, steam generators, moderator, shield tank / calandria vault, spent fuel pools and dousing tank where applicable. Means include:

1. Coolant makeup to prevent severe core damage.
2. If severe core damage cannot be precluded, then the make-up coolant should be used in severe accident management guidelines (SAMG) to mitigate the severe accident.

Deliverable:
A plan and schedule for optimizing existing provisions and putting in place additional coolant make-up provisions, and supporting analyses.

Applicable to: All sites

Timeline: Completion by end of December 2013.

1.8 Action:
Licensees should provide a reasonable level of confidence that the means (e.g., equipment and instrumentation) necessary for severe accident management and essential to the execution of SAMGs will perform its function in the severe accident environment for the duration for which it is needed.

Deliverable:
A detailed plan and schedule for performing assessments of equipment and instrumentation survivability, and a plan and schedule for equipment upgrade where appropriate based on the assessment.

Applicable to: All sites

Timeline: Completion by end of December 2013

1.9 Action:
Licensees should ensure the habitability of control facilities under conditions arising from beyond-design-basis and severe accidents.

Deliverable:
An evaluation of the habitability of control facilities under conditions arising from beyond-design-basis and severe accidents. Where applicable, detailed plan and schedule for control facilities upgrades.

Applicable to: All sites

Timeline: Completion by end of December 2014.

1.10 Action:
Licensees should investigate means of extending the availability of power for key instrumentation and control (I&C) needed in accident management actions following a loss of all AC power.

Deliverables:
1. An evaluation of the requirements and capabilities for electrical power for key instrumentation and control. The evaluation should identify practicable upgrades that would extend the availability of key I&C, if needed.
2. A plan and schedule for deployment of identified upgrades. A target of eight hours without the need for offsite support should be used.

Applicable to: All sites

Timeline: Completion by end of December 2012.

1.11 Action:
Licensees should procure, as quickly as possible, emergency equipment and other resources that could be either stored onsite or stored offsite and brought onsite to mitigate a severe accident.

Deliverable:
A plan and schedule for procurement.

Applicable to: All sites

Timeline: Completion by end of December 2012.

Recommendation 2

2.0 Licensees should conduct more comprehensive assessments of site-specific external hazards to demonstrate that **(Medium Term)**:

a) considerations of magnitudes of design-basis and beyond-design-basis external hazards are consistent with current best international practices
b) consequences of events triggered by external hazards are within applicable limits

Such assessments should be updated periodically to reflect gained knowledge and modern requirements.

2.1 Action:
Licensees should complete the review of the basis for external events against modern state-of-the-art practices for evaluating external events magnitudes and relevant design capacity for these events.

Deliverables:
Through implementation of the current S-294, *Probabilistic Safety Assessment (PSA) for Nuclear Power Plants*:

1. Re-evaluate, using modern calculations and state-of-the-art methods, the site-specific magnitudes of each external event to which the plant may be susceptible.
2. Evaluate if the current site-specific design protection for each external event assessed in 1 above is sufficient. If gaps are identified a corrective plan should be proposed.
3. Perform deterministic analyses for representative severe core damage accidents.

Applicable to: All sites

Timeline: Completion by end of December 2013.

2.2 Action:
Implementation of RD-310, *Safety Analysis for Nuclear Power Plants*, is already in progress and being tracked by the CNSC/Industry Safety Analysis Improvement Initiative working group.

Deliverable:
No new requirement since it is already being implemented.

Applicable to: All sites

Timeline: Completion by end of December 2013.

Recommendation 3

3.0 Licensees should enhance their modelling capabilities and conduct systematic analyses of beyond-design-basis accidents to include analyses of **(Medium Term)**:

a) multi-unit events
b) accidents triggered by extreme external events
c) spent fuel bay accidents

The analyses should include estimation of releases, into the atmosphere and water, of fission products, aerosols and combustible gases.

3.1 Action:

1. Licensees should develop/finalize and fully implement severe accident management guidelines (SAMGs) at each station.
2. Licensees should expand the scope of SAMGs to include multi-unit and IFB events.
3. Licensees should demonstrate effectiveness of SAMGs. Licensees should validate and/or refine SAMGs to demonstrate their adequacy in the light of lessons drawn from the Fukushima Daiichi nuclear accident.

Deliverables:

1. Where SAMGs have not been developed/finalized or fully implemented, provide plans and schedules for completion.
2. For multi-unit stations, provide plans and schedules for the inclusion of multi-unit events in SAMGs.
3. For all stations, provide plans and schedules for the inclusion of IFB events in station operating documentation where appropriate.
4. Demonstrate the effectiveness of SAMGs via table-top exercises and drills.

Applicable to: All sites

Timeline**:** Completion by end of December 2013.

3.2 Action:
Licensees of multi-unit NPPs should develop improved modelling of multi-unit plans in severe accident conditions or demonstrate that the current simple modelling assumptions are adequate.

Deliverables:

1. An evaluation of the adequacy of existing modelling of severe accidents in multi-unit stations. The evaluation should provide a functional specification of any necessary improved models.

2. A plan and schedule for the development of improved modelling, including any necessary experimental support.

Applicable to: All sites (multi-unit accident conditions are not applicable to Point Lepreau and Gentilly-2)

Timeline: Completion by end of December 2012.

Part 2 – Enhancing emergency response

The CNSC Task Force also confirmed that the current status of emergency preparedness and response measures in Canada, both the onsite and offsite preparedness and response, remain adequate. Nevertheless, the Task Force identified further improvements to be achieved through streamlining emergency preparedness between onsite and offsite authorities. These improvements are described in the actions outlined below. Commission consideration will be sought for all measures required to strengthen interaction with provincial and federal emergency planning authorities and where legislation may be needed. The CNSC has no regulatory mandate to interact in these areas; nevertheless, the CNSC is committed to facilitating discussions and liaising with appropriate regulatory authorities to address the concerns expressed by the Task Force.

Responsibility: Directorate of Security and Safeguards
Directorate of Power Reactor Regulation

The CNSC will retain the overall responsibility for coordinating, with licensees and affected federal or provincial authorities, the measures needed to implement the actions required by stakeholders to strengthen onsite and offsite emergency response plans and improvements to emergency facilities and equipment. The implementation of these actions will be prioritized, on a risk-informed basis, commensurate with short-, medium- or long-term completion dates established for each of the actions identified below. Cost-benefit implications may be included in the rationalization of each action but will be subject to CNSC consideration. Specific actions that include or may include overlapping among various federal, provincial and municipal jurisdictions will be referred to the Commission for consideration or guidance at the public Commission meeting on May 3, 2012.

Recommendation 4

4.0 Licensees should assess emergency plans to ensure emergency response organizations will be capable of responding effectively in a severe event and/or multi-unit accident, and conduct sufficiently challenging emergency exercises based on them. **(Short Term)**

4.1 Action:
Licensees should evaluate and revise their emergency plans in regard to multi-unit accidents and severe external events. This activity should include an assessment of their minimum complement requirements to ensure their emergency response organizations will be capable of responding effectively to multi-unit accidents or to severe natural disasters.

Deliverables:
1. An evaluation of the adequacy of existing emergency plans and programs.
2. A plan and schedule to address any gaps identified in the evaluation.

Applicable to: All stations (multi-unit accident conditions are not applicable to Point Lepreau and Gentilly-2)

Timeline: Completion by end of December 2012.

4.2 Action:
Licensees should review their drill and exercise programs to ensure that they are sufficiently challenging to test the performance of the emergency response organization under severe events and/or multi-unit accident conditions.

Deliverable:
A plan and schedule for the development of improved exercise program.

Applicable to: All Stations (multi-unit accident conditions are not applicable to Point Lepreau and Gentilly-2)

Timeline: Completion by end of December 2012.

Recommendation 5

5.0 Licensees should review and update their emergency facilities and equipment, in particular **(Short Term)**:

a) ensure operability of primary and backup emergency facilities and of all emergency response equipment that require electrical power and water
b) formalize all arrangements and agreements for external support and document these in the applicable emergency plans and procedures
c) verify or develop tools to provide offsite authorities with an estimate of the amount of radioactive material that may be released and the dose consequences, including the installation of automated real-time station boundary radiation monitoring systems with appropriate backup power

5.1 Action:
Licensees should review primary and alternate emergency facilities, and all emergency response equipment that requires electrical power to operate (e.g., electronic dosimeters, two-way radios), to make sure that appropriate backup power sources exist. The requirements and limitations should be documented in the applicable emergency plans and procedures.

Deliverables:
1. An evaluation of the adequacy of backup power for emergency facilities and equipment.
2. A plan and schedule to address any gaps identified.

Applicable to: All sites

Timeline: Completion by end of December 2012.

5.2 Action:
Licensees should formalize all arrangements and agreements for external support, and document these in the applicable emergency plans and procedures.

Deliverables:
1. Identify the external support and resources that may be required during an emergency.
2. Identify the external support and resource agreements that have been formalized and documented.
3. Confirm if any undocumented arrangements can be formalized.

Applicable to: All sites

Timeline: Completed by December 2012.

5.3 Action:
Licensees should install automated real-time station boundary radiation monitoring systems with appropriate backup power and communications systems.

Deliverable:
Provide a project plan and installation schedule.

Applicable to: All sites

Timeline: Completion by end of December 2012.

5.4 Action:
Licensees should develop source term estimation capability including dose modelling tools.

Deliverable:
Provide source term and dose modelling tools specific to each NPP.

Applicable to: Hydro-Québec and NB Power

Timeline: Completed by December 2012.

Recommendation 6

6.0 Federal and provincial nuclear emergency planning authorities should undertake a review of their plans and supporting programs, such as **(Medium Term)**:

a) ensuring plan revision activities are expedited and making regular full-scale exercises a priority
b) establishing a formal, transparent, national-level oversight process for offsite nuclear emergency plans, programs and performance
c) reviewing the planning basis of offsite arrangements in view of multi-unit accident scenarios
d) reviewing arrangements for protective action including resolving the issues pertaining to public alerting, validating the effectiveness of potassium iodide (KI) pill-stocking and distribution strategies and verifying, or developing the capability for predicting, offsite effects.

6.1 Action:
CNSC staff will meet with provincial and federal nuclear emergency planning authorities to ensure understanding of recommendations and findings.

Deliverables:
CNSC staff will participate in activities led by respective provincial and federal authorities and initiate adequate CNSC regulatory framework or oversight measures to address recommendations.

Applicable to: All sites, federal and provincial emergency planning authorities

Timeline: Completion by end of December 2013.

Part 3 – Improving regulatory framework and processes

The CNSC Task Force reviewed the CNSC regulatory framework and processes and confirmed that the Canadian regulatory framework is strong and comprehensive. Nevertheless, the Task Force identified further improvements to existing regulations and supporting regulatory documents and to the licensing basis to strengthen the oversight of existing programs and of programs currently being considered for potential new nuclear power plants. These are described in each of the actions outlined below.

Responsibility: Regulatory Policy Directorate
Directorate of Power Reactor Regulation
Directorate of Regulatory Improvement and Major Projects Management

When considering the measures needed to strengthen the regulatory framework, CNSC staff will develop enhancements to regulatory oversight programs under prioritized CNSC initiatives consistent with the general guidance outlined in the *CNSC Management Response*.

Recommendation 7

7.0 The CNSC should initiate a formal process to amend the *Class I Nuclear Facilities Regulations* to require NPP licensees to submit offsite emergency plans with an application to construct or operate a nuclear power plant. **(Medium Term)**

7.1 Action:
The CNSC will initiate a project to amend the *Class I Nuclear Facilities Regulations* to require submission of applicable provincial and municipal offsite emergency plans along with evidence to support how the licensees are meeting the requirements of those plans to the CNSC as part of the licence application or licence renewal process.

Deliverable:
1. The CNSC will prepare proposed amendments to the *Class I Nuclear Facilities Regulations* for consultation in *Canada Gazette Part I* and submit to the Commission for approval to proceed.
2. The CNSC will review results of consultation and prepare final amendments to the *Class I Nuclear Facilities Regulations* and propose to the Commission for enactment.

Applicable to: CNSC staff

Timeline: Completed by December 2013.

Recommendation 8

8.0 The CNSC should amend the *Radiation Protection Regulations* to be more consistent with current international guidance and to describe in greater detail the regulatory requirements needed to address radiological hazards during the various phases of an emergency. **(Medium Term)**

8.1 Action:
The CNSC will initiate a project to amend the *Radiation Protection Regulations* to introduce additional clarity on emergency dose limits for workers and to establish return to work criteria.

Deliverable:
1. The CNSC will prepare and consult on a discussion paper on potential amendments to the *Radiation Protection Regulations* which will include proposed amendments to the emergency provisions in the regulations.
2. The CNSC will prepare proposed amendments to the *Radiation Protection Regulations* for consultation in the *Canada Gazette Part I* and submit them to the Commission for approval to proceed.
3. The CNSC will review results of consultation and prepare final amendments to the *Radiation Protection Regulations* and propose them to the Commission for enactment.

Applicable to: CNSC staff

Timeline: Completed by December 2013.

Recommendation 9

9.0 The CNSC should update the regulatory document framework through:

a) updating selected design-basis and beyond-design-basis requirements and expectations, including those for **(Short Term)**:
   i) external hazards and the associated methodologies for assessment of magnitudes
   ii) probabilistic safety goals
   iii) complementary design features for both severe accident prevention and mitigation
   iv) passive safety features
   v) fuel transfer and storage
   vi) design features that would facilitate accident management
b) developing a dedicated regulatory document on accident management **(Medium Term)**
c) strengthening the suite of emergency preparedness regulatory documents **(Medium Term)**
d) reviewing applicable Canadian Standards Association standards **(Medium Term)**

9.1 Action:
The CNSC will initiate projects to amend applicable regulatory documents in order to incorporate the findings of the CNSC Task Force for both existing and new nuclear power plants.

Deliverables:
1. The CNSC will adapt the proposed GD-310, *Guidance on Safety Analysis for Nuclear Power Plants*, prior to publishing it, to address the findings of the CNSC Task Force review findings.

2. The CNSC will prepare revisions to RD-337, *Requirements and Guidance for Design of New NPPs* and, following a public consultation period, submit to the Commission for approval to publish.
3. The CNSC will prepare targeted amendments to specific regulatory documents and, following a public consultation period, submit them to the Commission for approval to publish. These include:
   - RD-346, *Site Evaluation for New Nuclear Power Plants*
   - S-294, *Probabilistic Safety Assessments for Nuclear Power Plants*
   - S-296, *Environmental Protection Policies, Programs, and Procedures at Class I Nuclear Facilities and Uranium Mines and Mills*
   - RD-310, *Safety Analysis for Nuclear Power Plants*
   - G-306, *Severe Accident Management Programs for Nuclear Reactors*

Applicable to: CNSC staff

Timeline: Completed by December 2013.

9.2 Action:
The CNSC will initiate a project to develop a dedicated regulatory document on accident management.

Deliverable:
The CNSC will prepare a draft document on accident management and, following a period of public consultation, submit to the Commission for approval to publish.

Applicable to: CNSC staff

Timeline: Completed by December 2013.

9.3 Action:
The CNSC will initiate a project to develop a dedicated regulatory document on emergency management.

Deliverable**:**
The CNSC will prepare a draft regulatory document on emergency management, reviewing and incorporating existing information in G-225, *Emergency Planning at Class I Nuclear Facilities and Uranium Mines and Mills*, and RD-353, *Testing the Implementation of Emergency Measures* and, following a period of public consultation, submit them to the Commission for approval to publish.

Applicable to: CNSC staff

Timeline: Completed by June 2014.

9.4 Action:
The CNSC will support the review of Canadian Standards Association (CSA) Standards to take into account the lessons from the Fukushima Daiichi nuclear accident through its participation in the CSA Nuclear Strategic Steering Committee (NSSC).

Deliverable:

The CNSC will request the CSA to provide, within the proposed timeline:

1. identification of the issues that need to be addressed in the next review cycles for its Standards.

2. action and work plans to address the identified needs.

Applicable to: CNSC staff

Timeline**:** Completed by December 2013.

Recommendation 10

10.0 The CNSC should amend all power reactor operating licences (PROLs) to include specific licence conditions, requiring implementation of accident management provisions, severe accident management and public information. **(Short Term)**

10.1 Action:
Require licensees to have programs for accident management, severe accident management and public communication.

Deliverables:

1. A Commission member document (CMD) will be produced for the February 2012 Commission meeting, requesting approval of a new PROL template that will include new licence conditions. The following wording is proposed:

   "The licensee shall develop and implement operational guidance and adequate capabilities to deal with abnormal situations, emergencies, and accidents, including severe accidents and, where applicable, multi-unit events."

   A licence condition will also be proposed, requiring licensees to implement and maintain a public information program that includes a proactive disclosure protocol, once RD-99.3, *Requirements and Guidance for Public Information and Disclosure* (or its replacement), has been approved for publication (refer to action 10.2 below for details).

   Sections will be added to the NPP Licence Condition Handbook (LCH) template to clarify the compliance verification criteria for the new licence conditions.

2. The amendments to the existing PROLs will be added to comply with the updated template.

Applicable to: CNSC staff

Timeline:
Item 1: Completion by February 1, 2012.
Item 2: Completion by end of December 2014.

10.2 Action:
The CNSC will continue to develop and submit to the Commission for approval, RD/GD-99.3, *Requirements and Guidance for Public Iinformation and Disclosure*

Deliverable:
1. The CNSC will submit the updated draft RD/GD-99.3 to the Commission for approval to publish at the February 2012 Commission meeting.
2. The amendments to existing PROLs will be consistent with the implementation timeline set out in Action 10.1.

Applicable to: CNSC staff

Timeline: Completion by end of February 2012.

Recommendation 11

11.0 The CNSC should further enhance the regulatory oversight of nuclear power plants through the implementation of a periodic safety review process. **(Short Term)**

11.1 Action:
The CNSC to consider the development of a regulatory framework for the implementation of the periodic safety review process.

Deliverable:
1. A CMD seeking endorsement to proceed with the development of regulatory requirements for conducting periodic safety reviews by licensees is to be submitted for consideration by the Commission at the February 15, 2012 public Commission meeting.
2. Amendments to existing PROLs are anticipated to be completed by December 2015 or as set out by the Commission.

Applicable to: CNSC staff

Timeline:
Item 1: Completion by February 1, 2012.
Item 2: Completion by end of December 2015.

Recommendation 12

12.0 The CNSC should review memoranda of understanding with regulatory counterparts in countries with CANDU reactors to outline what support, if any, they would require from the CNSC during a nuclear emergency. **(Short Term)**

12.1 Action:
The CNSC is to initiate discussions with CANDU Senior Regulators to determine areas of interest where mutual support can be offered during a nuclear emergency.

Deliverable:
The CNSC in collaboration with the IAEA and CANDU Senior Regulators proposes a meeting in April 2012 in Vienna, Austria, in advance of national report submissions for peer review in May 2012 to establish a common platform for harmonization of future improvements arising from the lessons learned from their independent safety reviews.

Applicable to: CNSC staff

Timeline: Completion by end of May 2012.

Recommendation 13

13.0 The CNSC should enhance cooperation with other nuclear regulators in addressing the lessons learned from the Fukushima Daiichi nuclear accident and thus further strengthen the capability to respond efficiently to any nuclear emergency. **(Short Term)**

13.1 Action:
Canada as a signatory to the Convention on Nuclear Safety is required to participate in triennial review meetings of the Convention and any extraordinary meeting that may be agreed to by contracting parties. The CNSC on behalf of Canada is responsible for coordinating the preparation and submission of the national reports for peer review and the participation of Canadian delegates at the review or extraordinary meetings. The CNSC in collaboration with industry and government stakeholders is to prepare a national report for peer review by contracting parties and to participate at the 2nd Extraordinary Meeting of the Convention on Nuclear Safety on the sharing of lessons learned and actions taken by contracting parties in response to the Fukushima Daiichi nuclear accident.

Deliverable:
A national report on lessons learned from the Fukushima Daiichi nuclear accident consistent with the requirements established by contracting parties at the 5th Review Meeting in April 2011. The national report is to be submitted to the IAEA Secretariat in May 2012 for peer review by the Convention on Nuclear Safety states and discussed at an Extraordinary Meeting of the Convention in Vienna, Austria, August 27–30, 2012.

Applicable to: CNSC staff

Timeline: Completion by end of September 2012.

Appendix B – Disposition of Comments on the *CNSC Fukushima Task Force Report*

Consultation Report on the *CNSC Fukushima Task Force Report* and *CNSC Management Response*

Introduction

The CNSC posted, on its Web site, the *Fukushima Task Force Report* and its accompanying *CNSC Management Response* for review and comment by the public. The *CNSC Management Response* provided CNSC staff, licensees and federal and provincial stakeholders with general direction on addressing the recommendations identified by the Task Force.

Consultation Process

On October 28, 2011, the CNSC posted, on its Web site, the *CNSC Fukushima Task Force Report* and accompanying *CNSC Management Response* for review and comment by the public until December 1, 2011.

Twelve responses were received that included members of the public, the nuclear industry, special interest groups and non-government organizations.

Summary of Stakeholder Comments

Comments received were general in nature, and in a number of instances were found to be out-of-scope. Nevertheless, CNSC Staff responded to all pertinent issues raised and provided substantive comments to address the concerns identified.

A summary of all the comments from the public and industry and their disposition for this first round of consultation is included in Table 1 – Disposition of Comments on the *CNSC Fukushima Task Force Report.*

Conclusion

There were no changes made to the *CNSC Fukushima Task Force Report* as a result of these comments.

Table 1 – Disposition of Comments on the *CNSC Fukushima Task Force Report*

#	From	Intervener Comment	CNSC Response
1	Keivan Torabi Member of public	Hi there, I was reading the recent CNSC Fukushima Task Force Report (INFO-0824), and I was wondering if there is an inconsistency in referencing to the 2003 station blackout. On page 76 of CNSC Fukushima Task Force Report (INFO-0824), dated October 2011 (attachment 1): However, on page 62 of Annual CNSC Staff Report for 2003 on the Safety Performance of the Canadian Nuclear Power Industry (INFO-0745), dated November 2004 (attachment 2): if the standby generators started automatically to supply shutdown cooling pumps (as the 2003 report says), the circulation would have been forced, not natural (thermosyphoning). So, it seems the two statements in the two reports are contradicting as whether there was a forced circulation or natural convection. Would you please, forward my question to technical staff and clarify this issue, please.	The Class III standby generators at Pickering B are capable of providing power to the shutdown cooling pumps. However, shutdown cooling is not designed to be used on a reactor that is hot and pressurized. High temperature primary coolant would cause boiling in the secondary side of the shutdown cooling heat exchangers which contains service water at a much lower pressure. During the 2003 loss of bulk electrical supply, Units 5, 6 and 8 could not use shutdown cooling because they were hot and pressurized. Class IV power was restored before they could achieve cold shutdown. These units were cooled by natural convection for 9 hours as stated in the *CNSC Fukushima Task Force Report*. Unit 7 was already using shutdown cooling at the time of the event and continued to do so. In response to the 2003 event, OPG has added an auxiliary power system to provide limited Class IV power in the event of a loss of bulk electrical supply. This allows primary heat transport pumps to be run. Had this been available in 2003, units 5, 6 and 8 could have been quickly taken to the cold, depressurized state allowing shutdown cooling to be used.
2	Roy Colquhoun	Please accept my compliments on a well-balanced and	Bruce A has a Qualified Power Supply (QPS)

#	From	Intervener Comment	CNSC Response
	Member of public	insightful report, Ref. 1. I am a Nuclear Engineer with over 45 years experience in the design and operation of Nuclear Power plants. I have several minor points that I will pass over to focus on the major point. CNSC staff recognise the significance of the Two Group approach adopted at all stations beginning with the design of Pickering B and Gentilly 2, circa 1973. That approach involves the installation of a level of defence independent of external power supplies or standby generators. The following stations were constructed and licenced with such capabilities: Pickering B, Gentilly 2, Point Lepreau, Bruce B and Darlington. Each of these stations has the ability to survive a loss of offsite power and failure of the Standby Generators, without involving fuel damage. The other two stations, Pickering A and Bruce A do not have a complete Group 2 per se. Pickering A has installed the capability to derive Class I and II power from Pickering B via a duplicated Class III Inter Station 600V transfer bus. Therefore long term monitoring is redundantly provided. Pickering A boilers can be supplied from Pickering B Service water so Pickering A has a capability similar to that provided via Group 2 EWS. Therefore, Pickering A has a "3rd" line of defence similar to Group 2. Bruce A does not have "3rd" line of defence for electrical	that provides power to Emergency Boiler Cooling (EBC) pumps and valves, emergency coolant injection valves and monitoring equipment, heat transport main pump circuit breaker trip, safety shutdown system 2 (SDS2) system equipment and air conditioning and lighting loads for the control and instrumentation rooms. This group of structures, systems and components (SSCs) can maintain essential safety functions following a main steamline break or design basis earthquake. The QPS consists of two 600V buses with one bus being supplied by a Unit 3 class III bus and the second by one of two QPS diesels. Each bus is rated to supply the loads of both buses and can be connected via a tie breaker. Equipment associated with the QPS is located in rooms which are designed to withstand environmental conditions resulting from a main steam line break. Specified loads will be transferred manually to the QPS and the system can be monitored from the main control room. The EBC system is designed to provide feedwater to the steam generators to ensure that adequate decay heat removal is available in the event of loss of normal feed. The EBC water is supplied by two pumps from Lake Huron via the fire pump suction headers. The EBC pump motors and valves are supplied by QPS power

#	From	Intervener Comment	CNSC Response
		power and for long term (beyond 5 hours) has insufficient battery capability to support essential instrumentation. Bruce A does have a single (one per unit) dedicated diesel driven pump capable of supplying the boilers for a long time. Note that there is no unit redundancy for these pumps. Consequently, Bruce A does not appear to meet the requirements for a 3rd line of defence. Please note that Bruce A had a "close call" re loss of off-site power and failure of all 4 Standby Generators, circa 1979, that was resolved by recovering off-site power. Questions: Does the CNSC staff concur with the above assessment? If not – why? And if CNSC staff agrees, what measures are proposed to upgrade Bruce A? References 1. CNSC Fukushima Task Force Report, INFO-0824, October 2011.	and are independent of the normal boiler feedwater system. The EBC system can supply up to four units simultaneously. The installation/upgrade of the QPS was a condition of return to service for units 3 and 4. The system was retrofitted to meet CSA 290.5, section 5.6 for emergency power supply requirements. By including the QPS, Bruce A is on par with other facilities in terms of electrical backup.
3	Raidis Zemdegs Candu Energy Inc.	Overall This is a well-written and thorough report, largely consistent with the findings of other regulators and Candu Energy's own EC6 Fukushima Design Impact Assessment Team. Section 9 of the report lists issues which need to be considered for new designs; some elements discuss the potential for detailed prescriptive requirements. This	RD-337, *Design of New Nuclear Power Plants*, section 11 explicitly allows a designer to use an alternative approach that provides an equivalent

#	From	Intervener Comment	CNSC Response
		approach could constrain the designer in choosing the best solution to an issue - in an effort to achieve a balanced design. It would be preferable to restate these issues in terms of goals where possible, and allow the designer to demonstrate how the goals will be achieved.	level of safety.
4	Raidis Zemdegs Candu Energy Inc.	Pg.13, Sect. 4.2.2 The description of CANDU in this section may be enhanced as "CANDUs have two groups of separated backup power supplies and most postulated failures are unlikely to incapacitate both". Editorial - clarification	The purpose of taking comments on the *CNSC Fukushima Task Force Report* was to allow those comments to be considered in the Action Plan.
5	Raidis Zemdegs Candu Energy Inc.	Pg.14, 4.2.3, para. 2 Consider clarifying that CANDU spent fuel bays, unlike Fukushima, have the large advantage that they are mostly below grade and outside containment, hence far more accessible for mitigation of loss of heat sink. Editorial - clarification	The purpose of taking comments on the *CNSC Fukushima Task Force Report* was to allow those comments to be considered in the Action Plan. In addition to better accessibility, CNSC is also aware that the leakage rate, for a given degree of damage, from an in-ground pool is likely to be much lower than for an above-ground pool.
6	Raidis Zemdegs Candu Energy Inc.	Pg.15, Sect. 4.2.7, para. 2 Also pg.32, Sect. 6.4.2.1 Also pg.59, item #10 Also pg.60, Section The statement that "Containment integrity for multi-unit severe accidents should be assured by adequate venting" should be qualified as applying to existing multi-unit stations for which the long-term reliability of electrical	RD-337, *Design of New Nuclear Power Plants*, section 11 explicitly allows a designer to use an alternative approach that provides an equivalent level of safety.

#	From	Intervener Comment	CNSC Response
		power cannot be guaranteed. New designs may choose a different means to preserve containment. Issue – Allowing designer flexibility in design to address "preserving containment".	
7	Raidis Zemdegs Candu Energy Inc.	Pg.22, top of page Section 6.1 appears to cover design basis accidents. The primary coolant piping in CANDUs will withstand a Design Basis Earthquake. The description of consequences of design basis earthquake should be clarified (consider wording from Sect. 6.3.4.) Editorial - clarification	The purpose of taking comments on the *CNSC Fukushima Task Force Report* was to allow those comments to be considered in the Action Plan. Section 6.1 deals with both design basis and beyond design basis hazards.
8	Raidis Zemdegs Candu Energy Inc.	Pg.24, Sect. 6.2.1, 1st para. The main reason for not analyzing the design basis of external events in detail was that the plant was designed to withstand them. Clarification	The purpose of taking comments on the *CNSC Fukushima Task Force Report* was to allow those comments to be considered in the Action Plan.
9	Raidis Zemdegs Candu Energy Inc.	Pg.33, Sect. 6.4.4 While use of external resources would be helpful, and is certainly an option, they may not be available for some time, as Fukushima has shown. An alternative would be to ensure sufficient flexible on-site resources (e.g. portable power supplies) to perform key safety functions for many days.	CNSC staff agrees that onsite resources have an important role to play. Task Force recommendations 1 e) and 9 a) vi) make this clear. In revising RD-337, CNSC staff is considering setting a target duration for the capability of an NPP to be self-sufficient with installed

#	From	Intervener Comment	CNSC Response
		Issue – Broaden options to specify a mitigating strategy	equipment (not requiring connection), and a second target duration for the NPP to be self-sufficient with onsite resources, such as portable power supplies, that need connection.
10	Raidis Zemdegs Candu Energy Inc.	Pg.58, item 2 Suggest that the requirement be on the probability of production of combustible gases be below a specific threshold, including the impact of any design features that provide combustible gas management. Clarification/Definition	The purpose of taking comments on the *CNSC Fukushima Task Force Report* was to allow those comments to be considered in the Action Plan. This area will be clarified in the Action Plan response to Task Force recommendation 9 a).
11	Raidis Zemdegs Candu Energy Inc.	Pg.58, Item #3 The meaning is not clear. Does this refer to safety goals for multi-unit facilities? Clarification.	The purpose of taking comments on the *CNSC Fukushima Task Force Report* was to allow those comments to be considered in the Action Plan. This finding asks CNSC to consider setting, or requiring the licensee to provide and justify, a release for use in emergency planning that takes account of multiple units at a site that may be seriously damaged in an external event.
12	Raidis Zemdegs Candu Energy Inc.	Pg.58, Item #5 The safety goals in RD-337 of small release frequency and large release frequency also apply to irradiated fuel bays (BDBAs). Clarification/Definition	The purpose of taking comments on the *CNSC Fukushima Task Force Report* was to allow those comments to be considered in the Action Plan.
13	Raidis Zemdegs Candu Energy Inc.	Pg.59, Item #10	RD-337, *Design of New Nuclear Power Plants*, section 11 explicitly allows a designer to use an

#	From	Intervener Comment	CNSC Response
		A lesson learned from Fukushima is that the emergency ventilation system experienced difficulty in operation under the specific accident conditions. It may be preferable to include defence-in-depth provisions that act to control containment pressure before containment integrity is threatened. Issue – Designer should have the ability to demonstrate how the goal of containment integrity is ensured.	alternative approach that provides an equivalent level of safety.
14	Raidis Zemdegs Candu Energy Inc.	Pg. 59, Item 11 Discussion for requirements for 'minimum times' before significant operator interventions are required. The PSA identifies operator actions and times for operator to act. Operator performance is part of the human-machine interface, which provides operators with comprehensive information, in accordance with the necessary decision times and action times. Clarification/Definition	The purpose of taking comments on the *CNSC Fukushima Task Force Report* was to allow those comments to be considered in the Action Plan.
15	Raidis Zemdegs Candu Energy Inc.	Pg. 59, Item 12 RD-337 Section 7.3.4, 3rd para under 'severe accidents' has a statement dealing with equipment hardening (equipment is to perform as intended in the case of severe accidents) and also applies instrumentation for monitoring. Clarification/Definition	The purpose of taking comments on the *CNSC Fukushima Task Force Report* was to allow those comments to be considered in the Action Plan.
16	Mark Mattson Lake Ontario Waterkeeper	**The Task Force failed to address the need to separate Canada's nuclear regulator from the body charged with promoting the nuclear industry.**	As reported at the 5th Convention on Nuclear Safety (please note the link to the Report at the end of the quote):

#	From	Intervener Comment	CNSC Response
		One of the most significant responses to the Fukushima crisis by Japanese officials has been an effort to restructure the nuclear regulatory system. The restructuring aims to remove the conflict of interest (real or perceived) amongst officials responsible for both promoting the domestic nuclear industry, and for ensuring safety and environmental protection. The Task Force report fails to address this issue or consider its relevance to the Canadian nuclear regulatory system. Japan's new regulatory system structure is likely to include the separation of the Nuclear and Industrial Safety Agency (NISA) from the Ministry of Economy, Trade and Industry (METI). The new structure is set to be implemented by April 2012. The restructuring stems from the perception that the link between the NISA and the METI resulted in an insufficient level of independence and a potential conflict of interest, in that METI acted as both the promoter and regulator of the nuclear industry. Canada faces the same challenge as Japan in that our nuclear watchdog, the CNSC, is charged with regulating the nuclear industry, while simultaneously acting as its promoter. The CNSC includes the Commission Tribunal, which makes all major licensing decisions related to the nuclear industry. The Chair of the Commission Tribunal is also the President of the CNSC, Dr. Michael Binder. Dr. Binder regularly acts as a spokesman for the industry. He promotes the "nuclear renaissance" and declares nuclear power	**"Separation of CNSC and organizations that promote and utilize nuclear energy** The passage of the NSCA created distinct, enabling legislation for the regulation of nuclear activities and the separation of functions of the regulatory body from organizations that promote or use nuclear energy. The mandate of the CNSC (see subsection 7.1 a) focuses clearly on the health, safety and security of persons and the protection of the environment, as well as the implementation of international obligations. The mandate does not extend to economic matters. The Commission Tribunal is defined as a court of record in the NSCA, which allows it to conduct its matters in an independent manner. The NSCA provides that only the governor in council may issue directives to the Commission Tribunal, and these must be broad and not directed at any particular licensee. In addition, such an order would be published in the *Canada Gazette* and laid before each House of Parliament. A recent example can be found in the *Directive on Health of Canadians* (described in subsection 8.2 b). To safeguard the integrity of the Commission Tribunal's role as an independent decision-maker, contact between the Commission Tribunal and CNSC staff occurs through the

#	From	Intervener Comment	CNSC Response
		universally “safe”. Dr. Binder writes regular Letters to the Editor in response to articles in the media that describe negative aspects of the nuclear industry. For instance, in January 2011, just two months before the Fukushima disaster, Dr. Binder wrote to the Windsor Star in response to an article about wind power, stating that, “the very small controlled releases of nuclear facilities do not pose any risk to people and the environment”. In his presentations, Dr. Binder emphasizes that the public lacks understanding of nuclear issues, rather than acknowledging the valid concerns of an informed public. In a June 2011 presentation, he described proposals coming before the CNSC, such as the Darlington New Nuclear Power Plant proposal and the Deep Geologic Repository, as being, “all against a skeptical post-Fukushima public”. The Commission does not enjoy the independence traditionally associated with administrative tribunals in Canada. This issue was brought into sharp relief in early 2008 when then Commission Chair, Linda Keen, was fired by the Prime Minister after shutting down a medical isotope-producing nuclear reactor due to safety concerns. The Commission’s decision was overturned in the House of Commons and the nuclear facility reopened. By combining the regulator, particularly the Commission Tribunal that makes licensing decisions, with the body that promotes and speaks in defence of the nuclear industry, Canada faces the same conflict of interest identified by Japanese authorities as one cause of the disaster at	Secretariat. With the exception of the Secretariat and the president, CNSC staff has limited interaction with the Commission Tribunal outside of hearings. Please refer to Canada’s National Report to the 5th Review Meeting of the Convention on Nuclear Safety on the CNSC Web Site: http://www.nuclearsafety.gc.ca/eng/readingroom/reports/cns/

#	From	Intervener Comment	CNSC Response
		Fukushima. In order to ensure that the Commission Tribunal can make truly independent decisions in the interest of safety and the environment, it should be separated from the rest of the CNSC. Only by creating this independence can decisions made by the Commission be free of the perceived or actual conflict of interest that led, in part, to Fukushima.	

#	From	Intervener Comment	CNSC Response
17	Mark Mattson Lake Ontario Waterkeeper	**The Task Force failed to address the CNSC's role in environmental assessment.** The Task Force limited its regulatory review to the Nuclear Safety and Control Act and its regulations. No review was made of the other statutes and regulations regularly administered by the CNSC. Of particular concern, given the extensive negative impact to the environment around Fukushima, is the failure to review the CNSC's role in administering the Canadian Environmental Assessment Act [CEAA]. The CNSC is a Responsible Authority for any federal EA where the proponent requires a licence or approval from the Commission. Despite this regulatory responsibility, the relationship between accidents and environmental damage was not clearly acknowledged or addressed in the Task Force report. Instead, the Task Force report mentions offhand in section 8.6 that, "it may be useful for the environmental assessment process to include consideration of severe accidents, should this be regarded as responsive to public concerns". The CNSC's approach to environmental assessments should have been evaluated in light of Fukushima. The disaster in Japan shows how connected emergency planning is to protecting the environment from spills and deliberate contaminant releases. It is clear that emergency planning is not strictly a licensing issue and must not be restricted to review during licensing stages for new nuclear facilities. Instead, detailed design information, including how releases to the environment will be prevented in the case of an	While the task force report does not explicitly evaluate the CNSC's approach to environmental assessments, the *Canadian Environmental Assessment Act (CEAA)* requires the consideration of the environmental effects of accidents or malfunctions that may occur in connection with a project. CNSC's approach to assessing malfunctions and accidents is described on a project-by-project basis in a project specific Scoping Information Document (or equivalent). Guidance to the legislated obligations for environmental assessments under CEAA is typically provided by the Canadian Environmental Assessment Agency (the Agency). The CNSC is committed to continuous improvement which includes working with the Agency to ensure the requirements of CEAA, including the requirements to consider the environmental effects of accidents or malfunctions for nuclear projects, continue to be met. The CNSC review of the Fukushima Daiichi accident indicates that the CNSC's overall approach to examining the potential environmental consequences of severe accidents in environmental assessments is robust.

#	From	Intervener Comment	CNSC Response
		emergency, must be considered during the environmental assessment approval process. An example is the recent environmental assessment and licensing hearing for the Darlington New Nuclear Power Plant [NNPP]. Waterkeeper was an Intervenor in that proceeding and participated throughout the process. A major concern with the approach applied by the Joint Review Panel, as advanced by the CNSC as a Responsible Authority, was to apply the notion of a "plant parameter envelope" or "bounding scenario". The premise of the bounding scenario approach is that an EA can be completed without even basic design information, such as how many reactors will be built or what kind of cooling water system will be installed. Instead of detailed information, the EA is meant to proceed on the basis of the hypothetical maximum potential impact of a range of possible scenarios. While this approach has been applied by the CNSC at licensing hearings, it is not appropriate for an environmental assessment. The key difference is that the proponent must return for further licences as the project proceeds, at which time detailed design information will be provided to, and reviewed by, the Commission. In an environmental assessment, the initial review is never revisited; it is meant to cover the entire life of the facility from site preparation to decommissioning. If detailed (or even basic) design information is not available at the time of the EA review, it will never be reviewed in the context of the CEAA requirements. The public will never have the opportunity to participate in the	

#	From	Intervener Comment	CNSC Response
		project review with respect to the CNSC's environmental protection responsibilities, outside of the more basic licensing requirements. This approach should have been reviewed by the Task Force in light of the events in Japan.	
18	Mark Mattson Lake Ontario Waterkeeper	**No new nuclear plants in Canada should proceed until the Task Force recommendations can be applied throughout the licensing and environmental assessment process.** Following the nuclear disaster in Japan, many countries decided to put nuclear activities on hold, learn lessons from the unfolding disaster, and apply those lessons to improve safety and environmental protection in domestic facilities. Japan has announced that it will abandon plans to build any new nuclear reactors. Germany is phasing out all reactors in favour of renewable power options. China suspended approvals for all new nuclear power plants until revised safety rules can be developed based on new information from Fukushima. Switzerland has frozen plans to build or replace any nuclear power plants. In contrast, Canada has charged ahead with approvals for new nuclear plants. Within days of the meltdown at Fukushima, the Panel responsible for the hearing into new nuclear reactors at Darlington decided to proceed with a licensing and environmental assessment hearing. Information about the crisis in Japan was not before the Panel for consideration, including the problems faced by TEPCO in attempting to cool the reactors, the insufficient storage space for contaminated water, and the major	In light of the lessons learned to date from Fukushima, CNSC's approach to the consideration of malfunctions and accidents in EAs remains robust. The CNSC is acting diligently to the *Task Force Report* recommendations for new build projects in strengthening its regulatory requirements. These requirements will be implemented for new build projects at the time of the licence to construct or thereafter in subsequent licensing steps. Moreover, the CNSC cannot comment in detail on this recommendation given the legal proceedings underway with respect to the noted project.

#	From	Intervener Comment	CNSC Response
		emissions to the air, soil, and water that resulted. When asked by Waterkeeper and other concerned Intervenors to postpone the hearing until information about the events in Japan became available, the Panel replied that there was no need to adjourn the hearing. The Chair stated that the Panel would continue its review until, "satisfied that it has all the relevant information to allow it to fulfill its mandate". Yet, the Panel released its final report, including recommendations to Cabinet, on August 25, 2011, more than two months before the Task Force released its draft report on lessons to be learned from Fukushima. This indicates that the Panel did not believe the lessons from Japan's disaster were "relevant" to the environmental assessment of a new nuclear plant in Canada. In his announcement of the Panel's decision to proceed with the hearing despite Fukushima, the Chair acknowledged that the lessons from Japan would be studied and applied to future regulatory supervision of nuclear facilities in Canada. Yet, he did not find that these lessons were relevant to the environmental assessment or licence to prepare the site hearing; instead, he stated that they would be, "rigorously examined if and when the Proponent can apply to the Canadian Nuclear Safety Commission for a license to construct and operate". Upon release of the Task Force report, it is clear it includes lessons relevant to the Darlington hearing. The Task Force found that, while the CNSC's current approach to reviewing NNP plans is sound, there are 16 specific improvements that should be made to the review process. These include	

#	From	Intervener Comment	CNSC Response
		issues relevant to the Darlington EA, such as: • "The CNSC has no requirements for the analysis of multi-unit accidents, particularly those that could arise from common-cause events". OPG plans to build up to four new reactors immediately beside four existing reactors. The recent Darlington NNPP hearing failed to analyze multi-unit accidents resulting from common-cause events. The project should be reassessed to address this gap. • "The CNSC does not have a full set of requirements for plant and site layout that would facilitate protection against external hazards". The Darlington hearing was conducted before the plant and site layout for the project were established by OPG. The project must be reassessed against the new criteria to ensure that plant and site layout meet these new requirements. • "The CNSC has not documented an overall, systematic approach to the evaluation of all types of external events that could occur in Canada. A systematic approach would encompass both design-basis events and beyond-design-basis events". This information should have been considered during the Darlington hearing. The project should be sent back to the Joint Review Panel for reassessment that fills the identified gaps. The Task Force Report states that the recommendations listed "must be considered for new builds". The lessons and recommendations identified by the Task Force should be applied to all nuclear facility reviews, regardless of whether they are licensing hearings or environmental assessments.	

#	From	Intervener Comment	CNSC Response
		The Task Force's findings should not be arbitrarily restricted to reviews commenced after October 2011, when it was clear from the early hours of the Fukushima disaster that lessons for the industry would be forthcoming. The CNSC has the opportunity to ensure that the updated, more robust standards recommended by the Task Force are applied prior to the construction of Canada's next nuclear power plant. The Darlington New Nuclear Power Plant proposal should be sent back to the Panel for reconsideration with specific reference to the Task Force report.	
19	Mark Mattson Lake Ontario Waterkeeper	SUMMARY OF RECOMMENDATIONS 1. The Task Force report should include consideration of the real and/or perceived conflict of interest inherent in Canada's nuclear regulatory system, in light of Japan's decision to separate the nuclear regulator from the industry's promoter. 2. The CNSC's approach to environmental assessments, including administration and application of the Canadian Environmental Assessment Act, should have been evaluated in light of Fukushima.. 3. The lessons and recommendations identified by the Task Force should be applied to all nuclear facility reviews, regardless of whether they are licensing hearings or environmental assessments. 4. The Darlington New Nuclear Power Plant proposal should be sent back to the Panel for reconsideration with	See responses to detailed comments above.

#	From	Intervener Comment	CNSC Response
		specific reference to the Task Force report	
20	R. J. Maceacheron Ontario Power Generation	The purpose of this email is to provide a written submission of OPG consolidated comments on the CNSC Fukushima Task Force Report, INFO-0824, October 2011. Overall, the report is well written and presents the results of the Task Force review in an organized and cogent manner. The review was conducted in a manner consistent with the Task Force Nuclear Power Plant Safety Review Criteria (e-Doc 3743877, July 2011) and presents the information in an accurate and balanced fashion. Except as discussed below, OPG agrees with the recommendations and findings set out in the report. OPG has already undertaken activities which address many of the issues identified in the report (see OPG letter to CNSC dated September 15, 2011, e-Doc 3804501). The following comments aim to provide clarity around specific areas covered by the report:	CNSC recognizes that licensees have been proactive in learning the lessons of Fukushima and have already taken a number of actions as a result of their own evaluations.

#	From	Intervener Comment	CNSC Response
21	R. J. Maceacheron Ontario Power Generation	1) Section 6.3.3: The last sentence in paragraph 5 regarding degasser (or bleed) condenser relief valve capacity stipulates that: "The CNSC Task Force finds that licensees should perform tests to verify the capacity of the degasser (or bleed) condenser relief valve capacity to respond to a complete loss of heat sinks." OPG maintains that additional testing is not required and proposes to provide the CNSC with an updated evaluation of the capability of these relief valves that demonstrates the valves have sufficient capacity.	CNSC staff accepts that alternative approaches may be possible to demonstrate the adequacy of pressure relief. The Action Plan response to Task Force recommendation 1 a) will take this into account.
22	R. J. Maceacheron Ontario Power Generation	2) Section 6.3.6 and section 10.1, item 1(c), ii: The CNSC Task Force finds that the need for hydrogen mitigation in the Irradiated Fuel Bay (IFB) has not been adequately evaluated. The issue around the potential for hydrogen gas production in the IFB has been already evaluated and dispositioned by OPG through existing assessments and the provision of Emergency Mitigating Equipment (EME). OPG maintains that it has adequately evaluated the need for hydrogen mitigation and has concluded that hydrogen formation is precluded provided that the fuel remains covered with water. OPG has committed to perform analysis to demonstrate the structural integrity of its fuel bays for elevated temperatures and has committed to additional water make-up for the Darlington and Pickering B fuel bays.	CNSC staff notes that the Fukushima accident demonstrated the destructive power of hydrogen; provision of hydrogen mitigation would provide additional defence in depth and should therefore be considered. CNSC staff accepts that, provided spent fuel is covered, it will not overheat. Provided the structural integrity of the irradiated fuel bays can be successfully demonstrated, existing assessments may be found to be adequate. The Action Plan response to Task Force recommendations 1 c) ii) and 1 d) will make this clear.
23	R. J. Maceacheron Ontario Power Generation	3) Section 6.4.2: OPG agrees with the overall discussion in this section and subsections. However, the CNSC Task Force report focuses on prevention of unfiltered releases. OPG maintains that for the extreme beyond deign basis events (BDBE) and severe accidents (SA) under	Section 6.4.2.1 acknowledges that all current NPPs have the ability to vent to preserve containment integrity. The emphasis here is on the capability for filtered venting. The Action Plan response to Task Force recommendation 1

#	From	Intervener Comment	CNSC Response
		consideration, there needs to be a focus on both filtered releases and the preservation of the containment envelope through controlled releases (if required) in order to minimize public exposure to radiological hazards under these extreme conditions.	b) will emphasize the importance of providing filtered venting to the extent practicable.
24	R. J. Maceacheron Ontario Power Generation	4) Section 6.3.1: The CNSC Task Force finds that its prediction of the time to pressure tube failure following a total loss of heat sinks is shorter than what has been reported by the licensees. Further discussion around this observation is required to determine if additional activities (beyond those already underway as part S-294 Probabilistic Risk Assessment (PRA) revision) are required.	CNSC staff would welcome the opportunity to discuss this issue as industry prepares its response to the Action Plan.
25	R. J. Maceacheron Ontario Power Generation	5) Sections 6.4.3 and Section 6.3 (and elsewhere): The CNSC Task Force has several findings related to opportunities to improve upon the Safety Analysis, Assessment of External Hazards and Assessment of Severe Accidents. There are significant improvement initiatives currently underway in these areas across the nuclear industry that were initiated prior to the Fukushima event. OPG maintains that the scope of BDBE analyses and assessments being undertaken to meet the requirements for PRA under S-294 compliance projects will adequately characterize the consequences of these extreme events, both in terms of the potential for (and/or extent of) core damage and ex-plant release of radioactive materials.	CNSC agrees that the ongoing activities, such as Safety Analysis Improvement and meeting S-294 will go far in addressing the FTF recommendation. Nevertheless, we maintain that the scope of these activities may need to be expanded to fully account for the lessons learnt. In particular, the Industry and CNSC expert will need to engage in discussions concerning the rules for beyond-design-basis events (BDBE) analyses, range of events considered, as well as release paths of radioactivity to the environment.
26	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	Préambule L'Agence tient en premier lieu à souligner la qualité du rapport présenté par le Groupe de travail de la CCSN sur Fukushima; qualité démontrée par son souci de transparence, par la portée des actions suggérées et par	Noté. Merci pour vos commentaires.

#	From	Intervener Comment	CNSC Response
		l'ampleur de sa démarche actuelle de consultation. Le service de la coordination régionale de la mission santé en sécurité civile de l'Agence a mandaté un groupe de travail affecté au dossier du Plan des mesures d'urgence nucléaire externe à Gentilly 2 (PMUNE-G2), dont le représentant de la Direction de santé publique, afin d'analyser ce rapport et d'émettre ses commentaires.	
27	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	Commentaires plus spécifiques : L'émission de nos commentaires respectera l'ordre de présentation du rapport. **Page v, Amélioration des interventions en cas d'urgence** Il semble y avoir une certaine hésitation entre l'affirmation qu'au Canada, l'état actuel de la préparation et des mesures d'intervention est adéquat, mais qu'il pourrait être meilleur si nous avions des arrangements, des accords spécifiques, un processus national officiel et un calendrier d'exercices à échelle réelle. Par contre, un processus national, officiel et transparent portant sur les plans et programmes serait sans doute très intéressant notamment au niveau des systèmes d'alerte de la population.	Nous avons bien noté votre commentaire visant la mise en place d'un processus national officiel afin de prendre en charge, à tous les ordres du gouvernement, la coordination des mesures d'intervention d'urgence au Canada.
28	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 11, Lignes directrices canadiennes sur les interventions en situation d'urgence nucléaire** L'affirmation « *On n'a observé aucun effet néfaste pour la santé à des doses inférieures à 100 mSv.* » nous semble inexacte puisque des études menées auprès des enfants suite à l'accident de Tchernobyl ont démontré l'augmentation de l'incidence du cancer de la thyroïde chez les enfants à partir	Le personnel de la CCSN a consulté des collègues qui ont mené des recherches épidémiologiques auprès des enfants de Tchernobyl atteints d'un cancer de la thyroïde. Selon ces experts internationaux réalisant la recherche en question (communication personnelle avec D^{re} L. Zablotska), une

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		de 50 mSv.	estimation du risque statistique significatif pour la plus faible catégorie de dose connue a été publiée par Zablotska et al., 2011, dans le *British Journal of Cancer*. Un risque en excès statistiquement significatif a été perçu à environ 0,45 Gy ou 450 mGy pour les enfants biélorussiens. En Ukraine, ce risque se mesurait à 0,75 Gy ou 750 mGy. (Dans toutes les études sur la thyroïde, le risque se fonde sur la dose à l'organe et s'exprime donc en Gy plutôt qu'en Sv.) À moins que l'intervenant ne possède de l'information tirée d'une (obscure) étude écologique, la CCSN s'appuie sur les constatations d'études publiées dans des revues scientifiques qui se composent de comités de lecture.
29	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 20, Intervention d'urgence** On y affirme que les séismes et tsunamis majeurs ne constituent pas des menaces crédibles pour les centrales nucléaires canadiennes. Or, une vague de 14 à 15 mètres ne constituait pas non plus une menace crédible à Fukushima, la préparation se limitant à une vague de 5,6 m. Il nous semble opportun de demeurer prudents au regard de séismes pour Gentilly-2, surtout en rapport à ce que nous pouvons lire en 5.1.2 et 5.2.4.	Nous sommes d'accords avec le principe de la prudence, c'est pourquoi la Recommandation 2 du Groupe de travail fera en sorte que les risques externes seront réévalués avec les meilleures méthodes internationales et les protections de la centrale contre ces risques seront aussi examinées et renforcées si nécessaire.
30	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 26, Analyses de dimensionnement originales** Nous jugeons important, du point de vue de la protection de la population, de s'assurer que la magnitude des événements externes de dimensionnement corresponde aux meilleures pratiques internationales modernes.	Nous sommes d'accord et la Recommandation 2 fait en sorte que ce soit le cas.
31	Gilles W. Grenier	**Page 28, Constatations de l'examen des risques externes**	La Recommandation 2 nous assure que

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	Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	Même commentaire.	l'évaluation des risques externes sera faite selon les meilleures pratiques internationales.
32	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 29, Constatations de l'examen des accidents de dimensionnement** Nous saluons le fait que le groupe de travail reconnaisse que les risques externes peuvent causer des accidents durant plusieurs jours et qu'un accident de dimensionnement peut dégénérer en accident hors dimensionnement, voire en accident grave. (Voici une preuve de transparence dans l'analyse des risques.)	Noté. Merci pour le commentaire.
33	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 41, Constatations de l'examen pour la gestion des accidents graves** Nous ne nous reconnaissons pas dans l'affirmation que tous les services publics ont mis en place des directives claires qui assignent à l'exploitant de la centrale la responsabilité décisionnelle concernant l'éventage de l'enceinte de confinement. Il faudrait peut-être préciser les services publics en question.	Merci pour le commentaire traitant de la responsabilité de la décision de l'éventage de l'enceinte de confinement. La CCSN va vérifier et obtenir plus d'information afin de confirmer les attentes de cette recommandation.
34	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 45, Estimation du terme source** Nous sommes très en accord avec le fait qu'Hydro-Québec devrait nous fournir l'estimation du terme source.	La CCSN a l'intention de coordonner cette fonction entre l'exploitant et la province pour y trouver une solution.
35	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 46, Surveillance radiologique à la périphérie de la centrale et sur le terrain** Il est vrai qu'Hydro-Québec obtient les informations en temps réel, mais ce n'est pas le cas pour les autorités hors site malgré une demande répétée.	La CCSN a l'intention de coordonner cette fonction entre l'exploitant et la province pour y trouver une solution.
36	Gilles W. Grenier	**Page 49, Gestion des urgences nucléaires au Canada**	La CCSN est d'accord que cette fonction devrait

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	Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	Nous ne sommes pas certains que les responsabilités des organismes et les canaux de communication sont bien définis et que les besoins d'information sont clairement établis. À tout le moins, cela reste à être vérifié ultérieurement lors d'un exercice.	être vérifiée lors d'un exercice.
37	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 50, Titulaire de permis de centrale nucléaire** Nous sommes d'accord avec l'affirmation que les titulaires de permis doivent apporter un soutien aux autorités hors site, mais il faudrait mieux définir la nature précise de ce soutien.	La CCSN a l'intention de coordonner cette fonction entre l'exploitant et la province pour y trouver une solution.
38	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 56, Québec** Il faudrait définir précisément ce que l'on entend par un exercice à échelle réelle parce qu'à notre sens, il n'y a jamais eu de tel exercice rassemblant tous les ministères et organismes impliqués. Nous ne croyons pas être tous prêts à réaliser un tel niveau d'exercice.	La CCSN a l'intention de discuter des attentes de cette recommandation avec les autorités de (la province du) Québec.
39	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 56, Plans** Une question : Pourquoi ne parler que de la mission santé, d'autres ministères et organismes ont également des coordinations spécifiques à exercer dans le cadre du plan des mesures d'urgence nucléaire.	La CCSN a mis l'accent sur la santé sachant qu'il y a d'autres aspects également importants à vérifier.
40	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 57, Évaluation des accidents/événements** On ne peut affirmer que l'ORSC a la capacité de réaliser la modélisation du panache, car c'est à Santé Canada ou à Hydro-Québec que nous nous référons pour obtenir cette modélisation.	La CCSN va vérifier afin de mieux comprendre l'acheminement de l'information.
41	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 57, Évaluation des accidents/événements** Cette affirmation « Les membres de l'équipe utilisent des mesures en temps réel provenant de la centrale pour prédire les effets hors site. » est également inexacte puisque, comme mentionné précédemment, nous n'avons pas les	Noté. Merci pour le commentaire.

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		données en temps réel à l'ORSC.	
42	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 57, Résumé - Québec** Il faut nuancer l'affirmation de la première puce parce que nous avons un plan directeur actuellement en révision et certains ministères ou organismes ont des plans d'intervention plus ou moins complets. Nous ne pouvons donc pas affirmer qu'il existe un plan d'intervention complet regroupant la réponse opérationnelle de tous les ministères et organisations impliqués.	La CCSN est d'accord avec votre commentaire et le fait que la version provisoire du plan directeur est actuellement en révision de même que des plans de soutien d'intervention. L'aspect opérationnel devrait être validé par l'entremise d'un exercice.
43	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 62, Constatations de l'examen sur la gestion des urgences nucléaires au Canada** Au point 4, on mentionne le fait que nous travaillons surtout sur les mesures de préparation et d'intervention et pas sur les éléments de rétablissement. Évidemment, nous sommes en accord avec cette constatation et nous croyons qu'il serait très important de commencer la planification de la sortie de crise et de la phase post-accidentelle car, advenant la survenue d'un accident important, cela représenterait pour les autorités hors site une gestion excessivement complexe qui risquerait de s'étendre très loin dans le temps.	Noté. Merci pour le commentaire.
44	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Page 65, Permis, conditions et ordres/ordonnances** Nous sommes d'accord avec les nouvelles exigences notamment le protocole de divulgation publique. Cependant, nous aurions aimé que l'ordonnance suggérée de mettre en œuvre les leçons tirées des accidents survenus soit maintenue même si les titulaires de permis y ont effectivement répondu. Cela démontrerait une volonté de transparence encore plus grande.	Noté. Merci pour le commentaire.
45	Gilles W. Grenier Agence de la santé et des services sociaux	**Page 73, Améliorer l'intervention d'urgence** Nous sommes d'accord avec les recommandations émises, mais nous ne comprenons pas la question concernant la	Erreur de traduction. Une correction sera apportée au texte de la Recommandation 6 dans la version provisoire du plan d'action du

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	de la Mauricie et du Centre-du-Québec	validation de l'efficacité des comprimés d'iodure de potassium.	personnel de la CCSN. Cette recommandation suggère l'efficacité de la gestion pour la distribution des comprimés d'iodure de potassium et non l'efficacité des comprimés d'iodure de potassium comme tel pour protéger la santé. En réalité, ceci s'applique surtout pour l'Ontario.
46	Gilles W. Grenier Agence de la santé et des services sociaux de la Mauricie et du Centre-du-Québec	**Conclusion** Nous espérons que ces commentaires sauront être utiles à l'élaboration de la version finale du rapport. Nous tenons également à mentionner à nouveau notre profonde satisfaction du travail accompli par l'équipe de la CCSN. Enfin, nous souhaitons que les recommandations de ce rapport permettent une amélioration tangible de notre préparation afin de faire face à d'éventuels accidents, autant dans la phase d'intervention que dans celle du post-accidentel qui représente à elle seule un véritable défi pour les autorités hors site.	Merci d'avoir partagé vos commentaires avec la CCSN.
47	Allison J. Stuart Emergency Management Ontario Ministry of Community Safety and Correctional Services	We would like to take the opportunity provided to respond to the Task Force Report prepared in response to Fukushima by the Canadian Nuclear Safety Commission (CNSC). Emergency Management Ontario has reviewed the CNSC Fukushima Task Force Report (October 2011). We find it to be a very thorough examination of the Japanese accident as it pertains to the Canadian nuclear environment, including external hazards, the current regulatory framework and nuclear emergency management. Emergency Management Ontario welcomes the report's recommendations related to federal and provincial off-site	Thank you for sharing this comment with the CNSC.

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		nuclear emergency management. We look forward to working closely with CNSC staff, our federal nuclear emergency planning counterparts, and our partners in other provinces to respond to the Task Force recommendations in a consistent and systematic manner.	
48	Sunil Nijhawan Prolet Inc.	**A Preliminary Review of the CNSC Fukushima Task Force Report – INFO 0824 – October 2011** The following are some of my comments on the CNSC Fukushima Task Force Report: **1. The main conclusion** - *"Task Force confirms that the Canadian regulatory framework is strong and effectively applied to the whole range of plant conditions, including severe accidents; that emergency preparedness and response measures are adequate; and that there are no significant gaps in nuclear emergency planning at the provincial or federal levels"* **is self congratulatory and delusional. The statement is also contradicted by many details of the report itself.**	An independent peer review recently performed by a team of senior regulators under the IAEA's International Regulatory Review Service rated the CNSC's response following the Fukushima accident as a "good practice", concluding that the CNSC had systematically and thoroughly reviewed the lessons learned from the accident and had made full use of available information, including the review of actions taken by other international regulators. The comments from Dr. Nijhawan bring no new information.
49	Sunil Nijhawan Prolet Inc.	The most painful lesson that engineers will learn from reviews of the Fukushima disaster relates to the unacknowledged failure of Canadian regulators, designers and utilities in better retrofitting existing reactors in a timely manner to better withstand and mitigate known severe accident related challenges to PHWR reactor and containment integrity.	This comment is a statement of opinion. CNSC's requirements for reactor refurbishments are found in RD-360, *Life Extension of Nuclear Power Plants*. The Action Plan is intended to produce timely and effective enhancements to the already high level of safety achieved by Canadian NPPs.
50	Sunil Nijhawan Prolet Inc.	The Report fails to compare favourably with the technical depth of the US NRC and UK Office of Nuclear Regulation, IAEA and other competent authority reviews	This comment is a statement of opinion. Industry has performed specific severe accident

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		(such as the INPO report) and contains a number of inaccurate and incomplete assessments of the Fukushima events. The latter, however could have been influenced by the quality of information it received and the ability of its assigned personnel to understand severe accident progression in a non PHWR design, when they have not even yet acquired demonstrable ability for a reactor type they regulate regularly.	analyses in support of probabilistic safety assessments. CNSC has performed detailed reviews of these PSAs.
51	Sunil Nijhawan Prolet Inc.	If the purpose of the Report was to assess Canadian regulatory practices related to severe accident prevention, mitigation and management, the Report also fails to present the true picture of state of affairs and the apparent urgent need for change in the way Canadian nuclear power reactors are operated and regulated in regard to their severe accident prevention and mitigation capabilities. It just extrapolates the success of the Canadian PHWR designs under normal operating conditions and design basis accident safety reviews, to significantly more complex issues of a severe core damage accident.	This comment is a statement of opinion.
52	Sunil Nijhawan Prolet Inc.	Commercial nuclear power reactors have operated for over 50 years, and the first severe accident progression studies and understanding of related phenomena began to mature over 30 years ago, when the US NRC accelerated its related efforts after the Three Mile Island accident. However, some very basic accident prevention, mitigation and management measures have not been required by the Canadian regulators and hence not initiated by the utilities that have also used favourable probabilistic or cost-benefit analysis tricks to resist and delay much required design enhancements and overhaul of anticipated emergency actions. The report does not acknowledge the lethargic ways in which even the minor design enhancements for design basis accidents such	The Action Plan is intended to produce timely and effective enhancements to the already high level of safety achieved by Canadian NPPs.

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		as those in the CNSC Generic Action Items have been addressed in Canada.	
53	Sunil Nijhawan Prolet Inc.	The Report is not unique in its failures. In public reviews that inevitably followed, severe accidents in power reactors at TMI, Chernobyl and Fukushima have been often presented as site specific aberrations in design, operations, safety culture and acts of God beyond mortal imagination. The CNSC Fukushima Task Force report is no exception and while it does contain some good technical elements that recognize the severe accident related deficiencies in design, regulation and operation, the upfront conclusions have no basis in fact or find any real support in the report itself. Perhaps the hope was that most people would not read the report and be comforted by the glorious upfront conclusions of the adequacy of the Canadian nuclear power reactor regulatory regime.	This comment is a statement of opinion.
54	Sunil Nijhawan Prolet Inc.	There is no acknowledgment in report of the risk impact of the limited number of CANDU PHWR design, accident management and emergency preparedness deficiencies related to severe accidents it does recognize.	A number of sections of the Task Force Report speak to the risk impact of severe accidents. See section 6.1.2, 6.1.3, 6.3.7, 6.3.8, 6.4.1, 6.4.7, 6.5.1, and 6.5.11. The Action Plan is intended to produce timely and effective enhancements to the already high level of safety achieved by Canadian NPPs.
55	Sunil Nijhawan Prolet Inc.	If a sincere soul searching, regulatory overhaul and actual, effective, timely and far reaching measures are not taken for operating reactors, the world is bound to witness recurring severe core damage scenarios followed by series of studies that will predictably conclude that such severe accidents can happen only in other jurisdictions and in other designs and	This comment is a statement of opinion. The Action Plan is intended to produce timely and effective enhancements to the already high level of safety achieved by Canadian NPPs.

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		that 'our' reactors are 'safe'. The CNSC Fukushima Task Force Report seems to have a serious dissociation between reality and its upfront conclusions.	
56	Sunil Nijhawan Prolet Inc.	Canada can ill afford a severe accident in a CANDU plant and if one was to occur the blame would shift to the operators or 'unanticipated' external or internal events, just at did at Fukushima where many say that the Japanese regulator failed to provide technical assistance in accident mitigation because no real accident management expertise existed just as it surely does not at CNSC. From years of denying the usefulness of understanding potential severe core damage accidents, for example by accident progression analysis by claiming that any analyses of severe accident progression would be 'speculative' and wasted years of not acquiring any in-house expertise, CNSC is no position today to claim that their regulatory framework is sound for severe accidents. CNSC must stop being a proponent of the status quo in Canadian nuclear industry but take the role of a regulator who intelligently guards public interest with evolving public expectations and information and lessons from Fukushima, Chernobyl and Three Mile Island disasters – all probably preventable by sound regulatory practices. The Report does not give any such indication or raise hopes that any real lessons were learnt by CNSC from the Fukushima disaster.	This comment is a statement of opinion. Several of the recommendations of the Task Force lead to improvements in the regulatory framework. The Action Plan is intended to produce timely and effective enhancements to the already high level of safety achieved by Canadian NPPs.
57	Sunil Nijhawan Prolet Inc.	The Report failed to acknowledge the role played by regulators and other Canadian stakeholders in failure to ensure that the so-called residual risk from operating nuclear reactors is minimized in a timely manner. There are many very obvious examples of known deficiencies in CANDU PHWR designs that may exasperate a sustained	RD-360 gives CNSC's requirements for reactor refurbishments. These include reviews against modern standards and identify means of reducing the risk from, among other things, beyond design basis accidents.

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		loss of power, changing an otherwise recoverable outcome into significantly more severe consequences. Regulators have failed to develop strategies for potential design retrofits and failed to see the need for more open, concerted and cooperative efforts internationally in accident progression and consequence analyses and supporting experiments.	The Action Plan is intended to produce timely and effective enhancements to the already high level of safety achieved by Canadian NPPs.
58	Sunil Nijhawan Prolet Inc.	CNSC has failed to acknowledge in this report and anywhere else that there are certain elements of the current PHWR designs that actually exasperate the situation, accelerate the onset and progression of core damage and present substantially degraded opportunities for mitigation and control. In many cases, a sustained loss of power in a PHWR may cause a containment bypass with early and unacceptable off site consequences. Instead of defensive posturing, CNSC needs to address severe accident related technical issues more aggressively and openly.	The recommendations made by the Task Force in section 10.1, and the Action Plan developed from them, are intended to enhance safety in Canadian NPPs.
59	Sunil Nijhawan Prolet Inc.	CNSC has failed to require the utilities to engage in severe accident related activities and timely retrofits. This is not acknowledged in the Report. Their governance is on this matter is lethargic. Some related and important AECB/CNSC Generic Action Items, such as those pertaining to hydrogen mitigation have taken over 20 years and are not yet fully addressed in 2011 and where implementation is pending, the pace is slow. For example PARS being implemented at PLGS and later at Darlington are not designed to mitigate severe accident conditions but just the most severe of design basis accidents (LOCA+LOECC) analyzed in a stylistic and not necessarily conservative manner. Hydrogen source term from severe accidents resulting from Zircaloy and steel reactions with steam and corium-concrete interactions has not been	The original CANDU plant design basis included accidents with significant core damage such as a loss of coolant accident with simultaneous failure of the emergency core cooling system (LOCA+LOECC (loss-of-coolant accident + loss of emergency core cooling)). Safety measures were implemented to provide the required protection. Additional measures – design enhancements, operational provisions, and analytical studies - were introduced based on the best national and international practices. For example, PARS are being implemented or are already implemented at all Canadian NPP. The number of recombiners is well in excess of that required to

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		considered.	cope with the hydrogen generated in the most severe of design basis accidents and will be adequate to mitigate the hydrogen source from the Zircaloy and steel reaction with steam. Current safety analyses of a loss of coolant accident with simultaneous failure of the emergency core cooling system (LOCA+LOECC) are very conservative. Moreover, they would be considered a beyond design basis accident in most countries. Recommendation 3 will lead to further improvements in modeling capability.
60	Sunil Nijhawan Prolet Inc.	**2. Existing CANDU reactors do not meet present public expectations of risk from reactor operation** a) CNSC does not recognize that public risk expectations of risk from operating plants are no different than that for new plants. b) Only very basic accident consequence analyses have been performed so far and not done for all stations. Ability to simulate accident progression pathways is pivotal to developing accident management capabilities. c) SAM guidelines developed so far are elementary and not comprehensive. They include no significant design changes.	These items are discussed point-by-point below. a) The public comments on the Environmental Assessments performed for reactor refurbishments do not support this assertion. b) Substantial work has been done on severe accident consequence analysis as part of level 2 Probabilistic Safety Assessments. Task Force recommendation 3 calls for further improvement. c) SAM guidelines are well developed. The industry, working together in the CANDU Owners' Group, produced generic CANDU SAMGs. These are based on the IAEA recommendations as well as in line with the best international practices. However, they have not been full implemented and do not

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			yet make specific provision for multi-unit stations. Task Force recommendations 1 and 9 address this point.
		d) Risk from severe accidents is significantly greater than acknowledged and ability to predict accident progression is poor, bordering on criminal negligence.	d) CNSC staff disagrees that the risk from severe accidents is significantly greater than acknowledged. Systematic and repeated studies all indicate that the risk is within the internationally accepted goals. Nevertheless, implementation of several of the Task Force recommendations will reduce this risk still further.
		e) Existing PHWR designs did not consider even the simplest to model severe accident (sustained unit blackout) with consideration of consequential events such as fires.	e) Recommendations 1 and 2 address this issue.
		f) Existing designs have not even demonstrated an ability to maintain a sustained stable, cold depressurized, shutdown state even after design basis accidents and have not done so at all for severe accidents.	f) Section 6.2.3 finding 3 addresses this issue for design basis accidents. For severe accidents, the Task Force Report section 6.3 covers the ability to provide the fundamental safety functions. Some enhancements to safety are identified in recommendation 1.
		g) Regulatory expectations for design features that facilitate accident mitigation and management are poor and ill defined. Utility interest in upgrading existing units is correspondingly lukewarm.	g) Recommendation 9 addresses this issue.
		h) Regulatory requirements for unit and station specific operator action capabilities are not well defined. This would have better defined external intervention capabilities.	h) Recommendation 9 addresses this issue.
		i) There is little pressure to install monitoring and mitigating systems in a timely manner. First re-combiners in a CANDU will be installed 30 years after	i) The Action Plan is intended to produce timely and effective enhancements to the already high level of safety achieved by

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		initial start-up. Their design basis is poorly defined. Not all Canadian reactor units will have re-combiners by the time the US reactors do. j) Severe Accident Management capabilities at operating CANDU plants are woefully inadequate and the SAM guidelines developed so far are only a small first step.	Canadian NPPs. Recommendation 1 addresses this issue. j) SAM is developed to make the best use of the available capabilities, and supplement those where practicable. Further enhancements are identified in recommendations 1, 2, and 9.
61	Sunil Nijhawan Prolet Inc.	**3. Emergency Response capabilities are inadequate and not practiced fully** a) Agreements and commitments not in place with external organizations to offer assistance following a severe accident at any Canadian nuclear power plant. b) There are no expectations that the responders can effectively respond to multi-unit accidents c) There are no assurances that external responders can even respond under severe external event conditions (flood, tornado, fire, earthquake, sabotage, military action). d) There are no assurances that they function independently of plant personnel support e) There are no assurances their radios, dosimeters, vehicles work under external event hazards. f) There are no new provisions for external hookups. One of the lessons learnt from Fukushima is that without knowledge of in-reactor conditions emergency hookups may not work. g) Realistic and periodic exercises not mandated by	These items are discussed point-by-point below. a) Agreements are in place and will be enhanced. See section 7 and recommendations 4, 5 and 6. b) Enhancements to the response to multi-unit accidents are covered by recommendation 4. c) External emergency management organizations have their own measures for ensuring they can respond in a variety of emergency situations. d) This comment is unclear. Site information is essential to emergency management and is built into the procedures. e) No basis for this assertion is supplied. The licensees ensure that adequate functional equipment is available and this is verified by CNSC. f) Recommendations 1 and 9 cover this issue. g) Recommendations 4 and 6 cover this issue.

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		regulators. Most exercises are in meeting rooms and on computer screens. h) There are no simulators for severe accident management training.	h) CNSC staff disagrees with the implication of this comment. It is difficult to see what benefit a simulator would provide.
62	Sunil Nijhawan Prolet Inc.	**4. Off Site monitoring capabilities are inadequate** a) Regulatory requirements for field radiation monitoring are not defined in detail b) Need to monitor radiation at critical locations in real time with systems that function automatically and transfer information flawlessly. These are not available at any CANDU site. c) Requirements for monitoring of expected radioactive releases from a failed containment have not been properly defined. d) Ability to attempt to predict source terms from monitoring data in real time has not been fully developed. e) Definition of roles between different government agencies for monitoring and emergency response not well defined. f) Public alerting systems in potentially ever increasing off-site zones not available. g) Public access to some old style mitigating measures such as KI pills questionable (pills stocked at local pharmacies which may not be open when needed).	These items are discussed point-by-point below. a) Recommendation 9 covers enhancements to the regulatory framework. b) Recommendation 5 identifies enhancements in this area. c) Recommendation 9 covers enhancements to the regulatory framework. d) Recommendation 5 identifies enhancements in this area. e) Recommendation 6 identifies enhancements in this area. f) Recommendation 6 identifies enhancements in this area. g) Recommendation 6 identifies enhancements in this area.
63	Sunil Nijhawan Prolet Inc.	**5. CNSC Regulatory Documents for severe accidents are inadequate and of poor quality** a) Guide 306 Severe Accident Management Programs for Nuclear Reactors is an example of failure of CNSC to define and enforce severe accident related expectations.	Task Force recommendation 9 covers enhancements to the regulatory framework. Regulatory guide G-306 was developed based on the best international practices, including

#	From	Intervener Comment	CNSC Response
		b) The guide is very late, very flimsy in technical requirements and lacking in details. c) In January, 1989, the NRC Staff issued SECY 89-012, "Staff Plans for Accident Management Regulatory and Research Programs". CNSC document came 17 years later. d) Does not present a time table for preparation of SAM guidelines and actual accident management capabilities. Actual delivery times by utilities are lax. e) Does not require additional design measures but emphasizes existing systems only f) Does not require simulators or other serious preparedness measures g) Did not specify specific measures : hydrogen control; core debris coolability; high-pressure core degradation; containment performance, (including the possible effects of molten core/coolant interactions); containment bypass including from steam generator tube ruptures; equipment survivability; instrumentation for severe accident monitoring, etc. h) Does not ask for specific accident management strategies related to depressurizing the primary system, due for example by the incorporation of severe accident related depressurization valves into designs. Such valves would reduce the risk from induced steam generator tube ruptures in high-pressure scenarios, as well as greatly mitigate the consequences of high-pressure core failures. i) Does not ask for hydrogen concentration monitoring; hydrogen control during and following degraded core or core melt j) Does not require that design must limit hydrogen concentrations in containment from a release of a 100%	those in the USA, and the IAEA recommendations. In fact, it is one of few regulatory documents internationally dedicated specifically to Severe Accident Management. G-306 is one of the documents that will be reviewed and supplemented if necessary. . The comments indicated that the intervener does not appreciate the difference between SAM which is an operational activity to manage an accident, and measures to enhance the design capabilities. Many of the concerns expressed, such as hydrogen control, debris coolability, containment features, etc, are addressed through the requirements for plant design. Note that in the regulatory document for plant design RD-337 is also undergoing revision The CNSC document approval process includes public comment and any remaining specific issues can be raised at that time.

#	From	Intervener Comment	CNSC Response
		fuel clad-steam reaction and steel-steam interactions to less than 10% by volume, and maintain containment structural integrity and appropriate accident-mitigating features. k) Does not offer any guidance on development of error-tolerant designs and control rooms for severe accidents l) There are no mechanisms in place for confirmatory analyses by independent assessments m) Does not ask utilities to fix known design deficiencies relating to inadequacy or improper design of over pressure protection in many reactor systems that play an important role in containing debris and radioactivity under severe accident conditions. These include the PHTS, Calandria, Shield Tank/reactor vault and containment.	
64	Sunil Nijhawan Prolet Inc.	This review of the CNSC Fukushima Task force report is just a small example of the inadequacy of the efforts by the CNSC in respect to severe accidents. A more comprehensive review can be prepared with more time and resources but many are discouraged by their past interactions with CNSC where the CNSC staff have failed to understand even basic severe accident related concerns and continued to parrot the rosy picture presented by the utilities, even when the utilities were telling obvious lies, later withdrawn upon challenge.	The recommendations made by the Task Force in section 10 of the Report, and the Action Plan developed from them, are intended to enhance safety in Canadian NPPs.
65	Sunil Nijhawan Prolet Inc.	There is such good technical talent in the Canadian nuclear industry and they have the ability to undertake real, effective measures for severe accident prevention, mitigation and management but the impetus and sincere guidance from the CNSC is lacking.	The recommendations made by the Task Force in section 10 of the Report, and the Action Plan developed from them, are intended to enhance safety in Canadian NPPs.
66	Sunil Nijhawan	Ultimately, the Canadian public and the Federal	The recommendations made by the Task Force

#	From	Intervener Comment	CNSC Response
	Prolet Inc.	government will realize that CNSC needs a severe overhaul of its leadership, regulatory practices and procedures and how effectively it interacts with those it regulates. Hopefully this will not be after a severe core damage at a Canadian nuclear power plant. At the minimum it needs to become technically competent in the field of severe accidents before the claims made in the CNSC Fukushima Task Force Report can have any justifiable basis. Its intensions may be noble but the CNSC capabilities for self assessment are poor as demonstrated by the disconnect between the conclusions and the meat of the CNSC Fukushima Task Force Report as well as some of my observations.	in section 10 of the Report, and the Action Plan developed from them, are intended to enhance safety in Canadian NPPs.
67	Chris Rouse CCNB Action SJ Fundy Chapter	Please find our intervention and supporting documentation on our thoughts on this matter. This was used in our intervention for Point Lepreau which the CNSC staff approved the licence. We do not feel any lessons have been learned. PDF Documents Attachment (6)	The documents provided by Mr. Rouse are the same as those previously submitted to the CNSC in respect to the December 1-2, 2011 Day-Two Commission Hearings on NB Power's re-licensing application of the Point Lepreau nuclear power plant, namely CMD 11-H12.33, CMD 11-H12.33A and CMD 11-H12.33B. These documents are now under review by the Commission pending its decision in the matter. CNSC staff responded to CCNB's concerns during the proceedings; as recorded in the official Hearing transcripts. Staff's position on these issues remains unchanged.
68	Jenny Tang Member of public	I am confident that the design and operation of our Ontario nuclear power stations have very high standards, and the geographical location the stations are much safer compare to Fukushima's physical location.	CNSC staff routinely review NPP emergency programs, including contractual arrangements for services, to ensure there is a continuous state of readiness. Information from actual events is reviewed by CNSC staff to ensure the causes

#	From	Intervener Comment	CNSC Response
		However, since early 2000's outsourcing of a number of internal organizations of formerly Ontario Hydro, especially IT organization, which provides access to crucial data during emergency situation, reliability as a vital component for disaster recovery become questionable. Even though there is contractual constrains to ensure the availability of such data, a private company has different goal settings; it can have conflict interests of public safety versus corporate profit. I would suggest as a minimum that computer system logs be saved during each annual disaster recovery for occasional external audit. In addition, on a separate item. In 2003 North American Blackout, emergency recovery staff were contacted via telephones ran on Bell land lines, since cell phones stopped working. Now, most people only use cell phone to be contacted. Has the reliability of cell phone carriers in emergency situation been looked into? Or there is now another way to get hold of recovery staff?	have been correctly identified and that subsequent corrective actions are implemented to prevent future occurrences. Through regular assessments of NPP emergency programs, CNSC staff verifies that the licensees maintain dependable primary (land lines) and backup communications systems (radios, cell phones and satellite phones) to ensure continuous communications are always available. This includes the backup power systems that are needed to keep those communication systems functional during loss of primary power. In addition, licensees also incorporate a separate paging system to alert emergency response staff in the event of an emergency. All systems are routinely tested to ensure readiness and functionality.
69	John Froats University of Ontario Institute of Technology	Thank you for the opportunity to review the CNSC report and provide constructive input. I found the report to be extensive and a good overall assessment of the issues related to Fukushima. I offer the following thoughts as input for consideration. 1. The adequacy of Emergency Planning and Preparedness is clearly an important area and one that the report has considered. The current version of the report suggests requiring the Licencees to submit offsite emergency response plans. This appears, in my view, to be an indirect way of attempting to influence content of documents and accountabilities that are Municipal and	CNSC has a responsibility under section 24(4) of the *Nuclear Safety and Control Act* to ensure that the licensee will make adequate provision for the protection of the environment and the health and safety of persons. Recommendation 7 is intended to allow CNSC to discharge that responsibility. The intent is not to directly or indirectly 'influence the content of documents and accountabilities that are Municipal and Provincial Governments', rather the intent is to ensure licensees' emergency plans and

#	From	Intervener Comment	CNSC Response
		Provincial Governments. Licencees have no direct control of these plans and cannot be held accountable for their content. I'd suggest a more direct method is needed to ensure that the various layers of Government are accountable to meet a clearly established standard of performance and response in a predictable manner.	procedures are consistent with and complementary to those off-site emergency plans. The purpose for including these off-site plans is to provide evidence and documentation of the integration of both the licensees' emergency plans and of the off-site organizations' plans commensurate with the hazards and risks resulting from the licensing of the NPPs. The licensees' actions and participation with off-site stakeholders and legislators would then need to be verified and confirmed prior to licensing. As far as the CNSC providing input into the content of the off-site emergency plans of provinces and municipalities, there are means to accomplish this and the CNSC does provide comment when opportunities are presented.
70	John Froats University of Ontario Institute of Technology	2. Extreme environmentally induced events will almost certainly impact surrounding communities and infrastructure as well as an affected Plant. Exercises have historically tended to separate the two. Events to date have consistently shown that technology infrastructure outside the Nuclear Power Plants (data telemetry, communications systems, computer networks, etc) are adversely affected or lost as a result of the events. These systems are not subject to the same rigorous qualification programs that equipment inside the Plants are. The current report makes some suggestions for additional technology solutions. While these may have some benefit in lesser events, their functionality is questionable in more severe events.	Agreed, this is a valid point, however, the reality is, the responsibility for the quality and survivability of off-site infrastructure clearly rests with the provinces and/or municipalities. Off-site systems and facilities for which the licensees are responsible are subject to assessment by the CNSC and those systems must meet regulatory requirements for robustness and redundancy like on-site systems, however, off-site infrastructure such as roads, power and water supply systems, etc. are the responsibility of the provinces and municipalities.

#	From	Intervener Comment	CNSC Response
		Follow-up actions to the report need to carefully evaluate the wisdom of reliance on these non qualified external systems. It would seem that at some point, postulated events become so severe that a fundamentally different approach to Emergency Response and event mitigation is required.	
71	John Froats University of Ontario Institute of Technology	3. Places as far away as Hawaii exercised evacuations due to concerns re tsunami or other Fukushima related impacts. In some cases very conservative modeling or lack of modeling resulted in evacuation that proved un-necessary. Work on making sure that modeling predictions are available need also to consider that there is human safety and wellness implication of evacuation post a major event. Work needs to ensure the right balance in conservatisms and most likely estimation of consequence.	Plume modeling is done by both the licensees and the provinces, and although decisions making regarding protective actions for the public are a provincial/municipal responsibility, there is a network of experts beyond the provinces and licensees, including the CNSC and other federal departments, that provide input in the modeling predictions and subsequent public safety directions for citizens living in the vicinity of NPPs.
72	John Froats University of Ontario Institute of Technology	4. There was some speculation that reliance on multiple levels of approvals delayed critical decisions at Fukushima. Prompt decision making by competent individuals is an essential element of success in emergency response. There have been some events in the history of the Canadian Industry where decisions were impacted by requirements for offsite approvals. In the review of adequacy of the decision making framework, it would be prudent to review OPEX in this area and to assess if the qualification and experience requirements for decision makers where-ever they reside in the decision change are adequate. All positions within licensee organizations that have decision making roles in emergencies are highly regulated and reviewed by CNSC. It is not clear that this is the case that this is true throughout the complete infrastructure.	Off-site decision making is beyond the jurisdiction of the CNSC and/or the responsibility of the licensees, however, both provide expert input and advice to the off-site authorities to ensure they have the best information upon which to base their decisions. This is recognized and relates to the finding in the Fukushima Task Force Report that suggests a National Exercise program that should be evaluated and exercised for government agencies.

#	From	Intervener Comment	CNSC Response
73	John Froats University of Ontario Institute of Technology	5. The current report suggests the need to implement Periodic Safety Review. While the process is used in most other countries, perhaps it is more accurate to indicate that there is a need to periodically update the hazard assessments and design adequacy as the core issue. How it is done is probably still in need of discussion as to how to best achieve that goal.	While there was no one specific lesson learned from the Fukushima accident with regard to PSRs, it is recognized that strong periodic reviews, including those of the design, would further contribute to strong regulatory oversight. The *Report of the Japanese Government to the IAEA Ministerial Conference on Nuclear Safety* identified 28 key lessons learned from the Fukushima accident. Lesson 24 relates to "Establishment and reinforcement of legal structure, criteria and guidelines". While the text of this lesson does not specifically refer to Periodic Safety Review, CNSC staff is of the view that it would address many of the concerns identified. This was part of the basis for the recommendation in the *CNSC Fukushima Task Force Report*.
74	John Froats University of Ontario Institute of Technology	Again, I'd like to acknowledge the good work done by Licensees and the CNSC in Canada in response to the event and in preparation of this report. I hope the points above serve as useful input for consideration.	Thank you for your comments
75	Charles de Vries Atomic Energy of Canada Limited	The CNSC Fukushima Task Force Report focuses on nuclear power plants (NPP), but makes recommendations that are more broadly applicable to the nuclear industry and to other licensed facilities. AECL's National Laboratories at Chalk River comprise Class 1A as well as other licensed facilities, and so will be affected by the Task Force's recommendations. Therefore, AECL offers the following comments on the CNSC Fukushima Task Force Report, from the perspective of AECL's licensed sites and facilities: 1. In Section 10, the report states: "Overall, the CNSC	CNSC encourages licensees to be proactive in performing upgrades. To their credit, there is significant evidence that NPP licensees already do this. Any recommended upgrade that had already been implemented voluntarily by a licensee will be removed from the list of actions for that licensee. CNSC has a policy on consideration of cost-benefit information (P-242) and is always

#	From	Intervener Comment	CNSC Response
		Task Force concludes that Canadian NPPs are safe and pose a very small risk to the health and safety of Canadians or to the environment. The CNSC Task Force is confident that the recommendations in this report will further enhance the safety of nuclear power in Canada and will reduce the associated risk to as low as reasonably practicable." Recommendations in Section 10.3 are related to improving the regulatory framework and processes. In light of the conclusion that NPPs are safe and pose a very small risk, it needs to be demonstrated that increases in regulatory requirements are justified, and that there are no equivalent or better approaches to achieve any necessary risk reductions (such as voluntary actions by licensees). That is, the report has not explored alternatives or addressed benefit-cost consistent with the spirit of Treasury Board guidelines. AECL believes that the nuclear industry has responded appropriately to the events at Fukushima, and that all recommendations to strengthen the regulatory framework should be scrutinized carefully to ensure they are essential. There is no evidence in the report that this has been done.	prepared to consider specific arguments presented by a licensee or applicant.
76	Charles de Vries Atomic Energy of Canada Limited	2. Recommendation 8: "The CNSC should amend the Radiation Protection Regulations to be more consistent with the current international guidance and to describe in greater detail the regulatory requirements needed to address radiological hazards during the various phases of an emergency." The report should clarify and justify any gaps in	The regulation making process includes a cost benefit assessment of the proposed regulations. At present, all that is proposed is to begin the process. If amendments to regulations are not justified, this will become clear.

#	From	Intervener Comment	CNSC Response
		Canadian regulations relative to international practice, and should specify the specific international guidance being referenced. As discussed in the first comment, any proposed changes to the Regulations should be justified consistent with the spirit of Treasury Board Guidelines.	
77	Charles de Vries Atomic Energy of Canada Limited	3. Recommendation 9: "The CNSC should update the regulatory document framework through: a) updating selected design-basis and beyond-design-basis requirements and expectations, including those for: i. external hazards and the associated methodologies for assessment of magnitudes ii. probabilistic safety goals iii. complementary design features for both severe accident prevention and mitigation iv. passive safety features v. fuel transfer and storage vi. design features that would facilitate accident management b) developing a dedicated regulatory document on accident management c) strengthening the suite of emergency preparedness regulatory documents d) reviewing applicable Canadian Standards Association standards" Consistent with comment 1, the report should state that any update of the regulatory document framework should be done in consideration of the overall benefit-cost and consideration of whether there are alternatives to regulation. In particular, given the report's	Individual regulatory documents are issued for public comment and those comments are dispositioned. The Commission considers the comment disposition before approving publication of regulatory documents. The time to argue the merits of specific changes to regulatory documents is when the proposed changes are published. A blanket consideration of changes before they have been written is neither practicable nor effective.

#	From	Intervener Comment	CNSC Response
		conclusions regarding the high overall level of safety of NPP's, it is important that consideration be given to: a) Ensuring that new regulatory requirements do not add complexity to NPP design and/or operation that could actually reduce safety. b) Whether there would be meaningful risk reduction to warrant increased costs associated with new regulatory requirements. c) Whether it would be sufficient to embed in regulatory documents the types of improvements already made or committed by NPP's, to provide assurance that i. they will not be "undone" going forward and ii. there is no requirement to go beyond implemented or committed improvements deemed by the CNSC to be acceptable.	
78	Charles de Vries Atomic Energy of Canada Limited	4. Recommendation 11: "The CNSC should further enhance the regulatory oversight of nuclear power plants through implementation of a periodic safety review process." The Task Force report does not provide evidence to demonstrate that the events at the Fukushima Dai-ichi plant would have been avoided or mitigated if the plant had undergone a periodic safety review. Therefore, the need for periodic safety review should not be justified on the basis of it being a lesson learned from Fukushima.	While there was no one specific lesson learned from the Fukushima accident with regard to PSRs, it is recognized that strong periodic reviews, including those of the design, would further contribute to strong regulatory oversight. The *Report of the Japanese Government to the IAEA Ministerial Conference on Nuclear Safety* identified 28 key lessons learned from the Fukushima accident. Lesson 24 relates to "Establishment and reinforcement of legal structure, criteria and guidelines". While the text of this lesson does not specifically refer to Periodic Safety Review, CNSC staff is of the view that it would address many of the concerns identified. This was part of the basis for the

#	From	Intervener Comment	CNSC Response
			recommendation in the *CNSC Fukushima Task Force Report*.
79		5. Recommendation 12: "The CNSC should review memoranda of understanding with regulatory counterparts in countries with CANDU reactors to outline what support, if any, they would require from the CNSC during a nuclear emergency." Recommendation 13: "The CNSC should enhance cooperation with other nuclear regulators in addressing the lessons learned from the Fukushima accident and thus further strengthen the capability to respond efficiently to any nuclear emergency." With respect to international cooperation in responding to a nuclear emergency, consideration should be given to a national effort to enhance cooperation with other countries, as opposed to agency by agency arrangements. For example, AECL's National Laboratories has capability to support other countries in a nuclear emergency, and this and other potential support should be considered more broadly when engaging other countries on cooperation.	The suggestion is noted. The agency to agency memoranda are required as a necessary first step.

Appendix C – Disposition of Comments on the *CNSC Staff Action Plan*

Consultation Report

on the *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations*

Introduction

The *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations* describes specific actions to be implemented by CNSC staff, licensees and affected federal and provincial authorities to strengthen the defence in depth, emergency preparedness and regulatory oversight of nuclear power plants in Canada.

The *CNSC Staff Action Plan* prepared by CNSC Staff took into consideration all comments from the first round of consultation with the public on the *CNSC Fukushima Task Force Report* and *CNSC Management Response*.

Consultation Process

During the period from December 21, 2011 to February 3, 2012, the CNSC posted the draft *CNSC Staff Action Plan* for review by the public and stakeholders of the CNSC's proposed measures for addressing the *CNSC Fukushima Task Force* recommendations.

Thirteen responses were received from members of the public, the nuclear industry, and non-government organizations.

Summary of Stakeholder Comments

A number of comments received during this second consultation were related to concerns raised in the first round, to legacy issues previously dealt with by the Commission in prior decisions, or to matters currently before the Commission pending licensing decisions. Several of these were deemed out of scope but were nevertheless dispositioned by CNSC staff.

There were four submissions from industry that provided general comments on the *CNSC Staff Action Plan* and a comprehensive response to each action in the plan that impacted their operations. Though generally accepting of the actions intended by the CNSC, a number of concerns were expressed about the proposed solutions, particularly with respect to the specificity of each site (e.g., location, single-unit vs. multi-unit operation), differing reactor technology, and planned refurbishment activities. CNSC staff considered all licensee comments and, where practicable, amended the *CNSC Staff Action Plan* to address the concerns or deficiencies identified.

A summary of all the comments from the public and industry and their disposition for this second round of consultation is included in Table 2 - Disposition of Comments on the *CNSC Staff Action Plan*.

Conclusion

There were no changes of a technical nature made to the actions or deliverables contained in the *CNSC Staff Action Plan* as a result of the second round of consultations.

Table 2 - Disposition of Comments on the CNSC Staff Action Plan

#	From	Intervener Comment	CNSC Response
1	Dr. Joseph John Bevelacqua, President Bevelacqua Resources	Hello, Thank you for the opportunity to provide written comments on the draft CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations. I commend you for this action and for the generally excellent recommendations in the draft report. My major comment focuses on the selection of the design basis accidents and beyond design basis events. Each reactor has been designed with a specified set of assumed limiting conditions. including: 1. maximum earthquake/tsunami 2. maximum flood 3. maximum precipitation 4. maximum wind loading 5. capability to withstand loss of onsite and offsite power In the case of Fukushima Daiichi, an earthquake beyond the design basis produced a tsunami that exceeded the design basis and beyond design basis licensing basis. The resultant flooding disabled onsite and offsite power that triggered the sequence of events that led to core damage, fission product barrier breaching, and offsite release of radioactive material. The root cause appears to be an inadequate design basis. Given this background, my comments follow. The purpose of these comments are to explicitly document that the design has considered all available seismic and climatic data, that the risks have been acknowledged and documented, and that stakeholders are aware of these risks and their inclusion in the licensing basis of each reactor.	The comments from Dr. Bevelacqua are out of scope of the current review as they are not related to: a. disposition of public comments on the Task Force Report b. CNSC Action Plan The topics were all addressed in the *CNSC Task Force Report*. However, the main points are addressed below.
2	Dr. Joseph John Bevelacqua, President Bevelacqua Resources	My specific comments are: 1. Given that the event sequence at Fukushima Daiichi exceeded the design basis assumptions of the reactor's licensing basis, what process was used and how was it validated to assure the Canadian reactor's design basis is adequate?	The current situation related to design-basis events was reported in section 6.1 of the Fukushima Task Force Report, INFO-0824 and the findings addressed by recommendations 2 and 9. These recommendations are addressed by Action 2.1 and 9.1 of the CNSC Fukushima Action Plan, INFO-

#	From	Intervener Comment	CNSC Response
			0828.
3	Dr. Joseph John Bevelacqua, President Bevelacqua Resources	2. Are the design basis assumptions valid and do historical seismic and climate data justify their continued use?	The current situation related to design-basis and beyond-design-basis events in Canada was reported in section 6.1 of the Fukushima Task Force Report, INFO-0824 and the findings addressed by recommendations 2 and 9. These recommendations are addressed by Action 2.1 and 9.1 of the CNSC Fukushima Action Plan, INFO-0828.
4	Dr. Joseph John Bevelacqua, President Bevelacqua Resources	3. Do these data suggest that a 100 y, 500 y, 1000 y, or longer frequency events will exceed the design basis?	Please see section 6.1 of the *Task Force Report*.
5	Dr. Joseph John Bevelacqua, President Bevelacqua Resources	4. Has a Level III Probability Risk Assessment been performed to justify the licensing basis?	Level III PSA is not a regulatory requirement in Canada. All CANDU plants have level II PSAs, though some are still in the process of being updated. See Task Force recommendation 2 and Action Plan action 2.1.
6	Dr. Joseph John Bevelacqua, President Bevelacqua Resources	5. Have all beyond design basis events considered Comment 3 and have these assumptions been accepted/justified based on a risk analysis?	The current situation related to design-basis and beyond-design-basis events in Canada was reported in section 6.1 of the Fukushima Task Force Report, INFO-0824 and the findings addressed by recommendations 2 and 9.
7	Dr. Joseph John Bevelacqua, President Bevelacqua Resources	6. The basis for risk acceptance should be documented and clearly defined for all stakeholders.	Please see section 6.1 of the *Task Force Report*. Also note that RD-337 sets the safety goals for new build.
8	Dr. Joseph John Bevelacqua, President Bevelacqua Resources	7. The licensing basis should be reaffirmed and the acceptance of risk documented with a consideration of comment 3.	Please see section 6.1 of the *Task Force Report*. Recommendation 9 will ensure that the licensing basis is reaffirmed.
9	Shawn-Patrick Stensil Energy and Climate Campaigner Greenpeace Canada, Toronto	4 Attachments	The comments from Greenpeace are out of scope of the current review as they are not related to: a. disposition of public comments on the Task Force Report

#	From	Intervener Comment	CNSC Response
		 gpcomments.doc  DarlingtonSOFinal.pdf  FinalDarlingtonrefurb scope-25-8-11.doc  GP_IRSS_NPP_22-1-08.pdf Hello/bonjour, Please accept the attached comments on the CNSC's Fukushima Task Force review. If you have any questions please don't hesitate to contact me.	b. CNSC Action Plan Comments are provided in the main document *gpcomments.doc* which is supported by three earlier documents. The supporting documents predate the issue of the *Task Force Report* and therefore do not include specific comments on the *Task Force Report* or the *Action Plan*. Only the main document is reproduced below. The information referenced from the supporting documents is considered where appropriate.
10	Shawn-Patrick Stensil Energy and Climate Campaigner Greenpeace Canada, Toronto	Re: Comments on CNSC Staff Action Plan on Fukushima Task Force Recommendations To whom it may concern, Thank you for this opportunity to comment on the CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations. Greenpeace, however, is deeply disappointed in the CNSC's response to the Fukushima disaster. At root, the scope of the review given to the task force by the Commission is too limited to address the root causes of the Fukushima disaster. This fact is highlighted by the stated conclusion of the current task force: "The CNSC Fukushima Task Force Report confirmed that Canadian nuclear power plants are safe and rely on multiple layers of defense." (Ramzi Jammal, Executive Vice-President and Chief Regulatory Operations Officer). This statement is misleading and ignores the key causes of the Fukushima disaster, which were outside of the mandate of mandate of the CNSC's Fukushima Task Force. Indeed, Greenpeace is deeply concerned that the scope of the current Fukushima review avoids addressing the root causes of Fukushima such as the failures of Japanese regulator bodies to prevent the accident.	In the main document Greenpeace makes three specific requests. These are addressed below:

#	From	Intervener Comment	CNSC Response
		Over and over again in the Task Force report CNSC staff note that the International Atomic Energy Agency (IAEA) concluded that the CNSC's regulatory response to the Fukushima disaster is adequate. An IAEA endorsement, however, is not guarantee of adequate regulatory oversight. Just two years prior to the Fukushima disaster, the IAEA concluded that Japan's regulatory oversight was sufficient to guarantee safety. Greenpeace includes with submission three documents: First, a letter sent to the CNSC regarding the approach to evaluating the life-extension OPG's Darlington nuclear station in light of Fukushima and Greenpeace's comments of the scope of environmental review proposed for the Darlington refurbishment. Finally, Greenpeace's comments on the CNSC's design and siting guides for new reactors. These public comments were all summarily dismissed by CNSC staff. Greenpeace requests that the issues raised in both these documents be addressed in response to the current Task Force report. Greenpeace makes three specific requests: 1) The CNSC commit to more objective risk communication. 2) The CNSC modify its design and siting guides to prioritize inherent or passive safety. 3) The CNSC consider the lessons learned from the Fukushima disaster in the Darlington refurbishment review. The following summarizes these requests.	
11	Shawn-Patrick Stensil Energy and Climate Campaigner Greenpeace Canada, Toronto	**1) Objective Risk Communication** The CNSC's Fukushima task for has maintained that Canadian nuclear facilities are 'safe'. This statement, however, is misleading and arguably opinion. The mandate of the Fukushima Task Force was to examine the adequacy of 'defense in depth'. That is the technological capacity of Canadian reactors to withstand accidents is sufficient.	The issues raised here relate to CNSC's institutional effectiveness and risk communication. None of the points raised are in scope of the current review. While the mandate of the Task Force focussed on the technical issues arising from lessons learned from the event, the Task Force did consider whether the more systemic problems identified by the Japanese regulator were applicable to Canada. The Task Force concluded that problems identified, such as safety culture and

#	From	Intervener Comment	CNSC Response
		This approach ignores the root cause of the Fukushima disaster: institutional failure. The Fukushima disaster was preventable. Both TEPCO and the nuclear safety agency were aware of the tsunami hazards at the station. Their failure to act was the cause of the accident. Institutional Failure has been has been the principal cause of all past nuclear accidents, including Chernobyl, Three Mile Island and now Fukushima. The CNSC's approach to risk assessment, however, ignores the historic contribution of institutional failure to nuclear accidents. As noted by a former CNSC staff member, the probabilistic risk studies produced by reactor operators to predict the frequency of component failures leading to radioactivity releases do not take into account failures of operators and regulators overseeing the plant. The failure of the CNSC to acknowledge this reality in this review is misleading and disappointing. For decades, the nuclear industry and its regulators have convinced themselves that low-probability of component failures meant that the nuclear technology was a low risk industry. The industry's focus on regulating the frequency of accidents neglected to also consider total risk posed by their facilities. Risk is typically defined as probability (or frequency) times consequence. In this formulation, even a low-probability event could be a high risk if the consequences were catastrophic. Nuclear risk studies tend to only calculate the frequency or probability of event and avoid consideration of consequences. This avoidance of actual risk assessment distorts public and the institutional understanding of the risk posed by nuclear stations. It also encourages risky behavior. Greenpeace thus requests that the CNSC acknowledge the empirical record in its risk communications. Greenpeace also recommends that contribution of Institutional failure be acknowledge in the risks assessments for nuclear stations in Canada. Moreover, Greenpeace requests that the CNSC objectively communicate the	independence of the regulator, were not pertinent to the Canadian context. We agree that institutional failure is an important consideration for nuclear safety, but disagree that this can be considered in any meaningful way in numerical assessments of risk, or that it would be useful to do so. There are other measures in place to help ensure that institutional failure will not occur, such as international peer reviews. The commenter states that the industry and regulator focus on frequency as the principal contributor to risk, while ignoring the consequences. This is not the case. The Safety Analysis Report evaluates the consequences of a wide range of design basis accidents and the PSA evaluates both the frequency and consequences of beyond design basis accidents including those of severe accidents. The Task Force review did not fail to consider the consequences of the event. A large part of the *Task Force Report* is focussed on beyond design basis accidents, severe accident management and emergency response. The conclusion that Canada's NPPs are safe is not merely a statement of opinion. It is based on a searching look at the lessons learned from Fukushima. The defence in depth concept implicitly recognizes that, despite the best efforts of designers, licensees and regulators, accidents can still happen. CNSC has made great efforts to provide open and transparent communication based on objective information and careful analysis.

#	From	Intervener Comment	CNSC Response
		risk of nuclear stations in Canada. This requires an analysis of the consequences of nuclear accidents and not simply the theoretical frequency of accidents.	
12	Shawn-Patrick Stensil Energy and Climate Campaigner Greenpeace Canada, Toronto	**2) The CNSC modify its design and siting guides to prioritize inherent or passive safety.** The CNSC's review of the Fukushima disaster acknowledged the need to revist the design and siting guides for reactors in Canada. Greenpeace notes that CNSC staff removed the prioritization of inherent or passively safe reactor designs in the Canadian design guidelines. Such requirements are prioritized in the IAEA guidelines. Attached to this document Greenpeace re-submits our 2008 comments on the design and siting guides for new reactors.	Greenpeace resubmits a 2008 report that commented on the draft regulatory documents, RD-337, *Design of New Nuclear Power Plants* and RD-346, *Site Evaluation for New Nuclear Power Plants*. As part of the regulatory document production process, drafts of these documents were issued for public comment prior to issue. All the comments provided on those documents were dispositioned and the documents presented to the Commission for approval in public Commission Meetings. The disposition reports are available. In addition, there is nothing in the 2008 report that is relevant to the Task Force findings, recommendations, or action plan. Note that the *Task Force Report* recommended revisions to certain documents in the CNSC regulatory framework. This work is in progress and the draft revised versions of RD-337 and RD-346 (among other documents) are expected be released this summer for public comment. Also, the Task Force report includes a finding regarding the importance of passive safety features versus active engineered systems. This finding is being considered in the revision of RD-337.
13	Shawn-Patrick Stensil Energy and Climate Campaigner Greenpeace Canada, Toronto	**3) The Darlington Refurbishment Review** Greenpeace and other organizations made a number of substantive suggestions for applying the lessons learned from the Fukushima disaster to the proposed life-extension of the exiting Darlington station. Indeed, the Joint Panel Review on new reactors at Darlington made a number	The JRP recommendation to which Greenpeace refers is recommendation #63 of the JRP report that recommends that an evaluation be performed, at the time of a licence to construct, of "a common-cause severe accident involving all of the nuclear facilities". It is premature for the CNSC to act on this recommendation prior to a decision by the Governor in

#	From	Intervener Comment	CNSC Response
		of recommendations related to the lessons learned from Fukushima relevant to the existing Darlington reactors. The CNSC has dismissed these recommendations. Greenpeace requests that they be addressed immediately. Thanks you for this opportunity to comment.	Council on the JRP report. It is noted that the environmental assessment will in any case include environmental impacts of potential severe accidents including those that might require an off-site emergency response. The document re-submitted by Greenpeace related to Darlington refurbishment raised five main issues. These were addressed in the *Task Force Report* as described below: **1) Multi-unit reactor design** The challenges of multi-unit design were considered in the *Task Force Report* and addressed in the *Action Plan.* See sections 6 and 7 and recommendations 3a) and 4. **2) Earthquake vulnerabilities** Earthquakes and other external events were considered in the *Task Force Report* and addressed in the *Action Plan.* See section 6 and recommendations 2 and 9. **3) CNSC's approach to nuclear safety** CNSC does not "dismiss or ignore" low probability accidents. Beyond-design-basis accidents, severe accident management and emergency response are the main themes in the *Task Force Report.* The issues raised are addressed in the *Task Force Report* and *Action Plan*. **4) Used fuel storage** Used fuel storage is considered in the *Task Force Report* and addressed in the *Action Plan.* See sections 6 and 7 of the report and recommendations 1c), 1d), 3c) and 9a).

#	From	Intervener Comment	CNSC Response
14	Michel A. Duguay	 INFO-0828 commentaires 30janv À qui de droit à la CCSN, Veuillez trouver ci-joint et ci-dessous les commentaires de Michel Duguay de l'Université Laval et de 32 cosignataires. Je pourrai, si nécessaire fournir les adresses de courriel de tous les cosignataires. Avec mes salutations distinguées, Michel Duguay **Commentaires sur le Plan d'action du personnel de la CCSN, INFO-0828** Le 3 février 2012, Michel Duguay, Université Laval, et les 32 cosignataires suivants : Sébastien Bois, Jean Chatillon, Marc Chénier, Jacinthe Denault, Marie-France Doucet, Sylvain Dussault, Isabelle Gingras, Gordon Edwards, Marc Fafard, Michel Fugère, Philippe Giroul, Hélène Lamothe, Pierre Jasmin, Marcel Jetté, Pierre-André Julien, François Lachapelle, Laurianne Lafontaine, Diane Lanouette, François Lapierre, Gaétan Lebel, Julie Lemieux, Denis L'Homme, Claude Lussier, Clément Nolin, Éric Notebaert, Daniel-Jean Primeau, Gilles Provost, Gaëtan Ruest, Lucie Sauvé, Christian Simard, Colette Tardif, Louise Vandelac **Introduction** Le Groupe de travail de la *Commission canadienne de sûreté nucléaire* (CCSN) sur Fukushima a publié en décembre 2011 son deuxième rapport sur le *Plan d'action du personnel de la CCSN* (document INFO-0828) suite aux événements de Fukushima. Les commentaires qui suivent répondent à l'invitation de la CCSN. Nous avons choisi de formuler plusieurs commentaires sous la forme de demandes.	La plupart des commentaires formulés par le professeur Duguay sortent du cadre du présent examen dans la mesure où ils ne sont pas liés : a. à la réponse aux commentaires du public sur le Rapport du Groupe de travail sur Fukushima b. au Plan d'action de la CCSN Les commentaires faisant partie du cadre sont traités ci-dessous. Une réponse brève est également donnée pour chaque commentaire sortant du cadre.
15	Michel A. Duguay	**Commentaire # 1 : Obligation de résister à des accidents nucléaires graves similaires à ceux de Fukushima**	La CCSN remercie le professeur Duguay pour ses commentaires positifs.

#	From	Intervener Comment	CNSC Response
		Le Plan d'action INFO-0828 représente un progrès remarquable à la CCSN dans la prise de conscience des accidents nucléaires graves et dans la volonté du régulateur d'obliger les propriétaires de réacteurs CANDU à mettre en place des équipements et des mesures opérationnelles pour faire face à d'éventuels accidents nucléaires similaires à ceux de Fukushima, afin d'en atténuer les conséquences. Le Plan d'action INFO-0828 traduit la volonté de la CCSN en 13 recommandations adressées aux firmes électronucléaires, aux ministères provinciaux, et au personnel de la CCSN. Ces recommandations sont bien étoffées et extrêmement exigeantes envers les firmes électronucléaires. Il est clair dans la Recommandation # 1 que parmi les accidents graves fréquemment évoqués se trouve la fusion du cœur du réacteur, comme cela s'est produit à Fukushima. Étant donné l'ampleur de la catastrophe de Fukushima, nous formulons les deux premières demandes suivantes : **Demande 1** : que la CCSN oblige Hydro-Québec à divulguer pleinement au grand public québécois les exigences du Plan d'action INFO-0828 et les modifications qu'Hydro-Québec apporterait à Gentilly-2. La *Loi sur la sûreté et la réglementation nucléaires* de 1997 stipule que la CCSN doit informer le public de façon objective et scientifique sur toutes les questions nucléaires. La CCSN et Hydro-Québec devraient conjointement informer le public québécois que la probabilité d'un accident nucléaire grave, suite aux leçons de Fukushima, est maintenant estimée être à un niveau 10 fois plus élevé qu'auparavant. **Demande 2** : que la CCSN veille à ce que le *Plan d'action INFO-0828* se traduise dans la réalité avec un niveau de rigueur à la hauteur du risque nucléaire. La documentation de la CCSN montre qu'Hydro-Québec a souvent manqué de rigueur dans le domaine nucléaire.	**Demande 1 :** La CCSN déploie des efforts considérables pour s'acquitter de ses responsabilités relatives à la *Loi sur la sûreté et la réglementation nucléaires*, afin de diffuser de l'information objective et scientifique au public sur les questions liées au nucléaire. Les exigences du Plan d'action pour la centrale nucléaire de Gentilly-2 sont déjà publiées dans le Plan d'action de la CCSN. Les détails des changements apportés à la centrale nucléaire de Gentilly-2 en raison de ces mesures ne seront pas nécessairement publiés étant donné que beaucoup d'entre eux comportent des données liées à la sécurité ou à des renseignements confidentiels de nature commerciale. Le personnel de la CCSN envisage d'inclure une mise à jour à l'intention de la Commission dans le cadre de la présentation du Rapport sur les centrales nucléaires de 2011, lors de la réunion de la Commission d'août 2012. À l'avenir, le personnel de la CCSN a l'intention de faire le point deux fois par an, en commençant en juillet 2012, sur l'état d'avancement des mesures à prendre à la suite de l'accident de Fukushima (FAI) afin de les intégrer dans la présentation décrite ci-dessus. La prochaine mise à jour aura lieu en janvier 2013 pour vérifier si les mesures FAI qui devaient être clôturées pour décembre 2012 ont bien été achevées et intégrées dans la préparation du rapport sur les centrales nucléaires de 2012. Nous notons que la *Loi sur la sûreté et la réglementation nucléaires* ne stipule pas que la CCSN doit informer le public de façon objective et scientifique sur **toutes** les questions nucléaires. Ceci

#	From	Intervener Comment	CNSC Response
			entraînerait la publication de toutes les informations envoyées ou reçues par la CCSN dans l'exercice de ses fonctions. Le personnel de la CCSN n'est pas d'accord avec l'affirmation selon laquelle la probabilité d'un accident nucléaire grave est maintenant estimée être à un niveau 10 fois plus élevé qu'auparavant. **Demande 2 :** Le suivi des mesures soulevées à la suite du *Plan d'action de la CCSN* sera géré par les processus normaux de surveillance et de vérification de la conformité de la CCSN. Le personnel de la CCSN n'est pas d'avis qu'Hydro-Québec ait souvent manqué de rigueur dans le domaine nucléaire.
16	Michel A. Duguay	**Commentaire # 2. Faiblesse du confinement physique** Dans sa Recommandation 1 le Plan d'action INFO-0828 parle beaucoup du besoin de s'assurer que la structure de confinement physique du réacteur et de la piscine de stockage du combustible usé (PSCU) résisterait dans le cas d'accidents graves. C'est une chose pour la CCSN d'écrire ces directives sur papier, mais est-ce que la réalité physique suivra sur le terrain? Nous constatons que la firme française AREVA a jugé qu'une double enceinte comprenant une épaisseur totale de 2,6 mètres de béton armé est nécessaire à la fois pour contenir un accident grave avec fusion du cœur, et pour empêcher que l'écrasement d'un avion de ligne ou un avion militaire produise une brèche. Dans le cas du réacteur Gentilly-2 la structure de confinement physique comprend seulement un mètre de béton armé. En ce moment la salle de contrôle de la centrale, ainsi que la piscine pour le combustible irradié (environ 2000 tonnes de tonnes de déchets hautement radioactifs), ne sont même pas protégées par une structure offrant une résistance appréciable aux impacts d'avions ou de missiles d'origine malveillante.	Le suivi des mesures soulevées à la suite du Plan d'action de la CCSN sera géré par les processus normaux de surveillance et de vérification de la conformité de la CCSN. La demande 3, qui porte sur les vulnérabilités de la centrale, sort du cadre étant donné qu'il s'agit d'une demande liée au processus d'autorisation de la centrale Gentilly-2 et non d'un commentaire sur le *Plan d'action*. Nous pouvons rassurer le professeur Duguay sur le fait que la CCSN ne délivre pas de permis aux installations qu'elle juge dangereuses. En outre, nous notons que le personnel de la CCSN a préparé un rapport sur la robustesse des centrales nucléaires, après l'accident survenu à Fukushima. Ce rapport est classifié et sera présenté à la Commission à huis clos.

#	From	Intervener Comment	CNSC Response
		Du côté américain, depuis 2009 la Nuclear Regulatory Commission (NRC) exige que les réacteurs nucléaires aient en place des mesures pour faire face, entre autres, à un impact d'avion de ligne et au feu intense de kérosène qui pourrait s'ensuivre, comme ce fut le cas au World Trade Center à New York le 11 septembre 2001. Dans le cas de la centrale nucléaire Gentilly-2, il est légitime de se demander ce qui arriverait à la salle de contrôle et à la piscine de déchets radioactifs si un feu intense de kérosène les enveloppait? Dans une telle situation peut-on vraiment croire que le refroidissement du réacteur et de la piscine serait maintenu? En 2011 le refroidissement avait fait gravement défaut à Fukushima dans trois réacteurs et une piscine hébergeant les déchets radioactifs. Les conséquences du déversement massif de radioactivité dans l'environnement ont causé l'évacuation de 70 000 personnes dans un rayon de 30 kilomètres autour de la centrale nucléaire de Fukushima. Force est de constater que la faiblesse physique de la centrale Gentilly-2, laquelle se trouve à environ 100 mètres de la rive sud du fleuve Saint-Laurent, la rend vulnérable aux attaques à partir de bateaux. Des déversements massifs d'éléments radioactifs dans le fleuve St-Laurent, comme ce fut le cas à Fukushima tout près de la côte de l'Océan Pacifique, pourrait contaminer les prises d'eau potable pour plusieurs villes riveraines en aval, dont Québec et Lévis. Nous formulons donc notre troisième demande comme suit : **Demande 3 :** que la CCSN exige d'Hydro-Québec un niveau de protection physique rigoureusement adéquat pour résister à des attaques malveillantes par voie de la terre, de l'air et de l'eau. Dans le cas d'un refus de la part d'Hydro-Québec, que la CCSN n'accorde pas le permis d'exploitation.	
17	Michel A. Duguay	**Commentaire 3 : ''Definitely, the core will melt'', «Définitivement, le coeur va fondre.»** Le Plan d'action INFO-0828 confirme ce que le Dr. Greg Rzentkowski, Directeur général à la CCSN, avait déclaré le 2 décembre 2011 à Saint John au Nouveau Brunswick lors de l'audience publique de la CCSN concernant une éventuelle remise en marche du réacteur nucléaire de Point Lepreau. En réponse à une question plusieurs fois répétée par le Dr. Michael Binder,	Le *Rapport du Groupe de travail de la CCSN* et de nombreuses autres références disponibles établissent clairement que le cœur de toute centrale nucléaire peut fondre dans certaines conditions suffisamment extrêmes (et hautement improbables). Les remarques formulées par le D[r] Rzentkowski sont déjà de notoriété publique. Aucune autre annonce publique n'est donc

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		président de la CCSN, question touchant les conséquences d'un très fort tremblement de terre à Point Lepreau, le Dr. Greg Rzentkowski avait répondu ceci (voir les pages 214-215 de la transcription du 2 décembre 2011 sur le site web de la CCSN) : ''**DR. RZENTKOWSKI***: Yes, I tried to make this point yesterday, that even if we will experience an extremely high magnitude earthquake here in Point Lepreau, approaching the level of that in Fukushima, the reactor will shut down safely; however, there will be some consequences. Definitely, the core will melt. Now the question is, if the molten fuel will be contained in the calandria. Probably not. It may be, but it cannot be guaranteed. So the worst-case consequence would be some level of unfiltered releases to the environment after maybe four to five days from the accident. That's the worst-case scenario.''* **Traduction.** Dr. Greg Rzentkowski : *«Oui, j'ai tenté hier de faire ce point à savoir que dans le cas d'un séisme de grande ampleur ici à Point Lepreau, d'une ampleur de celui qui a secoué Fukushima, le réacteur va s'arrêter de façon sécuritaire. Cependant il y aura des conséquences. Définitivement le cœur va fondre. Maintenant la question est de savoir si le combustible nucléaire en fusion sera confiné à la calandre. Probablement que non. Il pourrait y être confiné, mais cela ne peut pas être garanti. Alors, les conséquences du pire scénario sont qu'une certaine quantité d'éléments radioactifs serait déversée dans l'environnement possiblement quatre ou cinq jours après l'accident. Cela est le scénario dans le pire des cas.»* Les intervenants Michel Duguay de l'Université Laval (Ph.D. en physique nucléaire) et Gordon Edwards (Ph.D. en mathématique et président-fondateur de la Canadian Coalition for Nuclear Responsibility), ont été témoins de cette discussion publique impliquant de nombreux intervenants, les commissaires et le personnel de la CCSN, et des dirigeants et ingénieurs de la firme *Énergie Nouveau Brunswick* (*New Brunswick Power*). À Saint John le 2 décembre 2011, aucune personne n'a tenté de contredire le Dr. Greg Rzentkowski suite à cette déclaration. Cette révélation du Dr. Greg Rzentkowski, bien confirmée par le Plan d'action INFO-0828, montre clairement que la prise de position de la CCSN par rapport aux accidents nucléaires graves a changé après la catastrophe de Fukushima. Ceci nous incite à formuler la demande suivante :	nécessaire.

#	From	Intervener Comment	CNSC Response
		Demande 4 : que la CCSN informe clairement le public québécois que des circonstances peuvent causer la fusion du cœur d'un réacteur CANDU.	
18	Michel A. Duguay	**Commentaire 4 : la non-conformité de Gentilly-2 aux normes sismiques** Le Plan d'action INFO-0828 ne fait pas mention du fait que le réacteur nucléaire Gentilly-2 ne rencontre pas les normes sismiques du *Code national du bâtiment* au Canada. Le premier rapport du groupe Fukushima, le document INFO-0824 d'octobre 2011, n'avait pas donné la valeur maximum de l'accélération du sol dénoté par le PGA, acronyme symbolisant *peak ground acceleration,* à laquelle on peut s'attendre lors d'un séisme significatif à Gentilly-2 ou à Point Lepreau. C'est cette accélération du sol qui fait s'écrouler les édifices et peut faire éclater des tuyaux dans les réacteurs nucléaires. Cette dernière possibilité a été tout de même reconnue dans INFO-0824 d'octobre 2011, mais n'a pas été élaborée à la lumière de Fukushima. Pour le cas du réacteur nucléaire Gentilly-2 les données de la *Commission géologique du Canada*, qui sont à la base du *Code national du bâtiment*, donnent un PGA de 0,6 g sur sol ferme et 0,43 g sur le roc (soit 43% de l'accélération terrestre). Cette valeur correspond à un séisme qui a une probabilité d'occurrence de 0,5% sur 50 ans, laquelle probabilité s'applique aux réacteurs nucléaires et à certaines usines de produits chimiques très toxiques. Pour un édifice à bureaux la probabilité d'occurrence du séisme considérée par le Code est de 2% sur 50 ans. Suivant les données de la *Commission géologique du Canada* la valeur du PGA dans ce cas est 0,3 g pour Trois-Rivières et Bécancour. Or le réacteur CANDU à la centrale nucléaire Gentilly-2 a été conçu pour une valeur du PGA de 0,15 g, soit deux fois moins que la valeur maintenant exigée pour les édifices à bureaux, et trois fois moins de la valeur maintenant exigée pour un réacteur nucléaire. La plus grande vulnérabilité des réacteurs CANDU réside dans ses 380 tuyaux à haute pression qui se fragilisent avec le temps à cause de plusieurs phénomènes de dégradation nucléaire et chimique bien documentés par la CCSN. Cette fragilisation est la raison principale nécessitant le projet de réfection, lequel comprend le remplacement de tous les tuyaux. En août 1983, en l'absence de tremblement de terre, un tuyau à haute pression avait éclaté à la centrale nucléaire Pickering A près de Toronto. Un accident majeur avait pu être évité grâce à une improvisation	La demande 5 est liée au processus d'autorisation de la centrale Gentilly-2. Il ne s'agit pas d'un commentaire sur le *Plan d'action*. Nous pouvons rassurer le professeur Duguay sur le fait que la CCSN ne délivre pas de permis aux installations qu'elle juge dangereuses. Le *Plan d'action* ne mentionne pas le besoin de satisfaire aux exigences sismiques du *Code national du bâtiment du Canada* parce que la centrale doit respecter des règles plus strictes imposées aux centrales nucléaires et définies par la norme CSA N289.1/2008. À l'égard de la rupture de tube de pression survenue à la centrale Pickering-A en 1983 : a. L'événement de Pickering n'a pas eu de conséquences significatives. Les systèmes de sûreté n'ont pas été activés en raison de la faible ampleur de l'événement. Les opérateurs ont calmement réduit la puissance du réacteur et activé le refroidissement à long terme. Aucun des travailleurs n'a subi d'exposition significative au rayonnement. b. Les tubes de pression de Pickering-A étaient faits d'un alliage de Zircaloy-2. Les tubes de pression de toutes les autres centrales CANDU ont été fabriqués à partir de Zircaloy-2.5, un matériau amélioré. Après cet incident, tous les tubes de pression de Pickering-A ont été remplacés par des tubes de Zircaloy 2.5. De l'information détaillée sur les différences entre le Zircaloy-2 et le Zircaloy 2.5 ainsi que sur la rupture de tube de pression à la tranche 2 de Pickering-A (canal

#	From	Intervener Comment	CNSC Response
		astucieuse des opérateurs. Sera-ce le cas si un tremblement de terre fait éclater simultanément plusieurs tuyaux à haute pression à Gentilly-2? Un optimiste pronucléaire pourra argumenter qu'une probabilité de 2% sur 50 ans, ou 1% sur 25 ans, est faible. Dans un casino on peut parier qu'un lancement simultané de trois dés donnera trois six. La probabilité est 1 sur 216, c'est-à-dire 0,46%, et le casino paye 150 fois la mise. L'optimiste pronucléaire pourra argumenter que le 1% sur 25 ans pour un réacteur Gentilly-2 remis en opération sur cette période, est seulement deux fois plus que le 0,46% du lancement de trois dés. Mais au casino le client mise et lance les dés volontairement. Dans le cas de Gentilly-2, où un accident grave pourrait dévaster une grande partie de la vallée du Saint-Laurent, ce sont des organismes comme Hydro-Québec et la CCSN qui lancent les dés. Une telle situation ne soulève-t-elle pas des questions d'éthique? M. Chris Rouse, intervenant à Saint John les 1 et 2 décembre, a imaginé un révolver muni de 216 places pour des balles. On y met seulement une balle et on contemple jouer à la roulette russe avec ce révolver. Si on tire seulement un coup, la probabilité que la balle sortira est seulement 0,46 %. Est-ce que quelqu'un veut payer 2 milliards de dollars pour jouer à cette roulette russe? Cette situation conduit logiquement à la question suivante que nous formulons sous la forme d'une demande à la CCSN : **Demande 5 :** Étant donné que de nombreux codes d'éthique professionnelle, notamment pour les ingénieurs, stipulent que le public doit être informé des dangers qui le menacent, est-ce que la CCSN prendra en ligne de compte ces codes d'éthique avant de rendre sa décision sur Gentilly-2?	G16) se trouve dans le document de l'AIEA TECDOC-1037, "*Assessment and management of aging of major nuclear power plant components important to safety: CANDU pressure tubes*", 1998, http://www-pub.iaea.org/books/IAEABooks/5334/Assessment-and-Management-of-Ageing-of-Major-Nuclear-Power-Plant-Components-Important-to-Safety-CANDU-Pressure-Tubes
19	Michel A. Duguay	**Conclusion** À Vienne le 22 juin 2011 la International Atomic Energy Agency (IAEA) a tenu une conférence sur la sûreté nucléaire (*Ministerial Conference on Nuclear Safety*) pour discuter les leçons apprises de Fukushima et applicables à toute la planète. Un des conférenciers était André-Claude Lacoste, directeur général de *l'Autorité de sûreté nucléaire* (ASN) en France. M. Lacoste a beaucoup fait dans toute sa carrière, et depuis Fukushima en particulier, pour rehausser les normes de sécurité nucléaire et pour assurer l'indépendance de l'ASN et une transparence accrue. Un des moyens est celui qu'il a décrit le 22 juin 2011 comme suit :	La demande 6 est la répétition d'un commentaire formulé au sujet du *Rapport du Groupe de travail de la CCSN*, et qui a été déjà pris en compte dans le *Plan d'action de la CCSN* (Annexe B, point n° 16).

#	From	Intervener Comment	CNSC Response
		‘’Dispositions to be submitted for a greater independence of regulatory authorities, a greater transparency and for a strengthened nuclear safety framework.’’ Traduction: «*Dispositions à soumettre en vue d’une plus grande indépendance des autorités de réglementation, une plus grande transparence et un cadre renforcé de sûreté nucléaire*». Ce point de vue d’André-Claude Lacoste a été soutenu par le Directeur général de l’IAEA, le Dr. Yukiya Amano. M. Lacoste parlait dans un contexte international, qui inclut évidemment le Canada. Or, au Canada, comme l’a noté Mark Mattson, représentant de l’organisme *Lake Ontario Waterkeeper*, la CCSN est liée de trop près à l’industrie nucléaire. À la page 32 de INFO-0828 on peut lire ceci de Mark Mattson : *‘’By combining the regulator, particularly the Commission Tribunal that makes licensing decisions, with the body that promotes and speaks in defence of the nuclear industry, Canada faces the same conflict of interest identified by Japanese authorities as one cause of the disaster at Fukushima. In order to ensure that the Commission Tribunal can make truly independent decisions in the interest of safety and the environment, it should be separated from the rest of the CNSC. Only by creating this independence can decisions made by the Commission be free of the perceived or actual conflict of interest that led, in part, to Fukushima.’’* **Traduction** : «*En combinant le régulateur, en particulier le Tribunal de la Commission qui prend les décisions d'octroi de licences, avec la partie de la CCSN qui favorise et parle pour la défense de l'industrie nucléaire, le Canada est confronté au même conflit d'intérêt identifié par les autorités japonaises comme une cause de la catastrophe de Fukushima. Afin de s'assurer que le Tribunal de la Commission puisse prendre des décisions véritablement indépendantes dans l'intérêt de la sécurité et de l'environnement, ce Tribunal doit être séparé du reste de la CCSN. C'est uniquement en créant cette indépendance que la prise de décisions prises par la Commission sera libre de la réalité ou de la perception de conflits d'intérêts qui ont conduit, en partie, à Fukushima.*» En guise de conclusion nous répétons la demande de Mark Mattson :	

#	From	Intervener Comment	CNSC Response
		Demande 6 : *''The Task Force report should include consideration of the real and/or perceived conflict of interest inherent in Canada's nuclear regulatory system, in light of Japan's decision to separate the nuclear regulator from the industry's promoter.''* **Traduction:** «*Le rapport du Groupe de travail devrait inclure l'examen des conflits réels et / ou perçu d'intérêts inhérents au système canadien de réglementation nucléaire, à la lumière de la décision du Japon de séparer la réglementation nucléaire du promoteur de l'industrie.*»	
20	Gordon Edwards	 CCNR_Action_Plan(1-4).pdf **Comments on the CNSC Action Plan (INFO-0828) on the CNSC Fukushima Task Force Recommendations** by Gordon Edwards, Ph.D., President, Canadian Coalition for Nuclear Responsibility February 4, 2012 The Canadian Coalition for Nuclear Responsibility (CCNR) respectfully submits the following comments on the CNSC Action Plan.	The comments from CCNR are out of scope of the current review as they are not related to: a. disposition of public comments on the Task Force Report b. CNSC Action Plan Nevertheless, the major points raised by CCNR are addressed below.
21	Gordon Edwards	In general, we find that the CNSC Staff have not shown sufficient imagination in grasping the true dimensions of an unforeseen nuclear catastrophe such as the horrifying sequence of events that took place at Fukushima Dai-ichi reactors number 1, 2, 3, and 4.	CNSC Staff does not accept that they have not grasped the true dimensions of the Fukushima accident. The accident and its consequences are objectively described in section 2 of the *Fukushima Task Force Report*.
22	Gordon Edwards	The Task Force Report is hampered by a failure to honestly state and elucidate the fact that catastrophic accidents in CANDU reactors are in fact possible and may in fact occur, no matter what precautions are taken ahead of time. The nature of a catastrophic nuclear accident is that it is a totally unforeseen event and hence nothing can be ruled out ahead of time as a possibility. To deny this is to be blind to the lessons of Fukushima. In order to profit from the lessons of Fukushima, one must begin with a frank admission that nuclear power is inherently dangerous -- as a number of responsible bodies have done in the past. We provide four examples in the appendix.	CNSC staff does not agree with this comment. Severe accidents are considered for CANDU reactors. A major part of the *Task Force Report* was dedicated to external hazards, beyond design basis accidents, severe accident management and emergency response. See sections 6 and 7 of the report.

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		In the appendix we have included excerpts from the 1978 Report of the Ontario Royal Commission on Electric Power Planning, entitled "A Race Against Time"; from the 1980 Report of the Select Committee on Ontario Hydro Affairs, entitled "The Safety of Ontario's Nuclear Reactors"; from the 1982 Report by the Department of Energy, Mines and Resources, entitled "Nuclear Policy Review Background Papers"; and from a 1989 submission to the Treasury Board of Canada by the Atomic Energy Control Board, the predecessor of the Canadian Nuclear Safety Commission. These documents all frankly admit that CANDU reactors can suffer catastrophic failures.	
23	Gordon Edwards	Now is the time for the CNSC to publicly admit that this is the case. The law that established the CNSC does not give it a mandate to provide b;and assurances of safety based on factually incorrect statements. Rather, the CNSC is obliged by law "to disseminate but "to disseminate objective scientific, technical and regulatory information to the public concerning . . . the effects, on the environment and on the health and safety of persons" of licensed nuclear facilities. [Nuclear Safety and Control Act, Article 9(b)]. Yet we read in the Task Force Report that "The main objective in submitting the Task Force Report to the public for comment was to assure Canadians that nuclear power plants in Canada are safe and able to withstand the conditions that led to the Fukushima nuclear accident . . . " Here the CNSC is admitting that its main motive is not to arrive at the truth, not to protect the public and the environment, not to disseminate objective information, but to give assurances that nuclear power plants are safe. In our view, this means that this whole exercise is being conducted in bad faith.	The conclusion drawn by CCNR is false. The objective of the CNSC Task Force was clearly stated in section 3.4 of the report, "to evaluate operational, technical and regulatory implications of the 2011 Fukushima Daiichi accident on Canadian NPPs." The statement quoted by CCNR is the main objective in submitting the Task Force Report to the public for comment; a completely different objective that is fully compatible with the first. The objective of publishing the document and seeking public input was to communicate to the Canadian public the conclusion of the Task Force's investigations. That conclusion, based on detailed study of objective information, was that Canadian reactors are safe. All these activities are in alignment with CNSC's responsibilities under the *Nuclear Safety and Control Act*.
24	Gordon Edwards	Indeed, the sentence quoted above is blatantly incorrect and profoundly misleading. As Dr. Rzentzkowski has publicly admitted (during the recent Point Lepreau licensing hearings held in Saint John) CANDU reactors cannot necessarily "withstand the conditions that led to the Fukushima nuclear	As stated above, severe accidents are considered for CANDU reactors. A major part of the *Task Force Report* was dedicated to

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		accident". On the record, he stated: . . . even if we will experience an extremely high magnitude earthquake here in Point Lepreau, approaching the level of that in Fukushima, the reactor will shut down safely; however, there will be some consequences. Definitely, the core will melt. Now the question is, if the molten fuel will be contained in the calandria. Probably not. It may be, but it cannot be guaranteed. So the worst-case consequence would be some level of unfiltered releases [of radioactivity] to the environment after maybe four to five days from the accident. That's the worst-case scenario. . . . which also includes large releases [of radioactivity], because we cannot preclude this if we have a seismic activity of that magnitude.	external hazards, beyond design basis accidents, severe accident management and emergency response. See sections 6 and 7 of the report.
25	Gordon Edwards	The Task Force Report has concentrated attention too narrowly on the machinery: equipment maintenance and the potential for equipment failures. While these are undoubtedly important aspects of accident prevention, they do not address the onsite and offsite consequences of an unanticipated catastrophe resulting in core melting, partial or complete containment failure, and massive releases of radioactive materials into the environment. In the absence of such considerations, we are simply not dealing with the lessons of Fukushima. There is in the Task Force Report no realistic assessment of the sheer magnitude of the problems that will have to be dealt with under catastrophic circumstances. In this document we delineate some of the many aspects that we feel have been overlooked.	CNSC staff does not agree with this comment. Onsite and offsite consequences are considered in CANDU reactors. A major part of the *Task Force Report* was dedicated to severe accident management and emergency response. See sections 6 and 7 of the report.
26	Gordon Edwards	(1) CONTAINING RADIOACTIVELY CONTAMINATED WATER During the Fukushima Dai-ichi accident, enormous volumes of contaminated water were dumped into the ocean adjacent to the plant. Yet the Task Force Report does not even address the question of what might happen with similar huge volumes of contaminated water in the event of an analogous catastrophic accident at a CANDU reactor. During the Point Lepreau licensing hearings in Saint John it was stated by the licensee that any contaminated water used to reflood the core of a badly damaged CANDU reactor could be recycled – pumped back through the core of the reactor over and over again, without releasing that water to the outside environment. But is this actually possible? Has CNSC carefully studied this scenario? What about the temperature build-	Recycling of emergency core cooling (ECC) water is a design feature common to all CANDU reactors. Dedicated pumps recover water from the containment sumps through debris strainers, cool it and return it to the reactor.

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		up? What about the debris?	
27	Gordon Edwards	At Fukushima Dai-ichi, recycling water through the core was not possible for a very long time. The debris-clogged water could not be pumped back through the core of the reactor until a special filtration and decontamination system was installed, and that was not accomplished for many months following the accident. In the meantime, there was nowhere to store the filthy contaminated water so it had to be dumped into the nearby receiving waters, which were ocean waters, while the core continued to be flooded with ocean water or fresh water taken from an uncontaminated and unclogged source. In Canada, an analogous situation would result in large volumes of heavily contaminated water being dumped into Lake Huron, or Lake Ontario, or the St. Lawrence River, or the Bay of Fundy. This would be an environmental catastrophe of the first order. The drinking water for millions of people could be seriously affected, not to mention the contamination of aquatic biota. Why has the Task Force not even addressed this question? Are there any plans at all to temporarily store huge volumes of debris-filled radioactively contaminated water to prevent it from going into our precious waterways in the event of a catastrophic CANDU accident? If not, why not?	Recommendation 3 of the *Task Force Report* considers releases to water as well as to air. While not addressed directly by the actions related to recommendation 3, this issue is covered by deliverable 1 of action 2.1. CNSC notes that prevention of core damage is the first priority and CANDU reactors have a number of features that prevent or delay this. Additional equipment can then be brought to delay core damage effectively indefinitely. Should such measures fail, licensees have implemented and are improving severe accident management guidelines to protect the containment and prevent a major release.
28	Gordon Edwards	(2) AIRBORNE RELEASES FROM SPENT FUEL POOLS During the Point Lepreau licensing hearings in Saint John it was admitted by the licensee that uncovering and overheating of the irradiated fuel in a CANDU spent fuel pool could trigger a strongly exothermic chemical reaction between the zirconium cladding and the steam. This would produce both heat -- driving the temperature upwards rapidly – and hydrogen gas – setting the stage for a possible chemical explosion -- as well as liberating substantial amounts of fission products in the form of gases and vapours. These fission gases and vapours would enter the outside atmosphere relatively easily due to the lack of any carefully designed containment envelope or any sophisticated atmospheric filtration system for the spent fuel pool. Why has the Task Force not required a negative pressure containment envelope for all CANDU spent fuel pools? Has CNSC staff even studied the potential unfiltered atmospheric releases	CNSC is fully aware of the zirconium properties including its ability to release significant amount of heat as well as hydrogen in exothermic oxidation. Spent fuel safety, and in particular, possibility of zirconium oxidation, has been specifically assessed and found to be robust with several opportunities for further improvements. Spent fuel pools in CANDU reactors are seismically qualified. Even in the event of leakage, in-ground pools would not leak catastrophically. Boil-off and evaporation of pool water would take many days and allow ample time to ensure that the modest make-up rates are provided. As per Action Plan action 1.6, the pool integrity at high temperature will be verified.

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		from a catastrophic overheating incident in the spent fuel pool? Can CNSC staff provide any assurance that the potential unfiltered atmospheric radioactive releases from a fuel pool overheating may not far exceed the potential unfiltered atmospheric radioactive releases from overheating of the core of the reactor?	As per action 1.5, if drainage cannot be precluded, appropriate means for hydrogen mitigation must be evaluated. As per action 1.7, means to provide additional make-up must be evaluated.
29	Gordon Edwards	(3) ZIRCONIUM FIRES IN SPENT FUEL POOLS During the Point Lepreau licensing hearings in Saint John the licensee denied the possibility that an actual zirconium fire might take place involving the zirconium cladding of the uncovered and overheated irradiated fuel in a damaged spent fuel pool. While zirconium is known to be highly pyrophoric and even explosive in a finely divided state – which is why zirconium is used as the combustible material in the old-fashioned "flash cubes" that were popular for cameras in years gone by – it appears that CNSC staff and CNSC licensees are oblivious to the very real possibility of an extremely energetic fire starting in an overheated spent fuel bay – with or without steam – at temperatures close to 1000 degrees C. This possibility has been studied by the U.S. National Academy of Sciences in their report entitled Safety and Security of Commercial Spent Nuclear Fuel Storage: Public Report. In Finding 3B, the authors point out that encountering a "partially or completely drained spent fuel pool could lead to a propagating zirconium cladding fire and the release of large quantities of radioactive materials to the environment. Details are provided in the committee's classified report." The National Academy's Report, cited above, includes the following recommendations: RECOMMENDATION: The Nuclear Regulatory Commission should undertake additional best-estimate analyses to more fully understand the vulnerabilities and consequences of loss-of-pool-coolant events that could lead to a zirconium cladding fire . . . . RECOMMENDATION: . . . the Nuclear Regulatory Commission should ensure that power plant operators take prompt and effective measures to	These comments are effectively addressed by the same measures described immediately above.

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		reduce the consequences of loss-of-pool-coolant events in spent fuel pools that could result in propagating zirconium cladding fires. It is amazing that the Task Force makes no mention of this important phenomenon. It is alarming that neither the CNSC Staff nor the licensees seem to even regard zirconium fires as a genuine possibility. Surely this hazard requires very close and serious attention. It should be noted that the heat generated by a self-propagating zirconium fire can be roughly equivalent to the heat load from freshly discharged LWR fuel assemblies, which in turn is considerably greater than the heat load from freshly discharged CANDU fuel bundles. Thus an uncontrolled zirconium fire can drive the temperature of irradiated fuel bundles up very quickly, and may even trigger episodes of fuel melting. It should also be noted that zirconium fires can also take place in an overheated CANDU core. This possibility should be an important part of the analysis of any severe core damage scenario in CANDU reactors. In this connection it is important to note that there is far more zirconium in the core of a CANDU than in any comparable LWR core.	
30	Chris Rouse, Sharon Murphy CCNB Action SJ Fundy Chapter	 CCNB Action SJ Fundy Chapter cover  Point Lepreau Fukushima Compariso Regarding comments on the draft CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations. Dear CNSC: Attached, find our follow up comments on the draft CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations. Your response to us previously was that our concerns had already been addressed at the Dec, 2011 Point Lepreau re-licensing hearings. We do not feel that our concerns were addressed in any meaningful way and decided to create this document ourselves for your information.	CCNB comments in the opening paragraph of their cover letter that their comments on the *CNSC Task Force Report* were not adequately addressed. However, as indicated in the disposition of comments in Appendix B of the *CNSC Action Plan*, CCNB had not provided specific comments on the *Task Force Report*. They had resubmitted documents that they had submitted to the Point Lepreau licensing hearings. Those submissions were considered in the hearings. Comments provided in the attachment to the current CCNB cover letter are out of scope and repeat many of the arguments that have already been considered. Although out of scope, those comments that have not been recently addressed in a public forum are addressed below.

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		Our community group consists of long-time residents of our city, and in that capacity, we are writing to express my concerns about the lack of serious discussion or attention that has been paid to our research and our expert's opinions. The pending decision of whether or not to re-license one of the most dangerous nuclear power plants in North America should not be taken so lightly. We believe that our people and land are being put at far too much risk for short term power from such a deadly and extremely expensive source. Like Japan, it would seem that the culture of deceiving the public on the extreme danger and expense of nuclear power is more important to the nuclear power industry in Canada than the health, safety and sustainability of our homes, people and ecosystems. The questions we are left with are these. Where will we go if Point Lepreau has an accident and releases radiation into our environment? Who will pay to relocate our population forever? Who will answer our children when they ask why so many died of cancers and why the fish are not safe to eat? Are these risks worth it for short term power that is not needed and certainly not affordable? We hope that you will take the time to read our attached document. Sincerely,	
31	Chris Rouse, Sharon Murphy CCNB Action SJ Fundy Chapter	-The CNSC does not accept that major damage to the Fukushima plant from the earthquake may have been occurred before the tsunami although there are news reports that point otherwise. In our report, expert Professor Duguay explained his concerns regarding pipe breakage during an earthquake as well as the history of pipes cracking in CANDU reactors. It is a concern that in Canada, the regulator is denying what others are learning from. http://www.businessweek.com/news/2011-12-04/tepco-says-fukushima-reactors-withstood-earthquake-jolt.html http://www.theatlanticwire.com/global/2011/07/meltdown-what-really-happened-fukushima/39541/	This concern is supported by references to two newspaper articles. One newspaper article contains anecdotal evidence that there was damage to building structures and pipework at Fukushima resulting from the earthquake. The anecdotes appear to be referring to non-safety significant structures and equipment in the vicinity of the turbines. From these anecdotes the newspaper columnist surmised that safety related pipework within the containment may have failed. In the *Report of the Japanese Government to the IAEA Ministerial Conference on Nuclear Safety*, on page IV-

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			39 the possibility of seismically induced loss of coolant is examined and rejected. The report states: *At 14:47, the loss of the power supply to the instruments due to the loss of external power caused the failsafe to send a signal to close the Main Steam Isolation Valve (hereinafter referred to as MSIV), and the MSIV was closed down. Regarding this point, since the increase in the main steam flow volume that would be measured if the main steam piping was broken, was not confirmed in the Past Event Records Device, TEPCO judged that judged that there were no breaks in the main steam piping and NISA considers that is a logical reason to make that judgment.* and later: *For the one hour that they remained following the earthwork [earthquake], the HPCI records show no indications of any drop to the automatic activation water level (L-L) or any records of the HPCI being activated.* The other newspaper article referred to a discussion paper issued by staff of the Norwegian Institute for Air Research in the journal Atmospheric Chemistry and Physics which is available at http://www.atmos-chem-phys-discuss.net/11/28319/2011/acpd-11-28319-2011.html Comments from reviewers of the draft paper question the accuracy of the calculated timing of events. One comment actually shows that the mathematical model predicts that the release began before the earthquake occurred! In response to the comments, the authors responded [emphasis added] "*The time resolution of the emissions obtained from our inversion is 3 hours. Therefore, it is impossible to judge from our results whether emissions took place during the 45 min time interval between the earthquake and the tsunami*

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			arrival with the associated station blackout, as it was erroneously said in some of the media reports on our study. Notice the word "possibly" in our statement in the abstract "There is strong evidence that the first strong Xe-133 release started very early, possibly immediately after the earthquake and the emergency shutdown on 11 March at 06:00 UTC." We will rephrase this to make clear that essentially we mean that we have strong evidence that the emissions started before the first venting event." CNSC staff concludes that this paper does not support the claim that the reactors were seriously damaged by the earthquake and radioactive releases began before the arrival of the tsunami.
32	Chris Rouse, Sharon Murphy CCNB Action SJ Fundy Chapter	-Both Fukushima and Lepreau have done seismic margin analysis that was not peer reviewed. We found a document on the IAEA website that showed Fukushima had done a seismic margin analysis similar to Point Lepreau's. The force that hit Fukushima was less than what the analysis showed it could withstand, but there may have been serious damage done before the tsunami. This would show that the formulas used in seismic margin analysis may not be correct. (A seismic margin analysis uses calculations to take out the normal engineering safety margins to give you what is called High confidence of low probability of failure or HCLPF number. HCLPF means that they are 95% confident that it will not fail at that magnitude of earthquake shaking. This is mainly used in just the nuclear industry.) If it was found that Japan did have major damage before the tsunami, it would prove that the concept of HCLPF is not valid, and should not be used to deem a nuclear plant safe. -Point Lepreau's seismic margin analysis which was not peer reviewed assumes it can handle an earthquake with a level of Peak Ground Acceleration(PGA) of .3g. It would only take approximately a 4.5 magnitude earthquake 9km away to produce that amount of shaking. If a 6.0 magnitude earthquake hit 11km away it would produce approximately .69g PGA. This is more than 2.5 times than the seismic margin analysis shows and 3.5 times what the plant was designed for. If a 7.5 magnitude earthquake occurred 11km away (which Natural Resources Canada considers credible but	Two key concepts need to be considered: 1. Although designs are often referenced to PGA, they are actually performed in terms of spectral acceleration. Small, close earthquakes can generate very high values of PGA, but their earthquake shaking lacks significant spectral amplitude (sideways motion) at the longer periods where the design is the most important. Furthermore very small earthquakes have very short durations - effectively they are a sharp jolt - and they lack the repeated side-to-side motions that accumulate to cause damage. 2. The seismic hazard assessment, seismic risk assessment, and indeed the engineering design are done in probabilistic terms. Small earthquakes close to the site are not common, and in any event their shaking is unlikely to be damaging for reasons given above. Moderate and large earthquakes are very rare in New Brunswick and the chance that they will also happen very close to the plant (such as at 11 km) is even less likely. At some point the likelihood of the postulated earthquake/distance combinations is so low that the consequent risk probability (say of a release of

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		unlikely) it would produce approximately 1.63g PGA. The Fukushima plant was designed to be much stronger than Point Lepreau, and its recorded PGA was .53g. Its' seismic margin analysis showed it could withstand around .61g. -From the Day 2 licensing hearings for Point Lepreau Greg Rzentkowski said "Yes, I tried to make this point yesterday, that even if we will experience an extremely high magnitude earthquake here in Point Lepreau, approaching the level of that in Fukushima, the reactor will shut down safely; however, there will be some consequences. Definitely, the core will melt. Now the question is, if the molten fuel will be contained in the calandria. Probably not. It may be, but it cannot be guaranteed. So the worst-case consequence would be some level of unfiltered releases to the environment after maybe four to five days from the accident. That's the worst-case scenario." In the Point Lepreau's response to the lessons learned report in a foot note it says there will be a large early release of radiation with a shaking level of .48g. The worst case scenario of a 6.0 earthquake would cause approximately .69g therefore there could be a large early release of radiation long before the 4 to 5 days quoted above. -There is a 250km fault called the Cobequid-Chedabuc to fault that is only 10 to 15 km off shore from Point Lepreau. There hasn't been a lot study done on this fault. A fault this large could possibly produce a large earthquake near Point Lepreau that would give similar shaking levels to that of Fukushima and create a situation of large early release of radiation to the public. -Post Fukushima, information came to light that regulators had approved technical assessments which contained errors. We have found errors in all of the regulatory approved technical assessments that we reviewed. -One of the technical assessments done by a NB Power electrical engineer two months after the Fukushima accident was in response to a warning from the US that there may be an increased seismic risk in Eastern North America. After it was found that the seismic hazard had increased we started asking questions about the previously reviewed assessment. On January 30, 2012 the US announced the completion of the most up to date seismic hazard information for North America, and is mandating all of its Nuclear Plants to re-evaluate their seismic capacity. Point Lepreau and Gentilly 2 are the only	radioactivity) after considering the engineering steps taken to mitigate the consequences is less than the threshold set by the regulator.

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		two plants in moderately seismic areas in North America. -One of the other technical assessments we found done incorrectly was the calculation of the Core Damage Frequency (CDF) and Large Release Frequency(LRF). NB Power's original claim was it could withstand a 1 in 100,000 years event which is not industry approved. Then the same electrical engineer did a calculation incorrectly which showed a CDF of 1 in 19493 years and LRF of 1 in 196000 years. Using the latest available data, and doing the calculation properly results in a CDF of 1 in 10899 years and a LRF of 1 in 24937 years. CDF frequency was calculated for all the plants in the USA and only one is less than Point Lepreau and that is Indian Point at 1 in 10000 years. Point Lepreau's Limit for CDF is 1 in 10000 years and LRF is 1 in 100000 years. -Experts warned that there would be a large seismic event in Japan but no action was taken to adequately protect the plants from the expected size wave. This is in the CNSC funded report, The Potential Impacts of Climate Change and Seismicity in Relation to the Point Lepreau Nuclear Generating Station, buried in the middle of 11-H12.33: Written submission from CCNB Action, Saint John-Fundy Chapter. In that same report, we advised the CNSC that according to well respected experts in their fields of climate change, seismity and physics, Pt Lepreau generating plant was not safe. To date, the CNSC has failed to heed advice from experts who have knowledge of the subject. -Both plants have had flooding problems which was flagged in the "Fukushima: Lessons Learned" document. In the case of NB Power, it is an overland flooding risk. We discovered the severity of this problem on our plant tour which we reported in the doc, 11-H12.33: Written submission from CCNB Action, Saint John-Fundy Chapter. Among other things, the pumps that could be used to protect the emergency generators are not even on the emergency power supply. This summer at the North Anna nuclear plant there was a larger than expected earthquake, followed by a hurricane two days later. It is possible to lose power and flood at the same time.	
33	Chris Rouse, Sharon Murphy CCNB Action SJ Fundy Chapter	-Many of the interveners at the licensing hearings submitted that the CNSC has been promoting the nuclear industry instead of properly regulating it. Since the accident, Japan is changing the nuclear regulator to report to the department of environment instead of the department of natural resources.	This concern was addressed in the Point Lepreau licensing hearings. CNSC does not promote the nuclear industry. As stated

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		Canada should be doing the same but is not. One of the main internationally accepted lessons learned was that the regulator was not doing its job properly.	in section 9.(b) of the *Nuclear Safety and Control Act*, one of the objects of the Commission is to disseminate objective scientific , technical and regulatory information to the public, concerning the activities of the Commission and the effects, on the environment and on the health and safety of persons, of the development, production, possession and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information.
34	Chris Rouse, Sharon Murphy CCNB Action SJ Fundy Chapter	-The (IAEA)IRRS mission(2011) concluded that Canada needs to do better at emergency preparedness, and recommends the following a. A Federal Government review of nuclear power plant off-site emergency plans should include all relevant organizations b. Full-scale emergency exercises should be held on a periodic basis -The lack of emergency planning in Japan contributed to much lost time in the prevention of the progression of the accident and the related unnecessary radiation exposure to the population.	It is correct that the IAEA IRRS Mission concluded that Canada needs to improve its Emergency Preparedness. This was also a finding of the *CNSC Task Force Report* and is reflected in the *Action Plan*. See Appendix A, Part 2 – Enhancing Emergency Response.
35	Chris Rouse, Sharon Murphy CCNB Action SJ Fundy Chapter	-NB Power is currently below expectation in the safety and control area of Emergency Management and Fire Protection, and is expected not to be compliant until 2014. This is due to not meeting a standard that came out in 2007, which they are just now having to meet. There are many old standards that the CNSC are not making them be compliant to till 2014 or 2015.	This concern was addressed in the Point Lepreau licensing hearings.
36	Chris Rouse, Sharon Murphy CCNB Action SJ Fundy Chapter	-Both are old plants that, according to experts in the industry, have not been designed to run past their designed life. Candus are 30 years http://nuclearsafety.gc.ca/eng/pdfs/Letters/Becancour/Attachment-1-July-7-2011_e.pdf and Japan is 40 years. http://www.nytimes.com/2012/01/07/world/asia/japan-new-limits-on-reactors.html -Japan is, post Fukushima, putting age limits on reactors. It doesn't seem age management is being taken seriously in Canada. NB Power is claiming the old reactors are still robust and can withstand earthquakes. We believe the concerned experts should be believed that CANDU plants as well as other models should not be run past their design life of 30 years.	Age management is taken seriously in Canada. CNSC's requirements are published in RD-334, *Aging Management for Nuclear Power Plants.* The safety of nuclear power plants in Canada is reviewed prior to relicensing, refurbishment or life extension.
37	Chris Rouse, Sharon Murphy	-Although NB Power has installed passive autocatalytic recombiners to	Information concerning the adequacy of Passive

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	CCNB Action SJ Fundy Chapter	prevent a hydrogen explosion, it says in the Fukushima task force report that in the event of a major accident, passive autocatalytic recombiners would not be able to keep up and that there would still be an explosion. We should not be confident that passive autocatalytic recombiners would work in the event of a major accident, or last as long as would be needed. -Although NB Power has installed a filtered vent stack to prevent a radioactive release, it says in the Fukushima task force report that in the event of a major accident, the filtered vent stack will not be able to keep the pressure below design pressure, and containment may fail. As well this vent may not be available during an accident. We discovered during our site visit that the valves on the vent are remotely operated by cables, that (at least during the time of our tour) were not properly secured or mechanically protected. There appeared to be no method to locally operate these valves. The vent and controls are both located under the main steam line leaving the containment area and in the secondary emergency control (still under steam line). The steam line problem has been known for many years but has not been fixed. If the steam line broke it could cause damage to the control room, secondary control room, and the emergency filtered vent stack operation.	Autocatalytic Recombiners and Filtered Containment Venting is presumably taken out of context from Appendix B of the *Fukushima Task Force Report*. The scenario under discussion was an extreme scenario assuming progressive failure of all engineering and procedural safety features. As was clearly stated in the opening paragraph of the appendix, it is not a realistic accident.
38	Chris Rouse, Sharon Murphy CCNB Action SJ Fundy Chapter	-Much of the radiation release at Fukushima has come from contaminated water used to try and keep the reactor from melting further. Point Lepreau would have the same problem in an emergency as it is situated alongside the endangered Bay of Fundy, containing a United Nations significant Geopark within a federal Marine protected area. No provisions have been taken to accommodate any radioactive water used in an emergency. -The recent heavy water spill at Point Lepreau was found that it could have been prevented as the same thing happened before. How can we expect NB Power to learn any lessons from the Fukushima accident if they cannot learn from their own mistakes?	Recommendation 3 of the *Task Force Report* considers releases to water as well as to air. While not addressed directly by the actions related to recommendation 3, this issue is covered by deliverable 1 of action 2.1. CNSC notes that prevention of core damage is the first priority and CANDU reactors have a number of features that prevent or delay this. Additional equipment can then be brought to delay core damage effectively indefinitely. Should such measures fail, licensees have implemented and are improving severe accident management guidelines to protect the containment and prevent a major release.
39	Dan Perley Marchhurst Technologies Corporation Ottawa, ON	 CNSC-FUKU-STAFF-RECOMMENDATIONS	The majority of the content of this submission is not in scope of the current review as it is a description of the company product and not related to: a. disposition of public comments on the Task

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	Workplace Technologies Corporation Long Beach, CA	1. Attached is our submission, being a Commentary on the CNSC Staff Action Plan on the Fukushima Report. **Please acknowledge receipt of the attached PDF file in good order.** 2. We request an invitation to submit a further document, and present verbally, at the public meeting CNSC is holding this spring. Please forward the invitation to my E-Mail address and/or call me at 562-494-8782. Best regards,	Force Report b. CNSC Action Plan Section 4.1 was the only section that appeared to be in scope. See below.
40	Dan Perley Marchhurst Technologies Corporation Ottawa, ON Workplace Technologies Corporation Long Beach, CA	**Section 4.1 Context** It is understood that CNSC has determined that it will not, itself, directly regulate off-site emergency management with respect to nuclear powerplants but rather will require license holders to fulfill the requirements set by the province. Nonetheless, it is believed that CNSC should reconsider this position and should in fact mandate national minimum standards for off-site public warning systems as recommended below.	Emergency Management is a provincial responsibility and is not within CNSC's mandate. CNSC works cooperatively with other jurisdictions to ensure adequate measures are in place. Only the federal and provincial governments can change the current responsibilities for regulating offsite emergency management.
41	Guy Rochefort	A qui de droit, Je viens tout juste de prendre de votre appel pour des commentaires, commentaires pour lesquels la date limite est demain, le 3 février 2012. Je laisse à d'autres le soin de discuter des aspects techniques du fonctionnement et de la sécurité de la centrale nucléaire Gentilly-2. Par contre, j'ai constaté que la centrale nucléaire de Gentilly-2 est située à côté d'un parc de réservoirs de produits chimiques hautement réactifs, dont la capacité totale est de plus de 250 000 mètres cubes. Au départ, il s'agit d'une proximité inquiétante pour une centrale nucléaire.	Les commentaires formulés par Guy Rochefort sortent du cadre du présent examen dans la mesure où ils ne sont pas liés : a. à la réponse aux commentaires du public sur le Rapport du Groupe de travail sur Fukushima b. au Plan d'action de la CCSN Toutefois, la plupart des points soulevés par l'intervenant sont abordés ci-dessous. La recommandation 2 du Plan d'action veille à la prise en considération de tous les dangers externes qui pourraient avoir une incidence sur la centrale. Ceci comprend le risque lié aux installations industrielles situées à proximité. L'évaluation environnementale réalisée dans le cadre de la remise à neuf a discuté des dangers externes de

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			manière suffisamment claire. La protection des opérateurs sur le site a été améliorée.
42	Guy Rochefort	À la lecture des rapports d'analyse environnementale réalisés pour le compte du MDDEP, Direction des analyses environnementales, Dossier 3211-19-011, et notamment les rapports datés du 3 février 2009, et le « Rapport final » de janvier 2008, j'ai constaté que dans la représentation du scénario ayant la plus grande (sic) conséquence possible, la limite du seuil de planification d'urgence se situe tout juste à l'extérieur de la clôture de la centrale de Gentilly-2. Mais il y a un problème, et c'est que la vélocité des vents calculée est de 5,4 km/h. Or, la ventilation détaillée de l'étude des vents rapporte des vélocités moyennes des vents variant de 12,1 à 14,3 km/h. De plus, des vélocités de vents atteignant 22,2 km/h ont été enregistrées. Croyez-vous que le seuil de planification d'urgence valable à 5 km/h est encore valable à 12, 14, ou même 22 km/h? Et on n'a pas tenu compte que des bourrasques de vent puissent être d'une vélocité supérieure à 22,2 km/h.	Le rapport thématique se rapporte au plan d'urgence de Servitank, Inc. Les plans d'urgence de la centrale Gentilly-2 tiennent explicitement compte des accidents industriels survenant dans les installations voisines. L'incidence de tout changement apporté aux installations voisines est évaluée dans le cadre du processus permanent de vérification de la conformité.
43	Guy Rochefort	Un autre sujet d'inquiétude est la présence, dans ce parc de réservoirs de produits chimiques, d'un réservoir de nitrate d'ammonium liquide, d'une capacité de 1 200 mètres cubes. Évidemment, il y a certains dispositifs de sécurité: inertage à l'azote, centrale de réfrigération. Tchernobyl, Three Mile Island, et Fukushima, sont là pour nous prouver que les systèmes de sécurité sont infaillibles. Ce qui ne me rassure aucunement, c'est qu'on ne m'a fourni aucune étude d'impact démontrant ce qui arriverait si ce réservoir explosait.	L'évaluation environnementale réalisée dans le cadre de la remise à neuf a discuté des dangers externes de manière suffisamment claire. La protection des opérateurs sur le site a été améliorée.
44	Guy Rochefort	La centrale de Gentilly-2 demeure dans une zone où une prospection gazière intensive a cours: les gazières forent à Sainte-Gertrude, à Gentilly, à Bécancour, à Champlain (sur la rive nord du fleuve). Il suffirait d'une mauvaise lecture de GPS pour aller creuser en-dessous de la centrale, ou se trouve un réseau de piézomètres, dont certains pénètrent dans le roc. À quelle profondeur? On a refusé de divulguer l'information.	Le gouvernement du Québec a assuré à la CCSN qu'il ne délivrerait aucun permis d'exploration du gaz de schiste en dessous ou à proximité de la centrale.
45	Guy Rochefort	La centrale de Gentilly-2 se trouve entre deux failles géologiques: une faille dans le lit du fleuve, et la faille Yamaska, vers l'est. D'après les données soumises par l'Hydro-Québec à l'appui du renouvellement du permis d'exploitation en 2006, il y aurait une autre faille dans le lit du fleuve, mais on n'était pas sûr. Autrement dit, l'Hydro-Québec a construit et opéré une centrale nucléaire sans connaître réellement les	Bien que des tremblements de terre se produisent le long des failles et qu'il y ait des failles et des séismes dans de nombreuses parties de l'est du Canada, on n'observe aucune corrélation suggérant l'activité de certaines failles. De nombreux séismes ont lieu à très grande profondeur (> 15 km) et peuvent se produire sur

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		caractéristiques du sous-sol! S'il y avait un accident nucléaire majeur, le Fleuve Saint-Laurent, la Voie maritime du Saint-Laurent, serait dans la « zone de mort », autrement dit, la circulation maritime en amont de Gentilly serait bloquée. En avez-vous discuté avec les autorités internationales pertinentes? Eh oui, les Grands Lacs et le Fleuve Saint-Laurent sont une juridiction internationale, avec notamment les ports américains de Buffalo, Érié, Détroit, Chicago, ... Dans le contexte décrit ci-dessus, je suis d'avis que la centrale nucléaire de Gentilly-2 doit être fermée et démolie. Bien vôtre, Guy Rochefort le 2 février 2012 Note: Vous avez déjà mes coordonnées, étant donné que j'ai soumis un mémoire en avril 2011.	certaines des nombreuses failles qui n'atteignent pas la surface. Par conséquent, à moins que des recherches n'indiquent l'existence d'une faille particulière, cartographiée en surface, et ayant subi des déplacements récents, nous ne devrions pas le considérer comme un cas spécial lors de l'évaluation du risque sismique.
46	Kathy Bleyer Planning Officer Program Development Section Emergency Management Ontario	I believe there is a typo in the document – Part 2 –Enhancing Emergency Response Recommendation 6 is identified in section 6.0 as MEDIUM TERM. However 6.1 TIMING identifies Completion by *"December 2012"*. I believe this should read *"December 2013"* . Kathy	The observation is correct and the completion for this action should read December 2013. The *CNSC Staff Action Plan* has been amended accordingly.
47	Mary Cianchetti Canadian Standards Association	 CSA - Response to CNSC Staff Action Pla Please find enclosed comments on INFO-0828, *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations*. These comments are sent on behalf of the Canadian Standards Association, Nuclear Strategic Steering Committee.	Please see responses to specific CSA recommendations below.

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		Sincerely, **Mary Cianchetti**, P. Eng. | Program Manager, Energy and Utilities | CSA Standards | 5060 Spectrum Way, Suite 100, Mississauga, ON L4W 5N6 | Tel. 416.747.5572 | www.csa.ca	
48	Mary Cianchetti Canadian Standards Association	After review of the CNSC Staff Action Plan ("the Plan") on the CNSC Fukushima Task Force Recommendations and specifically CNSC Recommendations 9.3 and 9.4, we would like to submit the following feedback for your review and consideration on behalf of the CSA Nuclear Strategic Steering Committee (NSSC). **Recommendation 9.3** Recommendation 9.3 of the Plan calls for the CNSC to initiate a project to develop a dedicated regulatory document on emergency management. 9.3 Action: The CNSC will initiate a project to develop a dedicated regulatory document on emergency management. Excerpt from INFO-0828, CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations Currently, the proposed deliverable would have CNSC staff developing a draft regulatory document on emergency management based upon existing information in G-225 (Emergency Planning at Class I Nuclear Facilities and Uranium Mines and Mills) and RD-353 (Testing the Implementation of Emergency Measures). The CSA NSSC would like to suggest an alternative solution for the satisfaction of this recommendation. CSA's NSSC believes that an Emergency Management document would best be served by an industry standard-based solution, which would provide an opportunity for all stakeholders and levels of government (federal and provincial) to work collaboratively and build upon existing applicable standards and regulation already in use. Such existing documents include: a. CAN/CSA-Z731-03 (R2009), Emergency Preparedness and Response; b. CSA Z1600-08, Emergency Management and Business Continuity Programs; and c. ISO 11320 (2011), Nuclear Criticality Safety – Emergency Preparedness and Response.	The CNSC recognizes the important contribution of the CSA in the development of standards in the nuclear field. While the CNSC continues to see a need for a regulatory document to set expectations related to emergency preparedness and response, it welcomes the proposal of the CSA to develop standards for industry on how to meet and/or implement the CNSC requirements and looks forward to working collaboratively with the CSA on its development.

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		in addition to the above mentioned CNSC regulatory documents. It is worth noting that other CSA committees are actively developing sector specific emergency management standards based upon these existing standards, such as the petroleum and natural gas industry (CSA Z246.2 – under development). The knowledge and expertise for both the nuclear industry and the emergency management industry reside in CSA's stakeholder volunteers who span the private, public, and regulatory sectors. As an independent, third-party, not-for-profit membership association, CSA is able to facilitate a consensus-based standards development process, which respects the diverse stakeholder needs and interests within the nuclear industry. While the average development time of a CSA Nuclear Standard is 18-24 months, CSA has the proven capability to publish a consensus-based standard within 7 months on request (as in the case of CSA N290.15, Requirements for the safe operating envelope of nuclear power plants). Accordingly, the CSA NSSC recommends that an industry, standards-based solution be utilized for the development of an emergency management document for the Canadian nuclear sector.	
49	Mary Cianchetti Canadian Standards Association	**Recommendation 9.4** Recommendation 9.4 of the Plan calls for the review of CSA standards to take into account lessons learned from the Fukushima accident. 9.4 Action: The CNSC will support the review of Canadian Standards Association (CSA) Standards to take into account the lessons from the Fukushima Daiichi nuclear accident through its participation in the CSA Nuclear Strategic Steering Committee (NSSC). Excerpt from INFO-0828, CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations The CSA NSSC has outlined an approach to address the Fukushima Daiichi event. This approach is in line with the deliverable outlined in the Plan and will be completed by the requested timeline. The CSA NSSC will meet this deliverable within the requested timeline.	The CNSC looks forward to working with the CSA on this review activity.

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		We would welcome further dialogue on these comments. Please contact us directly if you have any questions or if you would like to set up a meeting to discuss our feedback in greater detail.	
50	**Jean Bélisle** Chef Analyse et fiabilité Centrale Nucléaire Gentilly	 2012-02-03 (dossier 11HQ02).pdf Bonjour, La lettre ci-dessus mentionnée est envoyée aujourd'hui à M. Ramzi Jammal par courier postal. Meilleures salutations, Le 3 février 2012 Objet : Commentaires sur le plan d'action du personnel de la CCSN concernant les recommandations du Groupe de travail de la CCSN sur Fukushima Monsieur, Pour faire suite à votre demande de formuler des commentaires sur le plan d'action du personnel de la CCSN concernant les recommandations du Groupe de travail de la CCSN sur Fukushima avant le 3 février 2012, nous vous transmettons par la présente nos commentaires sur ce plan d'action.	Comme indiqué dans sa réponse intégrale (voir le document incorporé), la centrale Gentilly-2 est généralement d'accord avec la réponse du personnel de la CCSN aux commentaires du public concernant le *Rapport du groupe de travail de la CCSN*. La centrale Gentilly-2 a également présenté des commentaires sur le *Plan d'action de la CCSN*, comprenant une mise à jour succincte pour chaque mesure. Les mises à jour sortent du cadre du présent examen. Par souci de brièveté, seules les mesures ayant fait l'objet de commentaires particuliers de la part de Gentilly-2 sont discutées ci-dessous.
51	**Jean Bélisle** Chef Analyse et fiabilité Centrale Nucléaire Gentilly	En effet pour l'action 1.1, l'analyse de la perte complète de toutes les sources froides est réalisée et décrite dans le Rapport de sûreté. Elle démontre que la protection contre les surpressions y est adéquate.	Le rapport G2-RT-2011-01537-015 qu'Hydro-Québec a joint à sa lettre du 28 juillet 2011 contient le texte suivant : « La pression augmente jusqu'à atteindre le seuil d'ouverture des soupapes 3332-RV11/RV21. Ces soupapes sont cependant insuffisantes pour permettre l'évacuation complète de la vapeur produite ». Cette information est en contradiction avec les travaux antérieurs acceptés par la CCSN et jette le doute sur la capacité des soupapes de sécurité destinées au dégazage du condenseur.

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			Des renseignements ultérieurs, présentés de manière informelle à la CCSN, appuient le point de vue selon lequel la capacité des soupapes est suffisante. Tant que cette information n'aura pas été officiellement présentée, évaluée et acceptée, la Mesure 1.1 demeure inchangée.
52	**Jean Bélisle** Chef Analyse et fiabilité Centrale Nucléaire Gentilly	Pour l'action 2.1, l'Évaluation Probabiliste de Sûreté (ÉPS) événements externes (référence 2) a été finalisée en 2011 et réalisée selon les pratiques internationales actuelles. Un résumé des événements pris en compte dans l'ÉPS a été soumis dans le rapport du 28 juillet 2011 (référence 1). Cette évaluation est donc terminée et Hydro-Québec considère qu'aucune analyse supplémentaire n'est requise.	Nous notons les soumissions d'Hydro Québec au sujet de l'Évaluation Probabiliste de Sûreté (ÉPS) et du triage des évenements externes. Ces soumissions sont présentement à l'étude et notre revue suivra nos procedures internes. Hydro Quebec sera avisé si d'autres études ou analyses seront necessaires.
53	WM Elliott Senior Vice-President Engineering and Chief Nuclear Engineer OPG	 N-CORR-00531-0557 4.pdf OSR-I Business Services Nuclear Regulatory Affairs Ontario Power Generation	As stated in their full response (see embedded document), OPG is generally in agreement with CNSC staff's disposition of public comments received on the *CNSC Task Force Report*. OPG responded to certain of the public comments on the *Task Force Report*. These comments are reproduced below. OPG also provided comments on the *CNSC Action Plan*, including a brief update statement for each action. The update statements are beyond the scope of this review. For the sake of brevity, only those actions where OPG had specific comments are discussed below.
54	WM Elliott Senior Vice-President Engineering and Chief Nuclear Engineer OPG	**Comments related to the Disposition of Public Comments** OPG notes that the draft report contains CNSC dispositions of comments received during the public consultation on the Fukushima Task Force Report (INFO-0825). OPG generally agrees with the CNSC dispositions and would like to add that OPG believes that some of the comments submitted by the public are incorrect and present an inaccurate view as to the risk to the public by suggesting that the Canadian Nuclear Industry has been less than vigilant in exercising their accountabilities related to public safety. In particular, in reviewing the comments numbered 48 through 66, OPG is unequivocal on these matters: • OPG is committed to safe operation of its facilities, and maintaining public risk within the regulatory envelope and has policies, practices	CNSC staff notes OPG's continuing commitment to safety.

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		and procedures to ensure that safe operation is not compromised. • OPG has been completely forthright in providing the CNSC with detailed information related to plant operation and safety and has been fully supportive of the CNSC Fukushima Task Force. • OPG's design, engineering and operations staff have evaluated and characterized Severe Accident phenomena and event progression to optimize the functionality and capability of existing station systems and equipment, as well as, to identify improvement opportunities. • Regarding station retrofits, over the last forty years of operation, OPG has invested extensively in modifications and upgrades which enhance public safety for both design basis and beyond design basis events. Examples include the installation of the Auxiliary Power Supply at Pickering, extensive modifications to improve the integrity of safety systems and equipment against fire and harsh environmental conditions at all three stations, and modifications to emergency power supplies. • OPG continually strives to be a "Learning Organization," applying effort and resources towards the review of both internal and external operating experience and towards participation in Nuclear Power Industry organizations. OPG is committed to the goals of continuous improvement and unwavering commitment to safe nuclear plant operation.	
55	WM Elliott Senior Vice-President Engineering and Chief Nuclear Engineer OPG	**Comments related to the Action Plan** **2.2 Action:** Implementation of RD-310, Safety Analysis for Nuclear Power Plants is already in progress and tracked by the CNSC/Industry Safety Analysis Improvement Initiative working group. **Deliverables:** Site-specific implementation plans for RD-310. **Applicable to:** All sites **OPG Response** The action, deliverables and timeline are acceptable as written. However, OPG believes that RD-310 implementation is not directly linked to post-Fukushima follow-up activities. Furthermore, RD-310 implementation is	CNSC will close the station-specific Action Items for RD-310, since they had not been effective in achieving rapid progress. The topic will be tracked via FAI 4.2 until such time as we are satisfied with the transition plans and can transition to station-specific AIs.

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		currently being tracked under a separate action item.	
56	Frank Saunders Vice President Nuclear Oversight and Regulatory Affairs Bruce Power	 E-DOCS-#3870693-v1-Bruce_Power_Comm **<u>Bruce Power Comments on the CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations</u>** The purpose of this letter is to submit Bruce Power's comments on the "CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations". Bruce Power specific comments on the individual Action Items are also provided in Attachment A.	As stated in their full response (see embedded document), Bruce Power is generally in agreement with CNSC staff's disposition of public comments received on the *CNSC Task Force Report*. Bruce Power provided comments on the CNSC Action Plan, including a brief update statement for each action. The update statements are beyond the scope of this review. For the sake of brevity, only those actions where Bruce Power had specific comments are discussed below.
57	Frank Saunders Vice President Nuclear Oversight and Regulatory Affairs Bruce Power	Action 1.11, as currently written, focuses solely on off site storage of equipment. Our review to date indicates that on a large and remote site such as the Bruce Site storage of emergency materials will be a combination of on site (short term needs) and off site (longer term and backup needs). This action should be modified to reflect this possibility as both Bruce Power and the broader CANDU Industry plans to evaluate these alternatives.	CNSC agrees that the equipment can be stored either onsite or offsite, provided it will not be affected by whatever event may befall the station. Action 1.11 is reworded as follows: "Licensees should procure, as quickly as possible, emergency equipment and other resources that could be <u>either stored onsite or</u> stored offsite and brought onsite to mitigate a severe accident."
58	Frank Saunders Vice President Nuclear Oversight and Regulatory Affairs Bruce Power (	The key deliverable in 5.3 should be to ensure off-site monitoring capability is in place. We have not yet concluded that in a large disaster scenario that automatic systems are the best way to achieve this, although they should certainly be considered. This recommendation should be amended to reflect this.	The use of pre-installed, automated radiation detection equipment has the dual benefit of not only detecting the presence of radiation, but just as importantly it can confirm its absence. Real time situational awareness of radiation fields, or absence thereof, around the site is of value to all levels of response and oversight organizations: from NPP staff and first responders to provincial EMOs and regulators. The accuracy, timeliness and geographical coverage offered by an automated system cannot be achieved by deployment of a few mobile radiation survey teams, whether in large disaster scenarios or in accident scenarios limited to the NPP.

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59	Frank Saunders Vice President Nuclear Oversight and Regulatory Affairs Bruce Power	Actions 6.0 and 6.1 do not go far enough in our view. The events that occurred in March 2011 in Japan were the result of a natural disaster and although we understand CNSC's specific mandate, looking at nuclear plant preparedness alone will not be enough. In this disaster twenty-five thousand are reported to have died and the infrastructure was destroyed on a massive scale including 2 oil refineries, chemical plants, sewage and other waste storage plants, roads, communications, hospitals and so on. At the six nuclear power units at Fukushima Daiichi two people died at the time of the incident, there were no radiation doses approaching life threatening levels, and no indication of any significant uptakes of radioactive substances by the public. While there is bound to be significant pollution of the lands in the area where the Tsunami struck only a very small portion will be due to radioactive materials. The CNSC mandate is specific to nuclear material and facilities, but consideration beyond nuclear facilities will be necessary to ensure an adequate response. With full support from Bruce Power, Emergency Measures Ontario is leading the planning for a major regional disaster exercise in the north eastern Lake Huron region. This exercise will result in identification of opportunities for improvement on site, regionally and provincially. It is our desire that all levels of government utilize this opportunity to kick off a joint effort to develop a new CSA Standard that sets out the requirements for emergency response across the country with the goal of ensuring that a common approach is in place and that interoperability of the various agencies involved and mutual aid capability is ensured. Further a common set of evaluation criteria should be developed to assess general preparedness in all jurisdictions and seek out improvement opportunities whenever it is necessary to put plans into action should be established. Actions 6.0, 6.1, 9.2, 9.3, and 9.4 should be amended to reflect this.	CNSC agrees with Bruce Power that municipal and provincial authorities should ensure they have adequate response capabilities for the level of hazard in their jurisdiction. As Bruce Power has highlighted in their comment, the oversight of this capability lies beyond the mandate of the CNSC.
60	Frank Saunders Vice President Nuclear Oversight and Regulatory Affairs Bruce Power	RD-99.3 discussed in Recommendation 10.2 has begun a focus on public reporting, but Bruce Power believes that before it can be fully effective the RD-99 series must be re-examined with the express purpose of enhancing public knowledge and understanding. Anything less does a disservice to what is a very safe and reliable nuclear industry.	The public information program and its disclosure protocol, as required according to RD/GD-99.3, must be commensurate with the public's perception of risk and the level of public interest in the nuclear facility. The public disclosure protocol shall be developed in partnership with public stakeholders and interest groups with a primary focus on the local community in order to determine what types of information would be of public interest. Therefore, licensees should ensure that information generated as a result of the public information program and disclosure protocol are

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			prepared for the target audience's established level of knowledge, understanding and interest. RD-99.1 reports to the CNSC can form the basis of what is disclosed to the public through RD/GD-99.3, while keeping the target audience's knowledge level and level of stated interest in perspective. CNSC favourably views efforts made by licensees to explain how nuclear technology works. Our focus is safety and safety-related information.
61	Wade Parker Station Director	 2012-01-31 NBPower Nuclear comments on January 31, 2012 **Subject: NB Power Nuclear Comments on·"CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations"** Dear Mr. Jammal: The purpose of this letter is to submit NB Power Nuclear (NBPN) comments on the "CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations".	As stated in their full response (see embedded document), NB Power is generally in agreement with CNSC staff's disposition of public comments received on the *CNSC Task Force Report*. NB Power provided comments on the CNSC Action Plan, including a brief update statement for each action. The update statements are beyond the scope of this review. For the sake of brevity, only those actions where NB Power had specific comments are discussed below.
62	Wade Parker Station Director	Action 1.11 as currently written focuses solely on off site storage of equipment. The current NB Power Nuclear strategy is to store the majority of emergency mitigating equipment on site. Although that strategy is not yet solidified, it is expected that very little mitigating equipment would be stored far from site. In addition, we have a very good link with the military through NB Emergency Measures Organization (NBEMO) and have had discussions already regarding their equipment availability and capability. Given the defence-in-depth improvements already made to the Point Lepreau G.S. design, the Action 1.11 requirement to procure emergency equipment "as quickly as possible" does not reflect the realities of the improvements already made. The NB Power Nuclear approach for the design, selection,	CNSC agrees that the equipment can be stored either onsite or offsite, provided it will not be affected by whatever event may befall the station. Action 1.11 is reworded as follows: "Licensees should procure, as quickly as possible, emergency equipment and other resources that could be either stored onsite or stored offsite and brought onsite to mitigate a severe accident." CNSC staff recognizes the major enhancements to

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		procurement and connection points for emergency mitigating equipment are to ensure they are properly engineered and follow our established quality management system processes.	safety made by NB Power, both prior to the Fukushima accident and also as a result of the lessons learned. Nevertheless, we consider provision of additional temporary equipment a high priority and therefore the words "as quickly as possible" will be retained in this action.
63	Wade Parker Station Director	For Action 5.2, while industry utilities are working towards establishing a formal Mutual Aid Agreement, which will be included in emergency procedures, our view is that establishing formal agreements with external equipment and supply vendors, unless it is for equipment rental to be stationed at site on a normal basis, will do little to practicably benefit emergency response and, therefore, we have no formal agreements with external vendors catering to accident response. As a result, beyond the inter-utility Mutual Aid Agreement, NB Power Nuclear does not intend to seek formal agreements with external vendors to supply equipment from off-site during an accident. As stated earlier, we have had discussions with the NB Emergency Measures Organization (NBEMO) regarding their equipment availability and capability, and NBEMO has a very good link with the military as a resource for equipment. In addition, the Institute of Nuclear Power Operations (INPO) Emergency Resource Manual (INPO 03-001) identifies North America-wide member utility information and contacts, and lists the available technical expertise, specialized equipment and supplier contacts for obtaining additional aid and materials over and above that which will be provided by the Canadian Mutual Aid Agreement. NB Power considers this scope to be more than sufficient. To facilitate accident response and decision making for public protection measures, the S3Fast real-time radiation monitoring system has been implemented at Point Lepreau G.S. with a base computer and software located at the Emergency Offsite Center (EOC). This system employs five survey boxes and ten drop boxes that can be deployed or moved as needed during a potential release to measure radiation fields and track the plume. The S3Fast system uses this input to perform plume modeling, and provides recommendation for sheltering and/or evacuation that will be used to assist the off-site emergency organization in their decision making. The survey and drop boxes have dual communication capability with radio and cell phone. Fixed monitoring sites around the station provide near real time data to Health Canada; Health Canada has committed to provide NBEMO visibility on their data analysis through their ARGOS system. The combination of	Part 1 - Formal Agreements: Action 5.2 does not suggest that NPP should establish external support arrangements, but rather that if they require external support, that these arrangements must be formalized. It appears that NBPN is indicating that they require external support from a only a few governmental or industry sources. This information is in-line with what is required to meet the first deliverable under action 5.2. CNSC staff looks forward to reviewing NBPN submission. Part 2 - Radiation Monitoring: Although no explicit reference is made, it is assumed that this comment is made in reference to Action 5.3. The system described in NBPN appears to be a very good enhancement over fully manual radiation monitoring systems used at other NPP, improving accuracy and efficient use of resources. However, it does remain a manually deployed system. The use of pre-installed, automated radiation detection equipment has the dual benefit of not only detecting the presence of radiation, but just as importantly it can confirm its absence. Real time situational awareness of radiation fields, or absence thereof, around the site is of value to all levels of response and oversight organizations: from NPP staff and first responders to provincial EMOs and regulators. The timeliness and geographical coverage offered by an automated system cannot be achieved by deployment of a few mobile

#	From	Intervener Comment	CNSC Response
		fixed and deployable sensors and associated analytics provides NB Power Nuclear and NBEMO with near real time situational awareness and decision support.	radiation survey teams or semi-automated boxes. In regards to reference to the Health Canada monitoring stations, CNSC is familiar with the system used at all NPPs in Canada. Specifically for Point Lepreau, there are indeed three Health Canada monitoring stations in proximity to the site. However, the number of stations is limited and access to the data is restricted and not easily or quickly available to NPP staff and others
64	Wade Parker Station Director	For Action 5.4, NB Power Nuclear disagrees with this action as it is overly specific and not necessarily consistent with what is required by the licensee for accident response and decision making. Emergency procedures and short-term decision making during accidents at Point Lepreau G.S. are condition-based and are not made based on these types of calculations or modeling. In New Brunswick, tactical decisions for off-site short term response in terms of evacuation, sheltering, food ingestion restrictions, etc., are made on the basis of in-field measurements and plant condition, not on predictive modeling of source terms. In terms of longer term response and strategic decision-making, public communications and recovery, NBEMO is making plans to utilize the ARGOS system, which performs dose consequence modeling and requires the input of source term information. While NB Power Nuclear will need to provide the source term information, the dose calculations and modeling is not the responsibility of the licensee. NB Power Nuclear recognizes that there is merit in conferring and confirming with off-site stakeholders that they are providing all of the information needed for those stakeholders to effectively perform their tactical and strategic roles during a nuclear emergency. In terns of a holistic accident response strategy, a more appropriate action and deliverable is proposed as follows: **Action:** Licensees should work with off-site emergency response organizations to identify critical information needs that will facilitate decision-making by the off-site emergency response organization in the interests of public protection during an accident. **Deliverable:**	The basis for Action 5.4 is to ensure that NPP operators provide sufficient and timely information to offsite authorities to allow them to make appropriate decisions. Specifically, during an accident situation, NPP operators should provide an estimate of the radiological impact and timing of a potential release. This can only be done by estimating the source term, or magnitude of a release. In this manner, off-site authorities are in an informed position to choose between taking proactive or reactive protective action decisions. The current approach of waiting for in-field measurements used by NBPN and NBEMO may expose residents to unnecessary and unreasonable risk by delaying implementation of protective actions.

#	From	Intervener Comment	CNSC Response
		1. Evaluate the information needed by off-site emergency response organizations that must be provided by licensees. The evaluation should include information or notification methods and related infrastructure, and identification of any gaps. 2. Plan and schedule for licensees to develop the tools, methods and emergency procedures to resolve any gaps.	

Appendix D – Fukushima Action Items – Matrix of Applicability to Stations and Status

Appendix D – Fukushima Action Items – Matrix of Applicability to Stations and Status

Ser	Fukushima Action Item[1]	Darlington	Pickering A	Pickering B	Bruce A	Bruce B	Gentilly 2	Point Lepreau
1	FAI 1.1 An updated evaluation of the capability of bleed condenser / degasser condenser relief valves providing additional evidence that the valves have sufficient capacity. December 2012.	Open tcd 04/12	Open tcd 04/12	Open tcd 04/12	Open	Open	Open	Open
2	FAI 1.1.2 If required, a plan and schedule either for confirmatory testing of installation or provision for additional relief capacity. December 2012.	tbd	tbd	tbd	tbd	tbd	tbd	tbd
3	FAI 1.2.1 An assessment of the capability of shield tank/calandria vault relief. December 2013.	Closed	N/A	Open tcd 06/12	Open	Open	Closed (subject to acceptance)	Closed
4	FAI 1.2.2 If relief capacity is inadequate, an assessment of the benefit available from adequate relief capacity and the practicability of providing additional relief. December 2013.	Closed	N/A	tbd	tbd	tbd	Closed (subject to acceptance)	N/A
5	FAI 1.2.3 If additional relief is beneficial and practicable, a plan and schedule for provision of additional relief. December 2013.	Open	N/A	tbd	tbd	tbd	Open tcd Restart	N/A

Ser	Fukushima Action Item[1]	Darlington	Pickering A	Pickering B	Bruce A	Bruce B	Gentilly 2	Point Lepreau
6	FAI 1.3.1 Assessments of adequacy of the existing means to protect containment integrity and prevent uncontrolled release in beyond design basis accidents including severe accidents. December 2015.	Closed	Open tcd Q4/13	Open tcd Q4/12	Open tcd 06/12	Open tcd 06/12	Closed (subject to acceptance)	N/A
7	FAI 1.3.2 Where the existing means to protect containment integrity and prevent uncontrolled releases of radioactive products in beyond design basis accidents including severe accidents are found inadequate, a plan and schedule for design enhancements to control long term radiological releases and, to the extent practicable, unfiltered releases. December 2015.	Open tcd 2015	Open tcd Q4/14	Open tcd Q4/14	Open tcd 12/13	Open tcd 12/13	Open tcd Restart	N/A
8	FAI 1.4 A plan and schedule for the installation of PARs as quickly as possible. December 2012.	Closed	Closed	Closed	Open tcd 03/12	Open tcd 02/12	Closed	Closed
9	FAI 1.5 An evaluation of the potential for hydrogen generation in the IFB area and the need for hydrogen mitigation. December 2013.	Open tcd Q4/12	Open tcd Q4/13	Open tcd Q4/12	Open	Open	Open	Open
10	FAI 1.6.1 An evaluation of the structural response of the IFB structure to temperatures in excess of the design temperature, including an assessment of the maximum credible leak rate following any predicted structural damage. December 2013.	Closed	Open tcd Q1/13	Open tcd Q4/12	Open tcd 12/13	Open tcd 12/13	Open tcd 12/13	Open

Ser	Fukushima Action Item[1]	Darlington	Pickering A	Pickering B	Bruce A	Bruce B	Gentilly 2	Point Lepreau
11	FAI 1.6.2 A plan and schedule for deployment of any additional mitigating measures shown to be necessary by the evaluation of structural integrity. December 2013.	N/A	tbd	tbd	tbd	tbd	tbd	tbd
12	FAI 1.7 A plan and schedule for optimizing existing provisions (to provide coolant makeup to PHTS, SGs, moderator, etc) and putting in place additional coolant make-up provisions, and supporting analyses. December 2013.	Open tcd Q1/13	Open tcd Q1/13	Open tcd Q1/13	Open tcd 12/13	Open tcd 12/13	Open tcd 12/13	Open
13	FAI 1.8 A detailed plan and schedule for performing assessments of equipment survivability, and a plan and schedule for equipment upgrade where appropriate based on the assessment. December 2013.	Open tcd 12/13	Open tcd 12/13	Open tcd 12/13	Open tcd 12/13	Open tcd 12/13	Open tcd Restart	Open tcd 12/13
14	FAI 1.9 An evaluation of the habitability of control facilities under conditions arising from beyond-design-basis and severe accidents. Where applicable, detailed plan and schedule for control facilities upgrades. December 2014.	Open tcd Q4/12	Open tcd Q4/13	Open tcd Q4/13	Open tcd 12/14	Open tcd 12/14	Open tcd 12/14	Open
15	FAI 1.10.1 An evaluation of the requirements and capabilities for electrical power for key instrumentation and control. The evaluation should identify practicable upgrades that would extend the availability of key I&C, if needed. December 2012.	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12

Ser	Fukushima Action Item[1]	Darlington	Pickering A	Pickering B	Bruce A	Bruce B	Gentilly 2	Point Lepreau
16	FAI 1.10.2 A plan and schedule for deployment of identified upgrades. A target of 8 hours without the need for offsite support should be used. December 2012.	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12
17	FAI 1.11 A plan and schedule for procurement (of emergency equipment and other resources that could be stored offsite). December 2012.	Closed (subject to acceptance)	Closed (subject to acceptance)	Closed (subject to acceptance)	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12
18	FAI 2.1.1 Re-evaluation, using modern calculations and state of the art methods, of the site specific magnitudes of each external event to which the plant may be susceptible. December 2013.	Closed	Open tcd Q4/13	Open tcd Q4/12	Open tcd 09/12	Open tcd 09/12	Closed (subject to acceptance)	Closed
19	FAI 2.1.2 Evaluate if the current site specific design protection for each external event assessed in 1 above is sufficient. If gaps are identified a corrective plan should be proposed. December 2013.	Closed	Open tcd Q4/13	Open tcd Q4/12	Open tcd 2014	Open tcd 2014	Closed (subject to acceptance)	Open tcd 12/13
20	FAI 2.2 Site-specific implementation plans for RD-310. December 2013.	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open	Open	Open	Open tcd 12/13
21	FAI 3.1.1 Where SAMG has not been developed/finalized or fully implemented, provide plans and schedules for completion. December 2013.	Closed (subject to acceptance)	Closed (subject to acceptance)	Closed (subject to acceptance)	Complete (subject to acceptance)	Closed (subject to acceptance)	Open	Closed
22	FAI 3.1.2 For multi-unit stations, provide plans and schedules for the inclusion of multi-unit events in SAMGs. December 2013.	Open tcd Q4/13	Open tcd Q4/13	Open tcd Q4/13	Open tcd 12/13	Open tcd 12/13	N/A	N/A

Ser	Fukushima Action Item[1]	Darlington	Pickering A	Pickering B	Bruce A	Bruce B	Gentilly 2	Point Lepreau
23	FAI 3.1.3 For all stations, plans and schedules for the inclusion of IFB events in station operating documentation where appropriate. December 2013.	Open tcd 04/12	Open tcd 04/12	Open tcd 04/12	Open tcd 12/13	Open tcd 12/13	Open tcd Restart	Closed
24	FAI 3.1.4 Demonstration of effectiveness of SAMGs via table-top exercise and drills. December 2013.	Open tcd Q4/13	Open tcd Q4/13	Open tcd Q4/13	Open tcd 12/13	Open tcd 12/13	Open tcd Restart	Closed
25	FAI 3.2.1 An evaluation of the adequacy of existing modeling of severe accidents in multi-unit stations. The evaluation should provide a functional specification of any necessary improved models. December 2012.	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	N/A	N/A
26	FAI 3.2.2 A plan and schedule for the development of improved modeling, including any necessary experimental support. December 2012.	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	N/A	N/A
27	FAI 4.1.1 An evaluation of the adequacy of existing emergency plans and programs. December 2012.	Open tcd 04/12	Open tcd 04/12	Open tcd 04/12	Open tcd 09/12	Open tcd 09/12	Open tcd 12/12	Open tcd 12/12
28	FAI 4.1.2 A plan and schedule to address any gaps identified in the evaluation. December 2012.	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd 03/13	Open tcd 03/13	Open tcd 12/12	Open tcd 12/12
29	FAI 4.2 A plan and schedule for the development of improved exercise program. December 2012.	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd 10/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12
30	FAI 5.1.1 An evaluation of the adequacy of backup power for emergency facilities and equipment. December 2012.	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd 10/12	Open tcd 10/12	Open tcd 12/12	Open

Ser	Fukushima Action Item[1]	Darlington	Pickering A	Pickering B	Bruce A	Bruce B	Gentilly 2	Point Lepreau
31	FAI 5.1.2 A plan and schedule to address any gaps identified. December 2012.	Open tcd Q4/12	Open tcd Q4/12	Open tcd Q4/12	Open tcd 12/12	Open tcd 12/12	Open tcd 12/12	Open tcd 06/12
32	FAI 5.2.1 Identify the external support and resources that may be required during an emergency. December 2012.	Open tcd 04/12	Open tcd 04/12	Open tcd 04/12	Open tcd 12/12	Open tcd 12/12	Open tcd 12/12	N/A
33	FAI 5.2.2 Identify the external support and resource agreements that have been formalized and documented. December 2012.	Open tcd 04/12	Open tcd 04/12	Open tcd 04/12	Open tcd 12/12	Open tcd 12/12	Open tcd 12/12	N/A
34	FAI 5.2.3 Confirm if any undocumented arrangements can be formalized. December 2012.	Open tcd 04/12	Open tcd 04/12	Open tcd 04/12	tbd	tbd	Open tcd 12/12	N/A
35	FAI 5.3 Provide a project plan and installation schedule. December 2012.	Open tcd Q2/12	Open tcd Q2/12	Open tcd Q2/12	Open tcd 12/12	Open tcd 12/12	Open tcd 12/12	Open
36	FAI 5.4 Develop source term and dose modeling tools specific to each NPP. December 2012.	N/A	N/A	N/A	N/A	N/A	Open tcd Restart	Open

[1]INFO-0828 Deliverable

The thirty-six Fukushima Action Items (FAIs) are consistent with the Deliverables identified in INFO 0828- *CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations*.

The matrix describes which FAIs apply to which stations and its status, whether 'open' or 'closed' for each station. Some FAIs depend on the outcome of other; these are shown as 'to be determined' (tbd). Each FAI will only be closed when all stations have produced the required deliverable and it has been accepted by the CNSC. In some cases, station-specific Action Items may then be opened to track the performance of further deliverables.

This matrix will be updated every six months.

Appendix E – IRRS Report – Fukushima Module

The following is an excerpt from the *Integrated Regulatory Rreview Service (IRRS) Follow-up mission Report to the Government of Canada*, Ottawa, Canada (28 November – 9 December 2011)

For a copy of the complete IRRS Report please refer to the CNSC Web Site[1].

[1] http://www.nuclearsafety.gc.ca/eng/about/international/irrt/index.cfm

IAEA-NS-IRRS-2011/08
ORIGINAL: English

IAEA
International Atomic Energy Agency
Atoms for Peace

INTEGRATED REGULATORY REVIEW SERVICE (IRRS)

FOLLOW-UP MISSION TO CANADA

Ottawa, Canada

28 November to 9 December 2011

DEPARTMENT OF NUCLEAR SAFETY AND SECURITY

REPORT

INTEGRATED REGULATORY REVIEW SERVICE (IRRS)

FOLLOW-UP MISSION REPORT TO THE GOVERNMENT OF CANADA

Ottawa, Canada

28 November – 9 December 2011

INTEGRATED REGULATORY REVIEW SERVICE (IRRS)
FOLLOW-UP MISSION REPORT TO
THE GOVERNMENT OF CANADA
Ottawa, Canada

Mission date: 28 November to 9 December 2011
Regulatory body:
Canadian Nuclear Safety Commission (CNSC)
Location: Headquarters, Ottawa, Canada
Regulated facilities and practices: Nuclear power plants, research reactors, fuel cycle facilities, medical and industrial sources, waste management facilities, decommissioning, transport of radioactive materials, communication and public information.

Organized by: International Atomic Energy Agency (IAEA)

IRRS REVIEW TEAM

VIRGILIO, Martin	(Team Leader, USA)
GRAY, Robert	(Deputy Team Leader, UK)
CIUREA-ERCAU, Cantemir	(Reviewer, Romania)
GLOECKLE, Walter	(Reviewer, Germany)
JENDE, Erik	(Reviewer, Sweden)
NITSCHE, Frank	(Reviewer, Germany)
REPONEN, Heikki	(Reviewer, Finland)
SANFILIPPO, Nathan	(Reviewer, USA)
SELLING, Hendrik	(Reviewer, Netherlands)
LEVANON, Ishay	(Observer, Israel)
GRAVES, David	(IAEA/NSNI, Team Coordinator)
WHEATLEY, John	(IAEA/NSRW, Deputy Team Coordinator)
CAPADONA, Nancy	(IAEA/NSRW, Review Area Coordinator)
GILLEY, Debbie	(IAEA/NSRW, Review Area Coordinator)
AL-MADHI, Balsam	(IAEA Administrative Assistant)

The number of recommendations, suggestions and good practices is in no way a measure of the status of the regulatory body. Comparisons of such numbers between IRRS reports from different countries should not be attempted.

11.0 REGULATORY IMPLICATIONS OF THE TEPCO FUKUSHIMA DAIICHI ACCIDENT

11.1 Actions taken by the regulatory body in the aftermath of the TEPCO Fukushima Daiichi accident

A. IMMEDIATE ACTIONS TAKEN BY THE REGULATORY BODY

Following notification of the TEPCO Fukushima Daiichi accident on 11 March 2011, the CNSC Emergency Operations Centre (EOC) was activated at its Headquarters, using the CNSC Emergency Response Plan. For 23 days, CNSC staff (both communications and technical experts) worked on a 24/7 basis to monitor and assess the situation in Japan and contribute to the strategy for the Canadian response.

CNSC monitored the situation in Japan in collaboration with other Government of Canada departments and agencies, nuclear regulators from the United States, United Kingdom and France, as well as with the International Atomic Energy Agency (IAEA). CNSC supported Canada's Department of Foreign Affairs and International Trade Japan Crisis Team on a daily basis by providing timely and accurate information and advice to Canadians in Japan and in particular to the Canadian ambassador and his staff in Japan. Information was posted on the CNSC website to provide a consistent, objective, and credible source of information for the Canadian public, CNSC staff, and other government departments.

Response and monitoring of the Fukushima accident involved numerous entities within the Government of Canada and CNSC provided technical support, expertise, and leadership as part of a broad government response. Some of the other key agencies include Health Canada, Public Safety Canada, Environment Canada, and the Department of Foreign Affairs and International Trade. Health Canada is designated as the lead agency for federal nuclear emergency preparedness and maintains and administers the Federal Nuclear Emergency Plan (FNEP), which describes measures to manage and coordinate the federal response to a nuclear emergency.

Public Safety Canada is responsible for coordinating the Government of Canada's response to an emergency. The Federal Emergency Response Plan (FERP) outlines the processes and mechanisms to facilitate an integrated Government of Canada response to an emergency and is designed to harmonize federal emergency response efforts with those of the provinces and territorial governments, non-government organizations and the private sector. The FNEP (led by Health Canada) and the FERP (led by Public Safety Canada) are not completely integrated, and a memorandum of understanding between Health Canada and Public Safety Canada on the use of the FNEP was put in place as a temporary measure. There is an ongoing effort and consultation between Health Canada and Public Safety Canada to address the integration of both plans.

Health Canada is also responsible for operating various radiological monitoring networks: the Fixed Point Surveillance Network, the Canadian Radiation Monitoring Network and the Canadian Comprehensive Test-Ban Treaty (CTBT) Radiation Monitoring Network. Public Safety Canada and the Canada Border Services Agency are among the responsible agencies for the monitoring of people and goods entering Canada as well as monitoring of the Canadian food and water supply. The CNSC interfaced with these agencies to provide technical support in their review and decision making processes.

The CNSC EOC was deactivated on 4 April 2011, and CNSC staff undertook a formal lessons learned process to capture the experience of real-world implementation of their EOC. An after-action report and an improvement plan were approved by the CNSC Management Committee. The IRRS Review Team considers this prompt review to be of extraordinary value to both the continuous improvement of CNSC response to accidents and as an example to other organizations. The IRRS Team notes that the Government of Canada has not yet initiated a similar lessons-learned effort for the overall government response to the Fukushima accident.

B. TECHNICAL ISSUES CONSIDERED IN THE LIGHT OF THE FUKUSHIMA ACCIDENT

Subsection 12(2) of the *General Nuclear Safety and Control Regulations* places an obligation on licensees to respond to a request from the Commission, or a person who is authorized by the Commission, to "conduct a test, analysis, inventory or inspection in respect of the licensed activity or to review or to modify a design, to modify equipment, to modify procedures, or to install a new system or new equipment". On 17 March 2011, the CNSC Executive Vice-President and Chief Regulatory Operations Officer invoked Subsection 12(2) and wrote to all Class I nuclear facilities, requesting that licensees:

- "Review initial lessons learned from the earthquake in Japan and re-examine the safety cases of nuclear power plants, in particular the underlying defence-in-depth concept, with focus on:
  - External hazards such as seismic, flooding, fire and extreme weather events;
  - Measures for the prevention and mitigation of severe accidents;
  - Emergency preparedness; and
  - Report on implementation plans for short-term and long-term measures to address any significant gaps."

Letters similar to the "12(2) letters" described above were sent to the operators of uranium mines and mills licensed by CNSC.

In addition to the request made to licensees, immediately after the Fukushima event, CNSC site staff performed inspections at NPPs to verify the licensees' emergency preparedness for external hazards and severe accidents in order to reassure the Commission Tribunal and Canadian public that certain aspects that had contributed to the events in Japan had been specifically verified. These inspections included issues related to seismic, fire, backup power availability and condition, hydrogen igniters, and irradiated fuel bays. This information was reported to the Commission Tribunal on 30 March 2011, and there were no significant findings and no actions were placed on the licensees as a result of these inspections.

CNSC staff also verified the following immediate activities taken by the licensees:

- Capability of installed equipment (including procedures) to mitigate conditions that result from beyond-design-basis accidents;
- Capability to mitigate station blackout conditions, including robustness of backup power and the emergency power supply systems;
- Capability to mitigate consequences of external events;
- Identification of important equipment needed to mitigate consequences of external events;

- Identification of any potential scenarios that could compromise the equipment's function during seismic events;
- Ability of units to rapidly reduce reactor power following a loss of offsite power, the duration of battery backup, and fuel supply to emergency generators.

As reported to the Commission Tribunal on 8 June 2011, CNSC staff is satisfied with immediate actions taken by licensees. The IRRS Review Team considers these inspections, initiated just days after the accident, to be an appropriate step in ensuring continued safety and public trust of Canadian NPPs.

In parallel to the request to licensees and the inspections, CNSC set up a Fukushima Task Force to evaluate operational, technical and regulatory implications of the accident on Canadian NPPs. It was also tasked with reviewing NPP licensees' responses to the 12(2) letters. The mandate of the CNSC Task Force was to:

- Review submissions from licensees who had been directed under 12(2) letters to re-examine the safety cases of their respective NPPs;
- Assess available technical and operational information from the events at the Fukushima Daiichi NPP and identify a high-level set of lessons learned;
- Develop recommendations for short-term and long-term measures to address any shortcomings at CANDU reactors, and recommend whether design or operational modifications, including supporting research, are needed;
- Determine priorities for implementation of corrective actions from lessons learned and the need for further examination;
- Develop recommendations, as appropriate, for potential changes to CNSC regulatory requirements, inspection programmes and policies for existing CANDU reactors and new builds.

The CNSC Task Force confirmed that the CANDU units are robust and have a strong design relying on multiple layers of defence; however, the design basis for certain external events at certain stations needs to be updated. The post-Fukushima review has examined events more severe than those that have historically been regarded as credible by the CNSC. The Task Force developed 13 recommendations covering defence-in-depth and emergency preparedness of licensed NPPs, and the CNSC's regulatory framework.

Since issuance of the Task Force's report and CNSC management's endorsement of the recommendations, CNSC staff has begun development of an Action Plan to implement those recommendations.

C. OTHER ISSUES CONSIDERED IN THE LIGHT OF THE FUKUSHIMA ACCIDENT

During its evaluation of the TEPCO Fukushima Daiichi accident, the CNSC Task Force evaluated both information from Japan and reports issued by various nuclear regulators and industry groups from around the world to ensure the Canadian approach was appropriately considering all necessary programmatic elements. The IRRS Team found the Task Force's review scope to be comprehensive and appropriate.

CNSC established an External Advisory Committee in August 2011 to review CNSC's actions related to the TEPCO Fukushima Daiichi accident. The Committee was comprised of three

experts in safety and incident investigation, not related to the nuclear field, selected by the President of CNSC. At the request of the Committee, the team met with the Committee to discuss its actions and any issues the team had identified regarding the regulatory implications of the accident. The team discussed the purpose of the IRRS programme, the scope of the IRRS mission in 2009, the scope of the IRRS follow-up mission including the methodology used for the review of the regulatory implications of the TEPCO Fukushima Daiichi accident, and its preliminary findings. The team responded to questions from the Committee regarding preliminary findings from this part of the mission. Additionally, the Committee asked questions related to other international activities ongoing regarding the accident, as well as providing their opinions on issues related to the CNSC Fukushima accident response.

CONCLUSION

The IRRS Team concluded that the immediate actions taken by CNSC were comprehensive and appropriate.

In particular, the IRRS Team concluded that the initial response to the TEPCO Fukushima Daiichi accident performed by the CNSC in collaboration with their federal partners in Canada was thoughtful and appropriate to provide information to federal and provincial counterparts and the citizens of Canada. The CNSC's prompt initiation of inspection of licensees and actions to require information from its licensees placed the proper emphasis on safety. As the Task Force was commissioned, more detailed analysis and acceptance criteria were developed for the ongoing evaluation of licensee actions.

The IRRS Team commended the effort by CNSC to immediately review the applicable lessons learned from the activation of its EOC. Since CNSC provided technical support to many other parts of the Government of Canada's response, the other lead agencies and the government as a whole would similarly benefit from a lessons-learned review of their own responses.

The IRRS Team noted the incorporation and evaluation of international efforts helped ensure the detection of possible gaps and identified areas for improvement.

11.2 Plans for up-coming actions to further address the regulatory implications of the TEPCO Fukushima Daiichi accident

The CNSC Task Force report was issued for public comment and comments were received by 1 December 2011. CNSC staff considered the comments received in development of their Action Plan. Once drafted, the Action Plan will also be issued for public comment. A comment resolution and final draft of the Action Plan is scheduled for presentation to the Commission Tribunal at a Meeting in March 2012 for their information, and where necessary, to obtain endorsement of ongoing actions related to changing certain regulations and regulatory documents.

In addition to the public's opportunity to comment on the Task Force report and draft Action Plan, the President of the CNSC created an External Advisory Committee, consisting of senior officials from non-nuclear backgrounds, to provide an independent evaluation of the CNSC's actions in response to the Fukushima accident. This evaluation is expected to provide additional information to the Commission Tribunal as they deliberate on endorsement of the staff's Action Plan.

The IRRS Review Team considers the numerous efforts of the CNSC to both provide information to the public in an open and transparent way, as well as to invite public comment at various developmental stages, to be an effective method to promote public trust in the nuclear oversight provided by the CNSC.

Once the Action Plan has been approved and implementation begins, CNSC staff intends to fold ongoing actions into the 'normal' regulatory oversight activities and dissolve specific Fukushima follow-up activities.

CNSC staff recognizes the importance of Canadian leadership surrounding technical support of the CANDU reactor design. While the CANDU Owners Group is an industry-led organization, the Canadian government will play an important role should a significant accident occur at a CANDU design being used in another country. As evidenced by the interactions and coordination necessary in the United States concerning the General Electric design used at Fukushima, CNSC would likely play a key role in coordinating technical support to foreign regulators. The IRRS Review Team notes the CNSC Task Force recommendation in this area and supports expansion of CNSC leadership to develop protocols and expectations with foreign regulators in countries using the CANDU design.

The international regulatory community will be learning lessons from the Fukushima accident for many years to come. While the CNSC staff has acknowledged the need to continue to monitor international products which communicate additional lessons, the IRRS Review Team notes that a continued focus and proactive approach to evaluating emerging lessons learned from Fukushima will position the CNSC for both excellence in nuclear regulation and continued public trust.

CONCLUSION

The IRRS Team concluded that the CNSC has an effective and pragmatic framework in place to continue its follow-up to the TEPCO Fukushima Daiichi accident, and to ensure the continued safety of Canadian nuclear facilities.

The IRRS Team acknowledged the CNSC has taken an open and transparent approach in its review of the TEPCO Fukushima Daiichi accident and has taken multiple steps to involve the public in its deliberative processes. These efforts contribute positively to the CNSC's independence and the public's trust.

The IRRS Team recognized the leadership role CNSC can play in supporting the regulators of foreign countries which employ the CANDU reactor design, as CNSC could serve as a coordinator and important focal point should an accident at a CANDU reactor occur in the future.

CONCLUSION

The IRRS Team considers that CNSC should maintain its active approach, both domestically and as part of the international community, in applying the lessons learned from the TEPCO Fukushima Daiichi accident as they are developed in the coming years.

11.3 Significance of regulatory implications of the TEPCO Fukushima Daiichi accident across reviewed areas

MODULE 1: RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT

The legislative and regulatory framework in Canada for the safety of nuclear installations and radiological protection is based on a well-established hierarchical system that clearly identifies all of the authorities involved and allocates appropriate responsibilities. The interfaces between each of these authorities are specified for both routine and emergency situations.

The CNSC Fukushima Task Force reviewed the Canadian legislative framework in the light of the TEPCO Fukushima Daiichi accident. It found that a revision of the nuclear legislative framework is not necessary; however, it identified some additional requirements which would lead to improvements of the regulatory framework, namely:

- A new requirement for the submission of the provincial off-site emergency plans; and
- Additional detailed requirements in the Radiation Protection Regulation prescribing workers' dose limits in emergency and post-emergency phases in order to minimize doses.

The CNSC Fukushima Task Force also recommended that regulatory oversight of NPPs be further enhanced through implementation of a periodic safety review process for NPPs.

The IRRS Team encourages CNSC to initiate the aforementioned amendments to the regulatory framework.

The IRRS Team recognized that CNSC performed a review of its regulations based upon its own mandated responsibilities. However, other federal agencies (e.g. Health Canada, Public Safety Canada, etc.) have roles in radiation protection preparedness and response during both emergency and non-emergency situations, and those roles were not evaluated by the CNSC Fukushima Task Force or as part of this IRRS mission. Other government authorities having responsibilities at the federal and provincial levels may wish to follow the example of CNSC and review their regulations and requirements in the light of the Fukushima accident.

The CNSC Task Force recommended that NPP licensees improve their environmental radiological monitoring by installing automated real-time radiation monitoring systems. Some stations are voluntarily installing automated gamma-monitors at the site boundary. An expansion of the radiation monitoring network operated by Health Canada should be considered as well. In

some other countries, the automatic measurements of the licensees and of governmental organizations are automatically exchanged; thus, licensees' emergency response organizations and the regulatory body have instantaneous online access to the whole set of data during both normal and emergency situations.

Roles and responsibilities, arrangements and standards for off-site response to nuclear emergencies are described in municipal, provincial, and federal nuclear emergency response plans. Forums are available at the provincial and federal levels in the form of working groups and committees to discuss and coordinate plans, procedures, and arrangements for off-site nuclear emergency management. The off-site nuclear emergency management plans of municipal, provincial, and federal governments require a coordinated and harmonized approach. Therefore, the IRRS Team recommends that there be a requirement that a federal authority should verify the requirements and standards described in the off-site emergency plans are met, through tests and assessments.

CONCLUSION

The IRRS Team concluded that the responsibilities and functions of the Canadian government would be effective during a response to an accident of the magnitude of the TEPCO Fukushima Daiichi accident. The IRRS Team considered that assigned responsibility and common assessment of the off-site emergency plans is an opportunity to strengthen the cooperation and capabilities of the different organizations with responsibilities in nuclear safety and emergency response.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1)	**Basis:** ***GSR Part 1, 2.18 states:*** Where several authorities have responsibilities for safety within the regulatory framework for safety, the responsibilities and functions of each authority shall be clearly specified in the relevant legislation. The government shall ensure that there is appropriate coordination of and liaison between the various authorities concerned in areas such as: (4) Emergency preparedness and response.
(2)	***GS-R-2, 3.4 states, in part:*** This shall include establishing or identifying an existing governmental body or organization to act as a national co-ordinating authority whose function, among others, is to… co-ordinate the resolution of differences and incompatible arrangements between the various response organizations. This authority shall ensure that the functions and responsibilities of operators and response organizations as specified in these requirements are clearly assigned and are understood by all response organizations, and that arrangements are in place for achieving and enforcing compliance with the requirements.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
RF7	**<u>Recommendation:</u> The Government of Canada should assure that the review and assessment of off-site emergency plans for nuclear power plants include all relevant authorities and are comprehensive, and that the relevant organizations which implement those plans are capable of performing the assigned duties.**

FUKUSHIMA MODULE 2: GLOBAL NUCLEAR SAFETY REGIME

Canada has ratified the major international treaties and conventions in the area of nuclear safety and emergency preparedness including the Convention on Nuclear Safety, the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in Case of a Nuclear Accident. Canada has participated actively in the review meetings of the Convention on Nuclear Safety. It strongly promotes the international activities of lessons learned from the TEPCO Fukushima Daiichi accident. Canada also promotes IAEA standard-setting activities and CNSC adopts or adapts IAEA safety standards in developing and revising regulatory requirements.

Canada promotes sharing of operating experience and regulatory experience. CNSC closely cooperates with regulatory bodies in countries with CANDU reactors and plans to take a leading role in support of CANDU regulators during a nuclear emergency.

Apart from inviting an IRRS mission, Canada also frequently sends peer reviewers to IRRS missions in other countries. Up to now, there are no plans to conduct an Emergency Preparedness Review (EPREV) mission. In the past, Operational Safety Review Team (OSART) missions have been conducted. The last OSART mission in Canada took place in 2004 (follow-up mission in 2005). Since then, regular WANO operational safety reviews have been undertaken at NPPs.

CONCLUSION
The IRRS Team recognizes that CNSC is actively involved in international activities in general, as well as with regard to lessons learned from the TEPCO Fukushima Daiichi accident. The cooperation with regulatory bodies in countries with CANDU reactors is commendable. The IRRS Team suggests inviting an EPREV mission to enhance mutual learning.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	**Basis:** ***GSR Part 1, Requirement 14: International obligations and arrangements for international cooperation states:***

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
	The government shall fulfil its respective international obligations, participate in the relevant international arrangements, including international peer reviews, and promote international cooperation to enhance safety globally.
SF9	**<u>Suggestion:</u> The Government of Canada should consider inviting an international peer review mission for emergency preparedness and response.**

FUKUSHIMA MODULE 3: RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

The *Nuclear Safety and Control Act* (NSCA) establishes the CNSC as an independent nuclear regulatory body. The NSCA authorizes the regulatory body to verify and ensure the nuclear safety of installations by, among other things, issuing and amending licences, imposing requirements, and issuing orders. The tasks and the powers of CNSC are in accordance with international requirements.

The regulatory actions taken by CNSC immediately after the Fukushima accident are described in Section 11.1 of this report. They demonstrate that CNSC acted in accordance with its functions and responsibilities as an independent regulator.

During the IRRS follow-up mission, several members of the IRRS Team visited the Point Lepreau Nuclear Generating Station. The visit demonstrated that the licensee's prime responsibility for safety is clearly understood. Safety improvements were shown which are being installed during the continuing refurbishment outage, even though they are not required by regulation. Some improvements, e.g. the installation of a filtered containment vent, an accident monitoring and sampling system, and passive hydrogen re-combiners were planned before the Fukushima accident. These installations are useful in the mitigation of severe accidents. Other improvement actions, such as the installation of connections for the fire water supply outside the reactor building, were taken immediately after the Fukushima accident. From the discussion with the licensee's staff, the IRRS Team concluded that the role of the CNSC is respected by the operator, CNSC is appropriately challenging the operator, and the technical competence of CNSC staff was acknowledged.

During the visit, the team found that the CNSC site inspectors at Point Lepreau Nuclear Generating Station were familiar with the plant and its procedures and self-assured in their inspections. Both sides practice frank and open communication. Different viewpoints are discussed and resolved in technical meetings with the mutual goal to improve safety. Regular management level meetings are held to attain a common understanding of major challenges and projects and to resolve issues.

Within CNSC, the Emergency Management Program Division (EMPD) is tasked with emergency preparedness planning. The CNSC Emergency Response Plan describes what the CNSC must be prepared to do when an emergency occurs. In case of an emergency, the EOC is

activated and the Nuclear Emergency Organization (NEO) is formed by CNSC staff. In the CNSC Emergency Response Plan and additional detailed work instructions, the tasks of the NEO and the special positions/functions within this organization are described.

The IRRS Team found that the staff is familiar with the CNSC responsibilities and functions in the case of a nuclear emergency. The EOC operation in the aftermath of the Fukushima accident additionally served as an opportunity to train less experienced staff in the EOC's activation and function. In summary, about 150 staff members worked in the EOC during 23 days of round-the-clock operation. As already mentioned, the feedback of the staff from this long duration operation was used for improvements.

The CNSC Strategic Communications Directorate deals with public communication. It is staffed with about 25 people with expertise in communications and communication systems. This directorate works closely with technical experts all over CNSC in order to ensure that information given to the public is factual and technically correct. Some regulatory and technical staff members are specially trained in media contact and are spokespersons for the CNSC. Refresher training is also provided. During an emergency, NEO communication positions are staffed with communication experts. Templates for press releases and information dissemination exist. The public website provides information covering topics of general interest, such as the design of CANDU reactors, basics of radiation protection, etc. This information has been enhanced in light of lessons-learned from the Fukushima accident. Pre-designed web pages, which could be posted on the web in case of a major accident, are in preparation. The interfaces to public communication groups of the licensee and governmental emergency centres are clear and practiced during exercises.

In the CNSC Headquarters, a well-equipped EOC is available. The rooms are provided with emergency electrical power. The communication capabilities include wired telephones, cell phones, and satellite phones. A backup emergency centre exists in a separate building. Consideration of major hazards and infrastructure damage during severe weather are taken into account in the planning for staffing of the EOC. The goal is to have the EOC staffed within 90 minutes after alerting, even in cases of natural hazards like snow storms. CNSC's site inspectors will participate in the licensee's Site Management Centre and the Provincial Emergency Operations Centre to assist with liaison with the CNSC EOC.

CONCLUSION

The IRRS Team concluded that the regulatory body is capable of fulfilling its responsibilities and functions in both routine and emergency situations. Infrastructure, tools, and work instructions are available to respond to major emergencies. The emergency organization consists of experienced staff from various technical fields, including public relations.

MODULE 4: MANAGEMENT SYSTEM OF THE REGULATORY BODY – FUKUSHIMA ASSESSMENT

The CNSC continually assesses and improves its Management System by addressing improvement opportunities identified through a combination of audits, evaluations, assessments and staff feedback.

As part of its mandate, the CNSC Fukushima Task Force has also evaluated lessons learned from the Fukushima accident that are applicable to CNSC's regulatory regime, including the CNSC licensing (authorization) and compliance processes, with the understanding that some of these lessons learned may have broader implications for the Management System. So far, the CNSC has not found any issue needing immediate action and neither did the IRRS Team. The IRRS Team is assured that CNSC will address any relevant implications and lessons learned for further improvement of its Management System that may come up in the further analysis of the Fukushima accident.

CONCLUSION

The IRRS Team concludes that the CNSC´s Management was very responsive to the lessons learned from the TEPCO Fukushima Daiichi accident and made full use of all the information available, including the review of the actions taken by other international nuclear regulators. The organization of the CNSC Fukushima Task Force Team is in line with the Management System principles and requirements.

MODULE 5: AUTHORIZATION – FUKUSHIMA ASSESSMENT

The review of the current licensing process was included in the scope of the CNSC Fukushima Task Force.

One of the strengths of the Canadian regulatory framework, as identified by the Task Force, is the ability of the CNSC to rapidly amend licences to impose additional requirements in order to continuously improve the safety performance of the nuclear industry.

The Task Force recommended that CNSC should amend all power reactor operating licences to include specific licence conditions requiring implementation of accident management provisions, severe accident management and public information (Recommendation 10 in Appendix D of the Task Force Report). The review also highlighted the fact that the licence conditions handbooks (LCH) are lacking requirements and guidance needed to address lessons learned. This issue will also need to be addressed.

The recommendations that deal with amendments to existing licences or CNSC regulations and regulatory documents will be referred to the Commission Tribunal for approval or direction. The CNSC Action Plan will include measures for improving the licensing arrangements based on the findings and recommendations of the Task Force.

CONCLUSION

The IRRS Team concluded that CNSC has adequately addressed the authorization process in its review of the implications of the lessons learned from the TEPCO

CONCLUSION
Fukushima Daiichi accident.

MODULE 6: REVIEW AND ASSESSMENT – FUKUSHIMA ASSESSMENT

On 17 March 2011, as one of the initial actions taken after the TEPCO Fukushima Daiichi accident, the CNSC formally requested the licensees of Canadian Class I nuclear facilities (NPPs, research reactors and fuel fabrication facilities) under section 12(2) of the *General Nuclear Safety and Control Regulations*, to review the lessons learned from the TEPCO Fukushima Daiichi accident. The licensees were required to re-examine the safety cases of NPPs, in particular the underlying defence-in-depth concept, with focus on external hazards (e.g. seismic, flooding, fire and extreme weather events), measures for the prevention and mitigation of severe accidents and emergency preparedness, and to report on the implementation plans for short-term and long-term measures to address any significant gaps.

The CNSC staff also performed inspections of all the NPPs and other nuclear facilities in Canada to assess the readiness of accident mitigation systems, seismic preparedness, fire fighting capability, availability of backup power sources, hydrogen mitigation and systems for spent fuel bay cooling.

The CNSC prepared a Project Charter for the Task Force, outlining the project objectives, scope, main activities, deliverables, responsibilities and milestones, as well as the project assumptions and criteria.

A systematic review of the capability of the Canadian NPPs to withstand conditions similar to those that triggered the TEPCO Fukushima Daiichi accident, i.e. external events of higher magnitude than have previously been considered, and the licensees' preparedness for responding to such events, was undertaken in the framework of the CNSC Fukushima Task Force. A review of the current emergency preparedness arrangements and the relevant regulatory framework and processes has also been performed.

The scope of the review conducted under the Task Force is outlined in the "Nuclear Power Plant Safety Review Criteria" document and is consistent with the defence-in-depth approach:

- Identification and magnitudes of external events;
- Adequacy of design-basis-accident analysis;
- Consideration of beyond-design-basis accidents;
- Implementation of severe accident management;
- Licensees' emergency response plans;
- Nuclear emergency management in Canada; and

- CNSC regulatory framework and processes.

The safety review criteria have been established taking into account all relevant information available on the Fukushima accident and on the subsequent evaluations performed by international organizations and regulatory authorities of other countries.

The outcome of the review was documented in a detailed Task Force Report, providing the findings (73 in total), as well as the resulting recommendations (grouped under 13 main action directions). The Task Force report has been made available also to the public, which was invited to submit comments.

The recommendations have been structured into three major areas:

- Strengthening reactor defence in depth;
- Enhancing emergency response; and
- Improving regulatory framework and processes.

The review findings, together with the corresponding recommendations, are summarized in Appendix D of the Task Force Report.

Based on the reviews performed, the CNSC Task Force concluded that the Canadian NPPs are robust and have a strong design relying on multiple layers of defence, ensuring that there will be no impact on the public from credible external events and that the design also offers protection against more severe external events that are much less likely to occur. However, the CNSC Task Force has proposed changes to designs or procedures, wherever opportunities for improvement were found.

Among the recommendations arising from the review are several design enhancements for severe accident management (e.g. containment performance to prevent unfiltered releases of radioactive products, control capabilities for hydrogen and other combustible gases, and adequacy and survivability of equipment and instrumentation) and provisions for improving the emergency preparedness and response (e.g. upgrading onsite emergency facilities and equipment, in particular through formalizing all arrangements and agreements for external support and installing automated real-time station boundary radiation monitoring systems with appropriate backup power, and addressing multi-unit events).

The implementation of the technical and operational recommendations will be subject to the normal CNSC regulatory oversight of the current CANDU fleet, taking into account differences in reactor designs and sites. The recommendations apply also to any new reactors to be built in Canada.

Another recommendation made by the Task Force, particularly relevant for the review and assessment area, was the enhancement of the regulatory oversight of NPPs by implementing a Periodic Safety Review (PSR) process (Recommendation 11 in Appendix D of the Task Force Report). This Task Force recommendation is consistent with the findings from the 2009 IRRS mission (R5 and S6). The Integrated Safety Reviews (ISR) used for refurbishment and life extensions (National Research Universal reactor being the latest work done), on which the PSR approach is based, as well as the current CNSC ISR process, follow the IAEA guidance. The PSR process would contain the same guidance as the ISR except that the safety reviews would be

conducted periodically, not only on the occasion of major refurbishments or in view of life extension.

CNSC has prepared a Commission Member Document (CMD) with a formal recommendation on the introduction of PSRs for NPPs, including implementation timelines. It is anticipated that, with Commission Tribunal approval, such a process would be implemented over a period of several years.

Other recommendations arising from the Task Force address the review of the regulatory documents, guides and standards and the amendment of NPP licences to incorporate specific lessons learned from the Fukushima accident. CNSC has set up an Action Plan for addressing the individual findings and recommendations.

In preparation for the IRRS mission, the CNSC has also performed a self-assessment against the IRRS modules specifically developed for the review of the actions taken by the regulatory bodies in response to the TEPCO Fukushima Daiichi accident. This has been made available to the IRRS Review Team as a separate document.

CONCLUSION

The IRRS Team concluded that CNSC has performed a systematic and thorough review of the implications and the lessons learned from the TEPCO Fukushima Daiichi accident for the safety of the Canadian NPPs, for emergency preparedness and response, and for the regulatory framework and processes. CNSC has made full use of all the information available, including the review of the actions taken by other international nuclear regulators.

The CNSC has set up an Action Plan for addressing all the findings and recommendations arising from the review conducted under the CNSC Fukushima Task Force. The implementation of the technical and operational recommendations will be subject to the normal CNSC regulatory oversight of the existing nuclear installations, taking into account design differences and site specific aspects. The recommendations apply also to the regulatory review and licensing of any new reactors to be built in Canada.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1)	**BASIS: GSR Part 1 Requirement 15** states that *"The regulatory body shall make arrangements for analysis to be carried out to identify lessons to be learned from operating experience and regulatory experience, including experience in other States, and for the dissemination of the lessons learned and for their use by authorized parties, the regulatory body and other relevant authorities."*
GPF4	**Good Practice: The CNSC has performed a systematic and thorough review of the implications and the lessons learned from the TEPCO Fukushima Daiichi accident for the safety of the Canadian NPPs, making**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
	full use of all the information available, including the review of the actions taken by other international nuclear regulators. The CNSC has set up an Action Plan for addressing all the findings and recommendations arising from the review conducted under the CNSC Fukushima Task Force. The Task Force Report has been made publicly available.

FUKUSHIMA: MODULE 7: INSPECTION

As noted in Section 11.1 of this report, immediately after the Fukushima event, CNSC site staff performed walkdowns at Canadian NPPs to verify the licensees' emergency preparedness for external hazards and severe accidents so that the CNSC staff could reassure the Commission Tribunal and the Canadian public that any weaknesses that had contributed to the events in Japan could be specifically excluded. There were no significant findings and no actions were requested of the licensees as a result of these inspections.

The IRRS Team reviewed various aspects of the CNSC inspection framework to understand whether there were any programme vulnerabilities which might be exposed by an accident similar to Fukushima. The IRRS Team reviewed and discussed programmatic aspects such as: inspection planning, the baseline inspection programme, reactive inspections, review of operating experience, performance indicators, and trending of performance data. In addition, the IRRS Team reviewed several issues relating to the skills, abilities, and authorities of CNSC inspectors, training, objectivity, access, and enforcement authority. As part of the CNSC's commitment to continuous improvement, the CNSC compliance programme may benefit from a routine self-assessment, amongst other things, to ensure emerging trends within the industry are appropriately assessed by the programme.

A primary activity of CNSC staff is to verify compliance of licensees with regulatory requirements. CNSC staff conducts inspections, reviews, performance assessments and event follow-up to verify compliance. The CNSC Fukushima Task Force concluded that the staff should review the compliance programme for needed improvements once the identified changes to the regulatory framework have been implemented. This review will include, but not be limited to, updating the baseline compliance programme under which satisfactory performance of all safety and control areas is verified on a regular basis. In particular, enhanced focus on the following areas is anticipated:

- Licensees' accident management programmes and provisions, including station accident manuals and procedures;
- "Operational" aspects of nuclear safety, to maintain regulatory overview of the operational capabilities to provide fundamental safety functions, such as control of the fission reaction, cooling of fuel (including in the irradiated fuel bays) and confinement of radioactivity;
- Holistic evaluation of the overall station safety case against modern standards and best practices.

Once the specifics of licensees' plans to address Fukushima upgrades are known, compliance plans will be updated to include specific compliance activities, including inspections of implementation at the stations.

CONCLUSION

The IRRS Team concluded that the CNSC inspection programme is robust and capable to oversee licensee performance and compliance. CNSC inspectors have the proper access, authority, training, and guidance to perform their required duties. As Fukushima improvements are implemented by licensees, including severe accident management measures, the inspection programme will verify compliance.

FUKUSHIMA: MODULE 8: ENFORCEMENT

CNSC regulatory policy P-211 ”Compliance”, describes the attributes of an acceptable enforcement programme and links enforcement actions to the level of risk and the compliance record of the licensee in question. The CNSC uses a graduated enforcement approach whereby the selection and execution of the enforcement action depends on the risk significance of the situation being addressed. Some tables have been developed to assist inspectors in determining the severity of the non-compliance and the corresponding enforcement action. These tables were in place prior to the TEPCO Fukushima Daiichi accident.

In addition, CNSC developed a process document for assisting CNSC staff in the selection and application of enforcement actions in order to bring a licensee or a person subject to enforcement action, back into compliance and to deter further non-compliances with respect to the CNSC *Nuclear Safety and Control Act*, and associated regulations. The process, aligned with CNSC regulatory policy P-211, involves graduated enforcement and takes into account:

- The risk significance of the non-compliance with respect to health, safety, security, the environment and international obligations;
- The circumstances that led to the non-compliance (including acts of wilfulness);
- Previous compliance record;
- Operational and legal constraints;
- Industry-specific strategies, etc.

For situations deemed to be serious and considered to pose an imminent radiological hazard to workers, the public or the environment, the CNSC has the authority and will take whatever actions are necessary to restore an adequate level of safety and prevent unreasonable risk to the health, safety, security and the environment. This can range from a verbal request to cease the activities that are causing the situation, up to an order by an inspector or Commission Tribunal to cease activities and/or take whatever actions are deemed necessary to eliminate the hazardous situation or mitigate its impact. Following an enforcement action, the CNSC follows up to ensure that the licensee has effectively implemented the necessary corrective actions. Action items or items of non-compliance are entered into the CNSC’s Regulatory Information Bank/Banque d’information réglementaire (RIB/BIR) and include the licensee’s commitments for corrective action. Each item entered has an action owner and closure criteria. Before closing an action item, CNSC staff first verifies that the action(s) taken by the licensee have been adequate to correct the identified non-compliance or deficiency. This is accomplished by: inspections; review of documents submitted by the licensee; interviews of licensee staff; reviews of performance; or any combination of the above techniques.

The IRRS Team examined the P-211 policy and the CNSC Process Document "Select and Apply Enforcement Tools", and noted the graduated approach used for enforcement.

CONCLUSION

The IRRS Team concluded that the CNSC's enforcement policy and process are objective, utilize a graded approach, and are sufficient to ensure licensee compliance with issues identified resulting from the TEPCO Fukushima Daiichi accident.

FUKUSHIMA: MODULE 9: REGULATIONS AND GUIDES

CNSC has a suite of regulatory documents that have been developed on the basis of the best available knowledge. These documents cover a wide array of regulatory and technical topics, including emerging areas related to safety management and human factors. The CNSC updates its requirements and guidance in its regulatory framework to ensure that these reflect modern national and international standards.

CNSC staff keeps abreast of advances in knowledge in their fields of expertise through various means, including technical journals and peer meetings both domestically and internationally. The CNSC process for developing regulatory documents includes significant consultation with stakeholders which helps ensure that the best possible input is considered in all regulatory documents.

Regulatory documents and guides are reviewed periodically based on a regulatory framework rolling plan (3-5 years). Should a document require a review or an update sooner (for example, as a result of recommendations from the CNSC Fukushima Task Force), a proposal is brought before the Regulatory Framework Steering Committee and adjustments to the plan are made as necessary.

The nuclear standards published by the Canadian Standards Association (CSA) also play an important role in the regulatory framework in Canada. For example, there are CSA nuclear standards related to management systems for NPPs, pressure boundaries in CANDU reactors, and fire protection in CANDU NPPs (to name a few). These CSA standards, as well as CNSC regulatory documents, are cited in the NPP operating licenses. The CSA has a well-developed process for writing its standards based on the best available knowledge, and the CNSC participates in the writing of CSA nuclear standards.

Improvements will be made as a result of recommendations arising from the CNSC Fukushima Task Force Report**.** The CNSC Fukushima Task Force has performed a review of key regulations under the *Nuclear Safety and Control Act*, as well as key CNSC regulatory documents and guidance documents, including the topics of siting and licensing process; external hazards, including seismic and tsunami risks assessment; and emergency preparedness and response which are particularly relevant in the light of the Fukushima accident.

The main finding of the Task Force is that there is no overall need for the regulatory framework to be revisited in order to identify the minimum, necessary and sufficient number of Regulatory Documents (RDs) and Guidance Documents (GDs) to support the power reactor regulatory

programme. However, the Fukushima Task Force Report made a number of recommendations for revisions to individual RDs and GDs. The Task Force concluded that RDs should be revised to update selected requirements and expectations for design-basis and beyond-design-basis accidents to ensure that lessons learned are built into the regulatory oversight programme for existing reactors and for new builds. The regulatory documents and guides that need to be revised include RD-337 "Design of New Nuclear Power Plants", RD-310 "Safety Analysis for Nuclear Power Plants", S-294 "Probabilistic Safety Assessment (PSA) for Nuclear Power Plants", G-306 "Severe Accident Management Programs for Nuclear Reactors", G-225 "Emergency Planning at Class I Nuclear Facilities and Uranium Mines and Mills" and RD-353 "Testing the Implementation of Emergency Measures" (Recommendation 9 in Appendix D of the Task Force Report). A revision of RD-337 "Design of New Nuclear Power Plants" is already underway with draft content awaiting CNSC management approval for release to internal review which will be followed by public consultation, Commission Tribunal approval, and publication. When the framework is revisited by the Regulatory Framework Steering Committee, the templates for the power reactor operating licence (PROL) and the associated NPP LCH should be used as the basis for identifying needs for RDs or GDs. The PROL and LCH templates currently contain some regulatory requirements or expectations that are not found in RDs or GDs. When the framework is revised, the opportunity will be taken to remedy this.

One of the recommendations made by the Task Force was that the "Class I Nuclear Facilities Regulations" be amended to require licensees to submit offsite emergency plans. It also recommended that the "Radiation Protection Regulations" be amended to be more consistent with international guidance, and to describe the regulatory requirements needed to address radiological hazards during the phases of an emergency in greater detail (Recommendations 7 and 8 in Appendix D of the Task Force Report).

Any documents that were not reviewed by the Fukushima Task Force were identified in the Fukushima Task Force Report for follow-up by the CNSC Regulatory Framework Steering Committee.

CONCLUSION

The IRRS Team concluded that CNSC conducted an appropriate review of their regulations and regulatory guides in the aftermath of the TEPCCO Fukushima Daiichi accident. Significant work lies ahead in finalizing the Action Plan; revising regulations, regulatory documents, and guidance documents; and assessing licensee actions to meet these revised requirements. CNSC has positioned itself favourably for conducting these activities.

FUKUSHIMA MODULE 10: EMERGENCY PREPAREDNESS AND RESPONSE

The management of nuclear emergency situations involves municipal, provincial, and federal authorities. The roles and responsibilities are defined in the *Emergency Management Act* and in two federal plans, the Federal Emergency Response Plan (FERP) and the Federal Nuclear Emergency Plan (FNEP). At the provincial level, legislation and nuclear emergency plans exist. The tasks and cooperation of various stakeholders are described in those plans.

The general division of responsibilities is as follows: The licensee is responsible for the on-site emergency preparedness and response. The CNSC oversees the licensee during normal operation, as well as in emergencies. The responsibility for off-site emergency preparedness and response lies with the provincial authorities. The provincial level is supported by the federal level in the case of major accidents.

The CNSC Fukushima Task Force assessed nuclear emergency management in Canada. Their assessment is based on the emergency plans. It was found that comprehensive and well-documented emergency plans exist. The Task Force identified some areas for improvements including: the consistency of the FNEP with the emergency planning framework in the FERP; the inclusion of the recovery phase in the FNEP; and review of the provincial emergency plans using knowledge from the off-site emergency management in Fukushima.

The IRRS Team considers that the review of emergency plans using Fukushima lessons learned is an on-going effort and also presents an opportunity to improve the common understanding of the roles and needs of the different response stakeholders.

The CNSC Fukushima Task Force found that the licensees should review and update their emergency plans, facilities and equipment (especially regarding electrical power and water supply), arrangements and agreements for external support, and tools and installations to provide off-site authorities with measurements and predictions for off-site radiation. The activities of the licensees have already been started.

Apart from the emergency planning, emergency exercises are necessary to maintain effective response capabilities. The NPP licensees conduct exercises of their on-site emergency arrangements at least once a year. CNSC inspectors evaluate these exercises. Every five years, CNSC performs a compliance inspection of the licensee's emergency management programme.

CNSC conducts its own emergency preparedness exercises about two to three times per year. In the provinces, smaller exercises of single components of emergency preparedness plans are performed as well; however, full-scale exercises, including the municipal level, provincial level, federal level (i.e. the CNSC and Health Canada), and the licensee have not been conducted since 2007. The IRRS Team confirms that the nuclear emergency management in Canada is well-organized; nevertheless, many stakeholders are involved and an effective and efficient implementation of full-scale plans is necessary. Therefore, full-scale emergency preparedness exercises, including the municipal level, provincial level, federal level, and the licensee, should be held on a periodic basis.

CONCLUSION

The IRRS Team concluded that the CNSC maintains a strong regulatory oversight of the licensee's emergency arrangements. The CNSC Fukushima Task Force identified improvement actions which should be implemented in order to further strengthen the on-site and off-site emergency preparedness and response. Further exercising of all stakeholders in off-site emergency preparedness will provide enhanced assurance of the capability to protect public health and safety during a severe accident.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1)	**Basis: GS-R-2, 5.33 states**: Exercise programmes shall be conducted to ensure that all specified functions required to be performed for emergency response and all organizational interfaces for facilities in threat category I, II or III and the national level programmes for threat category IV or V are tested at suitable intervals. These programmes shall include the participation in some exercises of as many as possible of the organizations concerned. The exercises shall be systematically evaluated and some exercises shall be evaluated by the regulatory body. The programme shall be subject to review and updating in the light of experience gained (see paras 3.8, 3.16, 5.37 and 5.39 for further requirements in relation to exercises).
(2)	**GS-R-2, 5.35 states**: The officials off the site responsible for making decisions on protective actions for the population within the precautionary action zone and/or the urgent protective action planning zone (see para. 4.48) shall be trained in the strategy for protective action and shall regularly participate in exercises.
RF8	**<u>Recommendation:</u> The Government of Canada should assure that full-scale exercises of off-site emergency preparedness plans be held on a periodic basis, including participation of the licensee and the municipal, provincial, and federal organizations.**

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