




No	Auteur	Commentaire de l'intervenant	Réponse de la CCSN
		<p>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).</p> <p>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.</p>	
49	Mary Cianchetti Canadian Standards Association	<p>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.</p> <p>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</p> <p>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.</p> <p>The CSA NSSC will meet this deliverable within the requested timeline.</p> <p>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.</p>	The CNSC looks forward to working with the CSA on this review activity.
50	Jean Bélisle Chef Analyse et fiabilité Centrale Nucléaire Gentilly	 <p>2012-02-03 (dossier 11HQ02).pdf</p>	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


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		<p>Bonjour,</p> <p>La lettre ci-dessus mentionnée est envoyée aujourd'hui à M. Ramzi Jammal par courrier postal.</p> <p>Meilleures salutations,</p> <p>Le 3 février 2012</p> <p>Objet : Commentaires sur le plan d'action du personnel de la CCSN concernant les recommandations du Groupe de travail de la CCSN sur Fukushima</p> <p>Monsieur,</p> <p>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.</p>	<p><i>Rapport du groupe de travail de la CCSN.</i></p> <p>La centrale Gentilly-2 a également présenté des commentaires sur le <i>Plan d'action de la CCSN</i>, 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.</p>
51	<p>Jean Bélisle Chef Analyse et fiabilité Centrale Nucléaire Gentilly</p>	<p>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.</p>	<p>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 ».</p> <p>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.</p> <p>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.</p>
52	<p>Jean Bélisle</p>	<p>Pour l'action 2.1, l'Évaluation Probabiliste de Sûreté (ÉPS)</p>	<p>Nous notons les soumissions d'Hydro Québec au sujet</p>

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	Chef Analyse et fiabilité Centrale Nucléaire Gentilly	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.	de l'Évaluation Probabiliste de Sûreté (ÉPS) et du triage des événements externes. Ces soumissions sont présentement à l'étude et notre revue suivra nos procédures internes. Hydro Quebec sera avisé si d'autres études ou analyses seront nécessaires.
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	<p>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 <i>CNSC Task Force Report</i>. OPG responded to certain of the public comments on the <i>Task Force Report</i>. These comments are reproduced below.</p> <p>OPG also provided comments on the <i>CNSC Action Plan</i>, 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.</p>
54	WM Elliott Senior Vice-President Engineering and Chief Nuclear Engineer OPG	<p>Comments related to the Disposition of Public Comments</p> <p>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:</p> <ul style="list-style-type: none"> • OPG is committed to safe operation of its facilities, and maintaining public risk within the regulatory envelope and has policies, practices 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 	CNSC staff notes OPG's continuing commitment to safety.

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		<p>Fukushima Task Force.</p> <ul style="list-style-type: none"> • 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	<p>WM Elliott Senior Vice-President Engineering and Chief Nuclear Engineer OPG</p>	<p>Comments related to the Action Plan</p> <p>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.</p> <p>Deliverables: Site-specific implementation plans for RD-310.</p> <p>Applicable to: All sites</p> <p>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.</p>	<p>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.</p>

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		Furthermore, RD-310 implementation is currently being tracked under a separate action item.	
56	Frank Saunders Vice President Nuclear Oversight and Regulatory Affairs Bruce Power	 E-DOCS-#3870693-v 1-Bruce_Power_Com <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 <i>CNSC Task Force Report</i> . 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 stored offsite</u> 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	<p>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.</p>	<p>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.</p>
60	Frank Saunders Vice President Nuclear Oversight and Regulatory Affairs Bruce Power	<p>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.</p>	<p>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</p>

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			<p>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 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.</p> <p>CNSC favourably views efforts made by licensees to explain how nuclear technology works. Our focus is safety and safety-related information.</p>
61	Wade Parker Station Director	 <p>2012-01-31 NBPower Nuclear comments on</p> <p>January 31, 2012</p> <p>Subject: NB Power Nuclear Comments on "CNSC Staff Action Plan on the CNSC Fukushima Task Force Recommendations"</p> <p>Dear Mr. Jammal:</p> <p>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".</p>	<p>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 <i>CNSC Task Force Report</i>.</p> <p>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.</p>
62	Wade Parker Station Director	<p>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</p>	<p>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.</p> <p>Action 1.11 is reworded as follows: "Licensees should procure, as quickly as possible, emergency equipment</p>

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		<p>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, procurement and connection points for emergency mitigating equipment are to ensure they are properly engineered and follow our established quality management system processes.</p>	<p>and other resources that could be <u>either stored onsite or stored offsite</u> and brought onsite to mitigate a severe accident.”</p> <p>CNSC staff recognizes the major enhancements to 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.</p>
63	Wade Parker Station Director	<p>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.</p> <p>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</p>	<p>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.</p> <p>Part 2 - Radiation Monitoring: Although no explicit reference is made, it is assumed that this comment is made in reference to Action 5.3.</p> <p>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.</p> <p>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</p>

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		<p>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 fixed and deployable sensors and associated analytics provides NB Power Nuclear and NBEMO with near real time situational awareness and decision support.</p>	<p>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 radiation survey teams or semi-automated boxes.</p> <p>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</p>
64	Wade Parker Station Director	<p>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.</p> <p>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 terms of a holistic accident response strategy, a</p>	<p>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.</p> <p>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.</p> <p>In this manner, off-site authorities are in an informed position to choose between taking proactive or reactive protective action decisions.</p> <p>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.</p>

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		<p>more appropriate action and deliverable is proposed as follows:</p> <p>Action:</p> <p>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.</p> <p>Deliverable:</p> <ol style="list-style-type: none">1. Evaluate the information needed by off-site emergency response organizations that must be provided by licensees. The evaluation should include information on 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.	

**Annexe D - Mesures à prendre sur Fukushima (MPF) – matrice
d'applicabilité aux sites et leurs états**

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Ser	Mesure à prendre sur Fukushima ¹	Darlington	Pickering A	Pickering B	Bruce A	Bruce B	Gentilly 2	Point Lepreau
1	MPF 1.1 Une évaluation actualisée de la capacité des vannes de décharge du condenseur de purge/dégazeur fournissant une preuve supplémentaire que les vannes ont une capacité suffisante. Décembre 2012.	Ouvert DPA 04/12	Ouvert DPA 04/12	Ouvert DPA 04/12	Ouvert	Ouvert	Ouvert	Ouvert
2	MPF 1.1.2 Au besoin, un plan et un calendrier pour les essais de confirmation de l’installation ou la mise en place d’une capacité de décharge supplémentaire. Décembre 2012.	AED	AED	AED	AED	AED	AED	AED
3	MPF 1.2.1 Une évaluation de la capacité de décharge du bouclier caisson ou de la voûte de calandre. Décembre 2013.	Fermé	N/A	Ouvert DPA 06/12	Ouvert	Ouvert	Fermé (sous réserve de satisfaction)	Fermé
4	MPF 1.2.2 Si la capacité de décharge est insuffisante, une évaluation des avantages offerts par une capacité de décharge suffisante et de la faisabilité d’assurer une capacité de décharge supplémentaire. Décembre 2013.	Fermé	N/A	AED	AED	AED	Fermé (sous réserve de satisfaction)	N/A

Ser	Mesure à prendre sur Fukushima ¹	Darlington	Pickering A	Pickering B	Bruce A	Bruce B	Gentilly 2	Point Lepreau
5	MPF 1.2.3 Si une capacité de décharge supplémentaire est avantageuse et réalisable, un plan et un calendrier pour assurer une capacité de décharge supplémentaire. Décembre 2013.	Ouvert	N/A	AED	AED	AED	Ouvert DPA du redémarrage	N/A
6	MPF 1.3.1 Des évaluations de l'adéquation des moyens existants pour protéger l'intégrité du confinement et empêcher des rejets incontrôlés dans le cas d'accidents hors dimensionnement, y compris les accidents graves. Décembre 2015.	Fermé	Ouvert DPA Q4/13	Ouvert DPA Q4/12	Ouvert DPA 06/12	Ouvert DPA 06/12	Fermé (sous réserve de satisfaction)	N/A
7	MPF 1.3.2 Lorsque les moyens existants sont jugés insuffisants pour protéger l'intégrité du confinement et prévenir les rejets accidentels de matières radioactives dans le cas d'accidents hors dimensionnement, y compris les accidents graves, un plan et un calendrier pour l'amélioration de la conception afin de contrôler les rejets radiologiques à long terme et, dans la mesure du possible, les rejets non filtrés. Décembre 2015.	Ouvert DPA 2015	Ouvert DPA Q4/14	Ouvert DPA Q4/14	Ouvert DPA 12/13	Ouvert DPA 12/13	Ouvert DPA du redémarrage	N/A
8	MPF 1.4 Un plan et un calendrier pour l'installation des RAP aussi rapidement que possible. Décembre 2012.	Fermé	Fermé	Fermé	Ouvert DPA 03/12	Ouvert DPA 02/12	Fermé	Fermé

Ser	Mesure à prendre sur Fukushima ¹	Darlington	Pickering A	Pickering B	Bruce A	Bruce B	Gentilly 2	Point Lepreau
9	MPF 1.5 Une évaluation du potentiel de génération d'hydrogène dans la zone de la PSCU et de la nécessité de recourir à des mesures d'atténuation de l'hydrogène. Décembre 2013.	Ouvert DPA Q4/12	Ouvert DPA Q4/13	Ouvert DPA Q4/12	Ouvert	Ouvert	Ouvert	Ouvert
10	MPF 1.6.1 Une évaluation de la réponse structurale de la PSCU aux températures supérieures à la température limite de dimensionnement, y compris une évaluation du taux de fuite maximal crédible après tout dommage structural prévu. Décembre 2013.	Closed	Ouvert DPA Q1/13	Ouvert DPA Q4/12	Ouvert DPA 12/13	Ouvert DPA 12/13	Ouvert DPA 12/13	Ouvert
11	MPF 1.6.2 Un plan et un calendrier pour la mise en œuvre de toute mesure d'atténuation supplémentaire jugée nécessaire par l'évaluation de l'intégrité structurale. Décembre 2013	N/A	AED	AED	AED	AED	AED	AED
12	MPF 1.7 Un plan et un calendrier pour l'optimisation des mesures existantes (fournir un appoint de caloporteur au circuit caloporteur primaire, aux générateurs de vapeur, au modérateur, etc.) et prévoyant la mise en place de mesures additionnelles pour l'appoint en caloporteur, avec les analyses s'y rapportant. Décembre 2013.	Ouvert DPA Q1/13	Ouvert DPA Q1/13	Ouvert DPA Q1/13	Ouvert DPA 12/13	Ouvert DPA 12/13	Ouvert DPA 12/13	Ouvert

Ser	Mesure à prendre sur Fukushima ¹	Darlington	Pickering A	Pickering B	Bruce A	Bruce B	Gentilly 2	Point Lepreau
13	MPF 1.8 Un plan détaillé et un calendrier pour l'évaluation de la pérennité de l'équipement, ainsi qu'un plan et un calendrier pour moderniser l'équipement, le cas échéant et compte tenu de l'évaluation. Décembre 2013.	Ouvert DPA 12/13	Ouvert DPA 12/13	Ouvert DPA 12/13	Ouvert DPA 12/13	Ouvert DPA 12/13	Ouvert DPA du redémarrage	Ouvert DPA 12/13
14	MPF 1.9 Une évaluation de l'habitabilité des installations de contrôle dans les conditions découlant des accidents hors dimensionnement et des accidents graves. Le cas échéant, un plan détaillé et le calendrier des mises à niveau des installations de contrôle. Décembre 2014.	Ouvert DPA Q4/12	Ouvert DPA Q4/13	Ouvert DPA Q4/13	Ouvert DPA 12/14	Ouvert DPA 12/14	Ouvert DPA 12/14	Ouvert
15	MPF 1.10.1 Une évaluation des besoins et des capacités en alimentation électrique pour les principaux équipements et instruments. L'évaluation doit déterminer les améliorations possibles qui permettraient d'augmenter la disponibilité des principaux équipements et instruments, au besoin. Décembre 2012.	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12

Ser	Mesure à prendre sur Fukushima ¹	Darlington	Pickering A	Pickering B	Bruce A	Bruce B	Gentilly 2	Point Lepreau
16	MPF 1.10.2 Un plan et un calendrier de mise en œuvre des mises à jour identifiées. Une cible de huit heures sans avoir besoin d'un soutien hors site doit être utilisée. Décembre 2012.	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12
17	MPF 1.11 Un plan et un calendrier pour les achats (de l'équipement d'urgence et les autres ressources qui pourraient être stockés hors site). Décembre 2012.	Fermé (sous réserve de satisfaction)	Fermé (sous réserve de satisfaction)	Fermé (sous réserve de satisfaction)	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12
18	MPF 2.1.1 Réévaluer, par des calculs modernes et des méthodes de pointe, l'ampleur propre au site de chaque événement externe auquel la centrale peut être assujettie. Décembre 2013.	Fermé	Ouvert DPA Q4/13	Ouvert DPA Q4/12	Ouvert DPA 09/12	Ouvert DPA 09/12	Fermé (sous réserve de satisfaction)	Fermé
19	MPF 2.1.2 Évaluer si la protection nominale actuelle propre au site, pour chaque événement externe évalué au point 1 ci-dessus, est suffisante. Si des lacunes sont identifiées, un plan de correction doit être proposé. Décembre 2013.	Fermé	Ouvert DPA Q4/13	Ouvert DPA Q4/12	Ouvert DPA 2014	Ouvert DPA 2014	Fermé (sous réserve de satisfaction)	Ouvert DPA 12/13
20	MPF 2.2 Mise en œuvre du document d'application de la réglementation RD-310, <i>Analyse de la sûreté pour les centrales nucléaires</i> . Décembre 2013.	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert	Ouvert	Ouvert	Ouvert DPA 12/13

Ser	Mesure à prendre sur Fukushima ¹	Darlington	Pickering A	Pickering B	Bruce A	Bruce B	Gentilly 2	Point Lepreau
21	MPF 3.1.1 Lorsque des LDGAG n'ont pas été élaborées, finalisées ou totalement mises en œuvre, fournir des plans et des calendriers de réalisation. Décembre 2013.	Fermé (sous réserve de satisfaction)	Fermé (sous réserve de satisfaction)	Fermé (sous réserve de satisfaction)	Compléter (sous réserve de satisfaction)	Fermé (sous réserve de satisfaction)	Ouvert	Fermé
22	MPF 3.1.2 Pour les centrales multitranches, fournir des plans et des calendriers pour l'inclusion des événements pouvant toucher plusieurs tranches dans les LDGAG. Décembre 2013.	Ouvert DPA Q4/13	Ouvert DPA Q4/13	Ouvert DPA Q4/13	Ouvert DPA 12/13	Ouvert DPA 12/13	N/A	N/A
23	MPF 3.1.3 Pour toutes les centrales, fournir des plans et les calendriers pour l'inclusion des événements pouvant toucher les PSCU dans la documentation d'exploitation de la centrale, le cas échéant. Décembre 2013.	Ouvert DPA 04/12	Ouvert DPA 04/12	Ouvert DPA 04/12	Ouvert DPA 12/13	Ouvert DPA 12/13	Ouvert, DPA du redémarrage	Fermé
24	MPF 3.1.4 Démontrer l'efficacité des LDGAG au moyen d'exercices sur table et d'exercices sur place. Décembre 2013.	Ouvert DPA Q4/13	Ouvert DPA Q4/13	Ouvert DPA Q4/13	Ouvert DPA 12/13	Ouvert DPA 12/13	Ouvert, DPA du redémarrage	Fermé
25	MPF 3.2.1 Une évaluation de l'adéquation de la modélisation existante des accidents graves dans les centrales multitranches. L'évaluation doit fournir une spécification fonctionnelle de tous les modèles améliorés nécessaires. Décembre 2012.	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	N/A	N/A

Ser	Mesure à prendre sur Fukushima ¹	Darlington	Pickering A	Pickering B	Bruce A	Bruce B	Gentilly 2	Point Lepreau
26	MPF 3.2.2 Un plan et un calendrier d'élaboration de la modélisation améliorée, y compris tout le soutien expérimental nécessaire. Décembre 2012.	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	N/A	N/A
27	MPF 4.1.1 Une évaluation de l'adéquation des plans d'urgence et des programmes existants. Décembre 2012.	Ouvert DPA 04/12	Ouvert DPA 04/12	Ouvert DPA 04/12	Ouvert DPA 09/12	Ouvert DPA 09/12	Ouvert DPA 12/12	Ouvert DPA 12/12
28	MPF 4.1.2 Un plan et un calendrier pour combler les lacunes relevées dans l'évaluation. Décembre 2012.	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA 03/13	Ouvert DPA 03/13	Ouvert DPA 12/12	Ouvert DPA 12/12
29	MPF 4.2 Un plan et un calendrier pour l'élaboration de programmes améliorés d'exercices. Décembre 2012.	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA 10/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12
30	MPF 5.1.1 Une évaluation de l'adéquation de l'alimentation de secours pour les installations et l'équipement de secours. Décembre 2012.	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA 10/12	Ouvert DPA 10/12	Ouvert DPA 12/12	Ouvert
31	MPF 5.1.2 Un plan et un calendrier pour combler les lacunes relevées. Décembre 2012.	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA Q4/12	Ouvert DPA 12/12	Ouvert DPA 12/12	Ouvert DPA 12/12	Ouvert DPA 06/12
32	MPF 5.2.1 Identifier le soutien extérieur et les ressources externes qui peuvent être nécessaires pendant une urgence. Décembre 2012.	Ouvert DPA 04/12	Ouvert DPA 04/12	Ouvert DPA 04/12	Ouvert DPA 12/12	Ouvert DPA 12/12	Ouvert DPA 12/12	N/A

Ser	Mesure à prendre sur Fukushima ¹	Darlington	Pickering A	Pickering B	Bruce A	Bruce B	Gentilly 2	Point Lepreau
33	MPF 5.2.2 Identifier les accords de soutien extérieur et les ressources externes qui ont été officialisés et documentés. Décembre 2012.	Ouvert DPA 04/12	Ouvert DPA 04/12	Ouvert DPA 04/12	Ouvert DPA 12/12	Ouvert DPA 12/12	Ouvert DPA 12/12	N/A
34	MPF 5.2.3 Confirmer si les accords non documentés peuvent être officialisés. Décembre 2012.	Ouvert DPA 04/12	Ouvert DPA 04/12	Ouvert DPA 04/12	AED	AED	Ouvert DPA 12/12	N/A
35	MPF 5.3 Un plan de projet et un calendrier d'installation. Décembre 2012.	Ouvert DPA Q2/12	Ouvert DPA Q2/12	Ouvert DPA Q2/12	Ouvert DPA 12/12	Ouvert DPA 12/12	Ouvert DPA 12/12	Ouvert
36	MPF 5.4 Développer des outils d'estimation et de modélisation des termes sources, propres à chaque centrale. Décembre 2012.	N/A	N/A	N/A	N/A	N/A	Ouvert DPA du redémarrage	Ouvert

¹Livrables du document INFO-0828

Les 36 mesures à prendre sur Fukushima (MPF) sont conformes aux livrables présentés dans le document INFO-0828, *Plan d'action du personnel de la CCSN concernant les recommandations du Groupe de travail de la CCSN sur Fukushima*.

La matrice précise à quelles centrales les MPF s'appliquent de même que le statut (« ouverte » ou « fermée ») de celles-ci pour chaque centrale. Certaines MPF dépendent du résultat d'une autre MPF; la mention « à être déterminé » (AED) est indiquée dans ces cas. Une MPF ne sera fermée que lorsque toutes les centrales auront produit le livrable nécessaire, et que le personnel de la CCSN aura accordé son approbation. Dans certains cas, des mesures spécifiques à des centrales pourront être ouvertes pour vérifier l'exécution de livrables additionnels.

Cette matrice sera mise à jour aux six mois.

Annexe E - Rapport du SEIR - Module sur Fukushima

Ci-dessous, un extrait du rapport *Integrated Regulatory Review Service (IRRS) Follow-up mission Report to the Government of Canada*, Ottawa, Canada (28 novembre au 9 décembre 2011) [en anglais seulement].

Pour obtenir un exemplaire du rapport du SEIR, consulter le site web de la CCSN¹.

¹ <http://www.nuclearsafety.gc.ca/fr/about/international/irrt/index.cfm>

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



**INTEGRATED REGULATORY
REVIEW SERVICE
(IRRS)**

**FOLLOW-UP MISSION
TO
CANADA**

Ottawa, Canada

28 November to 9 December 2011



DEPARTMENT OF NUCLEAR SAFETY AND SECURITY



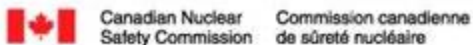
REPORT

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)

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IAEA-2011

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

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.

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)	<p>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:</p> <p>(4) Emergency preparedness and response.</p>
(2)	<p>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.</p>
RF7	<p><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.</p>

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)	<p>Basis: <i>GSR Part 1, Requirement 14: International obligations and arrangements for international cooperation states:</i></p> <p>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.</p>
SF9	<p>Suggestion: The Government of Canada should consider inviting an international peer review mission for emergency preparedness and response.</p>

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 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 <i>“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.”</i>
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 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.

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 TEPCO 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)	<p>Basis: GS-R-2, 5.33 states:</p> <p>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).</p>
(2)	<p>GS-R-2, 5.35 states:</p> <p>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.</p>
RF8	<p><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.</p>

