



**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



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire

Canada



Canadian Nuclear Safety Commission

nuclearsafety.gc.ca





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

Mission date: 28 November to 9 December 2011
Regulatory body: Canadian Nuclear Safety Commission (CNSC)
Location: Headquarters, Ottawa, Canada

Regulated facilities and practices: Nuclear power plants, research reactors, fuel cycle facilities, medical and industrial sources, waste management facilities, decommissioning, transport of radioactive materials, communication and public information.

Organized by: International Atomic Energy Agency (IAEA)

IRRS REVIEW TEAM

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

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

CONTENTS

EXECUTIVE SUMMARY	1
I. INTRODUCTION	3
II. OBJECTIVE AND SCOPE	5
III. BASIS FOR THE REVIEW	6
IV. REPORT STRUCTURE	8
V. RESULTS OF THE REVIEW	9
1. LEGISLATIVE AND GOVERNMENTAL RESPONSIBILITIES	9
2. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY	10
2.1. General	10
3. ORGANIZATION OF THE REGULATORY BODY	12
3.1. General organization	12
3.2. Advisory bodies and research organizations	14
3.2.1. Advisory Bodies	15
4. AUTHORIZATION	16
4.1. Nuclear installations: Nuclear Power Plants (NPPs), Research Reactors (RRs) and Fuel Cycle Facilities (FCFs)	17
4.2. New build	21
5. REVIEW AND ASSESSMENT	23
5.1. Nuclear installations: NPPs, RRs and FCFs	23
5.1.1. Reporting requirement and operating experiences for operating NPPs	23
6. INSPECTION AND ENFORCEMENT	24
6.1. Nuclear installations: NPPs, RRs and FCFs	25
6.2. Waste facilities, uranium mines and mills	28
7. DEVELOPMENT OF REGULATIONS AND GUIDES	29
7.1. Waste facilities, mines and mills	31
8. MANAGEMENT SYSTEM	32
8.1. Identification and monitoring of improvement actions	32
9. CODE OF CONDUCT ON SAFETY AND SECURITY OF RADIOACTIVE SOURCES	37
9.1. National strategy of gaining and regaining control over orphan sources	37
10. TRANSPORT OF RADIOACTIVE MATERIAL	39

10.1.	Introduction and background.....	39
10.2.	Legislative and governmental responsibilities in transport	39
10.3.	Regulatory body responsibilities and functions.....	41
10.4.	Organization of the regulatory body.....	42
10.5.	Authorization process, review and assessment.....	43
10.6.	Inspection and enforcement.....	46
10.7.	Development of regulations and guides	48
10.8.	Emergency preparedness for transport	51
10.9.	Management systems for regulatory bodies	52
11.	REGULATORY IMPLICATIONS OF THE TEPCO FUKUSHIMA DAIICHI ACCIDENT	53
11.1.	Actions taken by the regulatory body in the aftermath of the TEPCO Fukushima Daiichi accident	53
11.2.	Plans for up-coming actions to further address the regulatory implications of the TEPCO Fukushima Daiichi accident	56
11.3.	Significance of regulatory implications of the TEPCO Fukushima Daiichi accident across reviewed areas	58
	APPENDIX I: LIST OF PARTICIPANTS.....	73
	APPENDIX II: MISSION PROGRAMME	74
	APPENDIX III: SITE VISITS	76
	APPENDIX IV: LIST OF MISSION COUNTERPARTS	77
	APPENDIX V: RECOMMENDATIONS AND SUGGESTIONS FROM THE 2009 IRRS MISSION THAT REMAIN OPEN	78
	APPENDIX VI: RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES FROM THE 2011 IRRS FOLLOW-UP MISSION	79
	APPENDIX VII: REFERENCE MATERIAL PROVIDED BY CNSC.....	84
	APPENDIX VIII: IAEA REFERENCE MATERIAL USED FOR THE REVIEW	98
	APPENDIX IX: CNSC ORGANIZATIONAL CHART.....	99

EXECUTIVE SUMMARY

At the request of the Government of Canada, an international team of twenty one experts in nuclear, radiation and radioactive waste safety visited the Canadian Nuclear Safety Commission (CNSC) from 31 May to 12 June 2009 to conduct an Integrated Regulatory Review Service (IRRS) mission to review the CNSC regulatory framework and its effectiveness.

In December 2010, the Canadian Government requested a follow-up IRRS mission to review the measures taken to address the recommendations and suggestions presented in the 2009 IRRS Mission Report. One new review area, CNSC's role in regulating transport of radioactive material, was added to the mission at the request of CNSC. Additionally, a new IRRS core module focusing on the regulatory implications of the TEPCO Fukushima Daiichi accident was reviewed. One policy issue regarding special arrangements for transport of radioactive material was discussed during the mission.

The review was conducted from 28 November to 9 December 2011 by nine senior regulatory experts from seven Member States, four staff members from the IAEA, one observer and an IAEA administrative assistant. In addition to interviews and document reviews, several members of the IRRS Review Team made visits to Point Lepreau Nuclear Generating Station, Nordion, and the Port of Montreal, to witness regulatory inspections, observe CNSC staff conducting regulatory activities in the field, and discuss the CNSC's effectiveness with licensees. The IRRS Team also met with the CNSC External Advisory Committee to discuss its role in providing advice to the CNSC President regarding the CNSC's overall response to the TEPCO Fukushima Daiichi nuclear accident.

The IRRS Team concluded that the recommendations and suggestions from the 2009 IRRS mission have been taken into account systematically by a comprehensive action plan. Significant progress has been made in many areas and many improvements were carried out following the implementation of the action plan.

During this follow-up mission, the IRRS Team determined that 13 of 14 recommendations and 17 of 18 suggestions made by the 2009 IRRS mission had been effectively addressed and therefore could be considered closed. The CNSC should be commended for this accomplishment. For the remaining recommendation and suggestion, the CNSC has made progress but has not completed all the necessary actions and consequently these findings remain open. The IRRS Team also concluded that the CNSC should continue the implementation of its actions toward completion of the remaining findings.

The IRRS Team during the 2011 mission made note of the following strengths:

- The recommendations and suggestions from the 2009 IRRS mission were systematically addressed through active senior management commitment;
- The regulatory framework for transport of radioactive materials is well established and commensurate with the large scope and volume of transport activities in Canada;
- The regulatory response to the TEPCO Fukushima Daiichi accident was prompt, robust and comprehensive.

In addition to the strengths above, 4 Good Practices were identified relating to new review areas (the Transport and Fukushima modules).

This report also includes 8 recommendations and 9 suggestions from the new review areas included in this mission. Addressing these findings will further strengthen the regulatory framework in Canada. Key areas for improvement include:

- Adoption of the 2009 version of IAEA's Transport Regulations for the Safe Transport of Radioactive Material, TS-R-1, into the Canadian regulatory framework;
- National assessment of nuclear power plant off-site emergency plan that includes all relevant organizations;
- Conduct of full scale emergency exercises on a periodic basis.

The CNSC staff preparation for the mission was exemplary. During the review, the administrative and logistical support was excellent and the IRRS Team was extended full cooperation in technical discussions with CNSC personnel. The CNSC counterparts were enthusiastic and very interested in discussing their actions taken to address the previous findings, and in identifying ways to move forward to further improve the regulatory and nuclear safety framework in Canada.

I. INTRODUCTION

Background

At the request of the Government of Canada, an international team of twenty one experts in nuclear, radiation and radioactive waste safety visited the Canadian Nuclear Safety Commission (CNSC) from 31 May to 12 June 2009 to conduct an Integrated Regulatory Review Service (IRRS) mission to review the CNSC regulatory framework and its effectiveness.

The purpose of the 2009 IRRS mission was to review the application of the CNSC regulatory framework and regulatory activities to all regulated sources, facilities and activities, to review the effectiveness of the CNSC and to exchange information and experience in the areas covered by IRRS. The review was carried out by comparison against IAEA safety standards and the relevant Codes of Conduct as the international benchmarks for safety.

The IRRS Review Team consisted of 15 senior regulatory experts from 13 Member States, one observer, four staff members from the IAEA and an IAEA administrative assistant. The IRRS Team carried out the review of the CNSC in all relevant areas: legislative and governmental responsibilities; responsibilities and functions of the regulatory body; organization of the regulatory body; activities of the regulatory body, including the authorization process; review and assessment; inspection and enforcement; the development of regulations and guides; the Management System and communication and consultation with interested parties.

The IRRS addressed facilities and activities regulated by CNSC, including the operation of nuclear power plants (NPP), research reactors, waste management facilities, uranium mines and mills and other fuel cycle facilities; refurbishment of NPPs; licensing of new NPPs; and industrial, medical and research facilities and activities. The review also addressed radiation protection programmes; waste safety and environmental protection programmes; and implementation of the Code of Conduct on the Safety and Security of Radioactive Sources. Emergency preparedness was not included in the IRRS scope.

In addition, policy issues were addressed, including “Research for Safety and Regulatory Purposes”, “Roles and Responsibilities of Technical Services in Support of Regulatory Decision Makers” and “New Builds: Regulatory Transition from Pre-Operational to Operational Phases”.

In the 2009 IRRS Mission Report to Canada, the review team highlighted 19 good practices, and made 14 recommendations and 18 suggestions.

Follow-up mission

In December 2010, the Canadian Government requested a follow-up IRRS mission to review the measures undertaken following the recommendations and suggestions presented in the 2009 IRRS Mission Report. Additionally, a new review area, Transport of Radioactive Material, was reviewed at the request of CNSC. A new IRRS module, now part of the core IRRS modules, was also reviewed. This new module focuses on the regulatory implications of the TEPCO Fukushima Daiichi accident.

The review was conducted from 28 November to 9 December 2011 by nine senior regulatory experts from seven Member States, four staff members from the IAEA, one observer and an IAEA administrative assistant (Appendix I). IRRS activities took place primarily at the CNSC office in Ottawa, Canada, although other locations were visited as part of the reviews (Appendix III).

II. OBJECTIVE AND SCOPE

The purpose of the IRRS follow-up mission was to review the CNSC's progress in response to IRRS mission recommendations and suggestions from 2009, identify new good practices and to exchange information and experience among CNSC counterparts and the IRRS Team to contribute to harmonizing regulatory approaches and creating mutual learning opportunities among regulators. Additionally, a new subject area, Transport of Radioactive Material, was reviewed at the request of the CNSC. After the occurrence of the TEPCO Fukushima Daiichi nuclear accident, the IAEA developed, within the framework of the IRRS programme, a new module to take into account the current lessons learned from the accident and its application to regulatory systems for safety. A review of the regulatory implications of the TEPCO Fukushima Daiichi accident in Canada was also included in the mission.

The IRRS follow-up mission was structured to take into account the progress in implementing improvements resulting from recommendations and suggestions made in the 2009 IRRS mission and reviewing the areas of significant regulatory changes since the last mission.

Those areas where no suggestions or recommendations were issued during the 2009 IRRS mission were not included in the scope of the follow-up mission. Similarly, the good practices identified during the 2009 mission were not reviewed although the IRRS Team noted that the CNSC had confirmed that these practices were valid and would be continued.

The general key objectives of the IRRS follow-up mission were to enhance regulatory effectiveness by:

- Providing the host country (regulatory body and governmental authorities) with a review of their regulatory issues, in particular those highlighted in the 2009 mission;
- Providing the host country with an objective evaluation of their regulatory practices with respect to international safety standards;
- Contributing to the harmonization of regulatory approaches among Member States;
- Promoting sharing of experience and exchange of lessons learnt;
- Providing key staff in the host country with an opportunity to discuss their practices and action plans considering the 2009 findings with reviewers who have experience of other practices in the same field;
- Providing the host country with recommendations and suggestions for improvement;
- Providing other States with information regarding new good practices identified in the course of the review;
- Providing reviewers from other States and the IAEA staff with opportunities to broaden their experience and knowledge of their own field, in particular on how the host country is implementing the improvements; and
- Providing the host country through completion of the IRRS self-assessment of a comparison of its activities against IAEA safety standards and thereby identifying potential areas for improvement of its action plan.

III. BASIS FOR THE REVIEW

A) Preparatory work and IAEA review team

The preparatory work for the mission was carried out by the IRRS IAEA Coordinators David Graves, Senior Safety Officer, and John Wheatley, Unit Head, and the appointed Liaison Officer, Brian Gracie, of CNSC.

An IRRS preparatory meeting was held on 2 August 2011 to discuss the technical and administrative details of the follow-up mission. It took place at CNSC Headquarters in Ottawa with the participation of the appointed IRRS Team Leader, Martin Virgilio, Deputy Executive Director, U.S. Nuclear Regulatory Commission, and Robert Gray, representing the Office of Nuclear Regulation (ONR), an agency of the U.K. Health and Safety Executive, and David Graves and James Stewart of IAEA.

During the preparatory meeting discussions, it was agreed that the advance reference material (ARM), including the output from the self-assessment, would be provided to the IAEA in mid-October 2011. In addition, the scope of the follow-up IRRS mission was agreed to include: progress made to address the 2009 IRRS mission findings, the new review area of Transport of Radioactive Material, and a review of the actions taken by the CNSC regarding the regulatory implications of the TEPCO Fukushima Daiichi accident. The ARM and the main agenda items were discussed and agreed.

In accordance with the request from Canada, and taking into account the scope of the follow-up mission as indicated above, the tentative team composition was discussed and agreed (see Appendix I). The working areas and the counterparts were nominated as outlined in Appendix IV.

The ARM documents were made available to the IAEA review team through a dedicated web-site, USB memory sticks mailed to the team members, and hard copy as requested.

The reviewers and the IAEA staff prepared before the mission their initial impressions on the ARM, reviewed the CNSC activities and prepared for the interviews during the mission with the counterparts.

An initial IAEA Team meeting took place on Sunday, 27 November 2011, and was attended by the IRRS Review Team and from CNSC, Barclay Howden (Follow-up Counterpart) and Brian Gracie (Liaison Officer). The IRRS Team Leader and the IRRS IAEA Coordinator discussed specific aspects of the mission, the background and main issues from the IRRS in 2009, the basis for the review, the context and objectives of the IRRS. The IRRS methodology for the review and the evaluation were also discussed and agreed among all of the mission reviewers. The Liaison Officer presented the logistical and other aspects of the follow-up mission and B. Howden provided an overview of CNSC roles and responsibilities.

B) References for the review

The most relevant IAEA safety standards used as review criteria included: GSR Part 1, Governmental, Legal and Regulatory Framework for Safety; GS-R-2, Preparedness and Response for a Nuclear or Radiological Emergency; GS-R-3, The Management System for Facilities and Activities; BSS, the International Basic Safety Standards for Protection against

Ionizing Radiation and for the Safety of Radiation Sources; TS-R-1, the IAEA Regulations for the Safe Transport of Radioactive Material; and the Code of Conduct on the Safety and Security of Radioactive Sources.

C) Conduct of the review

The entrance meeting was held on Monday, 28 November 2011, with the participation of Michael Binder, President of CNSC; Ramzi Jammal, Executive Vice-President and Chief Regulatory Operations Officer; and other CNSC staff contributing to the follow-up mission.

Opening remarks were made by President Binder, Mr Virgilio and Mr Graves. Several presentations were carried out and discussed during the entrance meeting. The status of implementation of recommendations and suggestions from 2009 was discussed in detail in order to understand the current situation and delineate the initial main areas to be discussed during the interviews with the counterparts. In addition, presentations were made by the CNSC regarding the transport of radioactive material in Canada and the status of regulatory actions related to follow-up of the TEPCO Fukushima Daiichi accident.

During the mission, a systematic review was conducted of all recommendations and suggestions from the IRRS mission in 2009 with the objective of establishing progress by the CNSC in response to the 2009 mission. Progress was largely measured against the CNSC Management Response and commitments set in 2009. The review was conducted in topical areas taking into account the previous experience of the experts in the 2009 mission, through meetings, interviews and discussions with CNSC personnel and assessment of their action plan. The IRRS Team performed its activities in accordance with the Mission Programme, outlined in Appendix II.

The IRRS team also reviewed the CNSC's role and effectiveness related to regulation of the transport of radioactive materials in Canada. The review was conducted through interviews with staff involved in regulation of the transport of radioactive material, review of the self-assessment conducted by CNSC in this area, and by observation of inspection activities conducted by associated regulatory authorities. The results of this review are provided in Section V of this report.

The IRRS team also reviewed the CNSC response to the TEPCO Fukushima Daiichi accident. This review was performed by conducting interviews with involved CNSC staff, reviewing associated documents and the results of the self-assessment completed by CNSC. The results are provided in Section V of this report.

The exit meeting was held on Friday, 9 December 2011, with the participation of CNSC's management and a number of federal departments, namely: Natural Resources Canada, Transport Canada, Health Canada, and the Department of Foreign Affairs and International Trade.

The main conclusions of the IRRS follow-up mission were presented by the IRRS Team Leader, Martin Virgilio, and closing remarks were made by James Lyons, IAEA Director, Division of Nuclear Installation Safety; and Ramzi Jammal, Executive Vice-President and Chief Regulatory Operations Officer, CNSC.

The draft mission report was presented to the CNSC at the end of the meeting.

IV. REPORT STRUCTURE

Part V of this report contains sections that correspond to the three main components of the IRRS review. Sections 1 through 9 of Part V contain review results of nine areas that were evaluated with respect to follow-up to the findings of the initial IRRS mission in 2009. Section 10 contains the results of the review of the regulation of transport of radioactive material. Section 11 contains the results of the review of CNSC's response to the TEPCO Fukushima Daiichi accident.

V. RESULTS OF THE REVIEW

1. LEGISLATIVE AND GOVERNMENTAL RESPONSIBILITIES

There were no findings in this area in the 2009 IRRS mission.

2. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

2.1. General

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- S1 **Suggestion:** Consideration should be given to updating the 1998 Memorandum of Understanding with Health Canada. This update should also define the roles and responsibilities of the Federal Provincial Territorial Radiation Protection Committee to ensure that there is a comprehensive and consistent safety regulation and oversight.

Findings from the 2011 follow-up mission

Suggestion 1: CNSC Management Response in 2009 accepted the suggestion and committed to updating the CNSC-Health Canada Memorandum of Understanding (MOU). In March 2010, the CNSC and Health Canada developed a proposed revision of the 1998 CNSC-Health Canada MOU to ensure consistent regulatory oversight with respect to the public, patients and workers. This extensive memorandum details expectations of both the CNSC and Health Canada. The proposed MOU specifically addresses the coordination of regulatory activities to minimize complexity and duplication of the regulations; defines the scope of activities for both the CNSC and Health Canada; establishes cooperation for training; addresses and reemphasizes the 10 December 2007, Government of Canada “Directive on the Production of Isotopes for Medical Purposes”; promotes and preserves health and well-being of the people of Canada; and facilitates the investigation and conduct of research into public health.

The proposed MOU recognizes the roles of the CNSC and Health Canada in licensing and certification of medical devices. It also identifies Health Canada as the responsible party for: the regulation of patients with respect to radiation devices and radiation emitting devices; authorization of associated calibration laboratories; health monitoring; responding to emergencies; operating the National Dose Registry (NDR) and the Canadian Biodosimetry Network (CBN); and communication of any operational problems associated with the NDR to CNSC. The CNSC is responsible for the regulation of the protection of workers with respect to the use of radiation devices and radiation emitting devices.

The proposed MOU requires the cooperation between the CNSC and Health Canada in accordance with the terms of reference of the Federal-Provincial-Territorial Radiation Protection Committee (FPTRPC). The FPTRPC is the intergovernmental Committee responsible for providing a national focus for government radiation protection agencies; promoting the harmonization of radiation health and safety programmes for public, workers and patients; identification of emerging issues in radiation protection and recommending actions to the appropriate jurisdictions; and developing a forum for representatives of the provinces and territories, the CNSC, Health Canada, the Department of National Defence and other federal departments/agencies that promotes consideration of requests from other

governmental committees and agencies concerned with health, safety and environmental issues.

The proposed MOU reflects the role of the FPTRPC in patient radiation safety. Both parties have reportedly agreed with the content and concepts but they have not yet signed it. It is understood that the process was delayed when both the CNSC and Health Canada responded to the potential effects on Canada from the Fukushima Accident.

CNSC has revised the draft MOU to take into consideration the early lessons learned from the TEPCO Fukushima Daiichi accident.

In conclusion, the suggestion remains open until signed by both parties.

Suggestion 1 (S1): is open.

New findings from the 2011 follow-up mission

No new findings were identified.

3. ORGANIZATION OF THE REGULATORY BODY

3.1. General organization

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
S2	Suggestion: CNSC should review its arrangements to ensure that it can adequately recover its regulatory costs.
S3	Suggestion: Staff from the ROB and TSB branches of CNSC may wish to review how they could work together in a more harmonized manner to ensure that security measures do not compromise safety and vice versa and to ensure continued compliance with security requirements as reviewed.

Findings from the 2011 follow-up mission

Suggestion 2: Since the 2009 IRRS mission, the CNSC evaluated three cost allocation model options for fee charging resulting in a decision in March 2010 to adopt a Fixed Fee Allocation Model. This model was considered to offer advantages including:

- Increasing the predictability of fees and sources of funds for both CNSC and licensees;
- Increasing the ability to introduce regulatory cost based allocation assumptions and the flexibility to reallocate;
- Increasing clarity and transparency;
- Increasing fairness and equity; and
- Minimizing the operational and corporate burden within the CNSC.

This Model was introduced for the 2010–2011 financial year and feedback from a recent Cost Recovery Advisory Group Meeting would suggest that its introduction has provided mutually positive benefits for both CNSC and its licensees.

In conclusion, the CNSC has introduced a new Fixed Fee Allocation Model for cost recovery which is proving to be more predictable, effective and efficient.

Suggestion 2 (S2): is closed.

Suggestion 3: CNSC has undertaken a fundamental review of its approach to discharging its mandate for safety and security and has introduced a more holistic and integrated approach. This has resulted in the beginning of a culture shift in the area of security and safety integration. CNSC Nuclear Security Division (NSD) is making significant efforts to bridge past gaps and the organization as a whole is rising to the challenge of properly integrating

security behaviour with safety behaviour to create a homogeneous safety culture within the CNSC.

For nuclear power plant (NPP) security inspections, procedures have been revised to address how security inspections are conducted, including roles and responsibilities of participating CNSC staff. In addition, the communication protocol with Licensees has been revised to ensure that the Regulatory Program Directors in the Directorate of Power Reactor Regulation (DPRR) sign off security related inspections and desk top reviews, thus ensuring that they will be aware of any security items that may impact site safety. Where appropriate, this approach is also being applied by the Directorate of Nuclear Fuel Cycle and Facilities Regulation (DNCFR).

NSD now has a process in place, developed with the Directorate of Nuclear Substance Regulation (DNSR), for planning and conducting inspections of DNSR regulated nuclear facilities and activities where risk significant radioactive sources are used, processed or stored. This process has also included providing inspectors with security awareness training by NSD, allowing inspectors to better understand basic security requirements for facilities and activities they inspect. Security is identified as a line item for compliance verification on the DNSR inspection sheet. If the DNSR inspectors note a security concern, they bring it to the attention of NSD staff.

Discussions were held during the mission with the lead site inspector for security related matters at Darlington Nuclear Generating Station that confirmed the progress which had been made in this area and the integrated and co-operative working arrangements between the site inspection staff and security specialists.

Discussions were also held with a DNSR inspector confirming the improvements in coordination in this service line. Security assessments are conducted by NSD while the compliance with the assessment is a shared responsibility with DNSR. NSD staff members are members of the inspection team for Type I inspections (an audit type of inspection process). Type II inspections (a focused inspection to verify the results of licensee processes) are performed by DNSR and a component of this inspection is an evaluation of the licensee's compliance with the security requirements. Noncompliance security issues are immediately reported to NSD and if necessary the DNSR inspector has the authority to stop activities until the situation is corrected.

Finally, Security Commission Member Documents are now developed with input by CNSC personnel that have licensing and regulatory oversight responsibilities for the facility. Security is one element in the overall review of facilities.

In conclusion, the CNSC has demonstrated its commitment to integrate nuclear security with nuclear safety. This commitment has led to a shift in the understanding that security is an integral part of the overall organizational culture, and involves all employees.

Suggestion 3 (S3): is closed.

New findings from the 2011 follow-up mission

No new findings were identified.

3.2. Advisory bodies and research organizations

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- | | |
|----|---|
| R1 | Recommendation: CNSC should initiate a periodic strategic planning programme to define both short term and longer term research activities needed to support pending and potential regulatory decisions. |
| R2 | Recommendation: Sufficient resources for research activities should be allocated to support the outcome of the strategic planning programme. |

Findings from the 2011 follow-up mission

Recommendations 1 and 2: In response to the 2009 review findings and two recommendations relating to research, the CNSC undertook a review as to how it identifies, manages and controls its research related requirements. This review has led to a number of fundamental changes to CNSC's arrangements. These include:

- The establishment of a new Regulatory Research and Evaluation Division within the Regulatory Affairs Branch;
- A review and prioritization of the short, medium and long-term research needs to support CNSC's mandate;
- The creation of a single Integrated Research and Safeguards Support Program Plan;
- The move to a three year funded rolling programme for this integrated plan; and
- The use of established processes, controls and governance arrangements to oversee the programme and proposed programme enhancements, including ongoing work to extend the programme horizon to 10 years and longer.

In conclusion, actions have been, and continue to be, taken to effectively address the issues raised in the 2009 IRRS mission.

Recommendation 1 (R1): is closed.

Recommendation 2 (R2): is closed on the basis of progress and confidence.

New findings from the 2011 follow-up mission

No new findings were identified.

3.2.1. Advisory Bodies

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- S4 **Suggestion:** The CNSC should consider the use of issue-specific advisory bodies to support regulatory decisions where there are either new, complex technologies (e.g. emerging medical applications) or issues of high public interest.

Findings from the 2011 follow-up mission

Suggestion 4: There are two examples of CNSC's use of advisory bodies since the 2009 IRRS mission. First, the CNSC decided to use an advisory committee to review its response to the Fukushima accident. The External Advisory Committee will provide the Commission Tribunal (the decision making body) with an independent and external assessment of the CNSC's actions in response to the Japan 2011 nuclear event and to make recommendations for improvement. The External Advisory Committee will review the CNSC's immediate response to the Japan nuclear events, including activation of its emergency operations centre and connections with the rest of government and international organizations; review the CNSC's interactions with the Canadian nuclear sector and its regulated industries; review the CNSC's communications with all affected stakeholders, including governments, international organizations and the public; and assess the broad implications of the international response (i.e. IAEA Action Plan, international stress tests, etc.) on the CNSC's regulatory approaches.

The second example of the use of an external advisory committee is the independent expert evaluation of adequacy of information submitted for a specific licensing activity. In this example, an independent report recently prepared by Pacific Northwest National Laboratory to provide an assessment of cooling towers for condenser cooling at new NPPs was presented to the Darlington Joint Review Panel (a subset of the Commission Tribunal).

In conclusion, the CNSC has benefited from the use of advisory bodies for specific issues and this remains an option to meet future challenges as needed.

Suggestion S4: is closed.

New findings from the 2011 follow-up mission

No new findings were identified.

4. AUTHORIZATION

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

R3 **Recommendation:** The activities and processes identified within the Harmonized Plan for authorizations in relation to preparation of a comprehensive set of procedures, criteria and review guides should continue to be developed and should be fully implemented.

Findings from the 2011 follow-up mission

Recommendation 3: The CNSC is committed to the objective of continuous improvement. This concept is applied to the licensing process with the aim to improve its efficiency. Efficiency improvements include the implementation of a new licence structure for major facilities, the implementation of on-line applications for lower risk or less complex facilities and activities, and a proposal for the introduction of Periodic Safety Reviews and longer licence terms. The new licence structure follows a graded approach, commensurate with the risk of the licensed facility or activity. Another example of improvement involves the development of strengthened documentation requirements for licensing processes that will ensure integration across all service lines at the CNSC.

Documentation improvements and integration of processes related to authorization (Licensing and Certification) are ongoing under the Harmonized Plan and updated monthly to Management Committee (MC) and biweekly to Operations Management Committee (OMC).

Periodic updates and reviews are undertaken to track progress of initiatives, revisions to schedules, addition of new initiatives and removal of obsolete initiatives as they pertain to all three Harmonized Plan pillars; Compliance, Licensing and Certification and the Regulatory Framework.

While implementation of the improvements are completed for the licensing and certification processes across all regulated facilities and activities, the implementation of a standardized and systematic approach for technical assessments is ongoing. The Technical Assessment process improvements were approved and endorsed on 15 November 2011, by OMC. Within the same context, the CNSC has made available two documents, related to Phase II (of III) of this initiative as evidence for the progress made. These documents, “HP Initiative, Conduct of Technical Assessment, Phase II Report” and “How to Conduct a Technical Assessment”, both dated November 2011, in conjunction with established CNSC processes for control and governance, demonstrate that the process is well on track (further details are given in the findings with respect to S15).

It is planned that the completed supporting material for the licensing process will continue to be integrated with corresponding processes in the third pillar of the HP, Compliance.

In conclusion, the CNSC has demonstrated effective progress in satisfying this recommendation.

Recommendation 3 (R3): is closed on the basis of progress and confidence.

New findings from the 2011 follow-up mission

No new findings were identified.

4.1. Nuclear installations: Nuclear Power Plants (NPPs), Research Reactors (RRs) and Fuel Cycle Facilities (FCFs)

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
R4	<u>Recommendation:</u> CNSC should complete its licence reform project and should document processes and arrangements for Class I nuclear facilities, waste facilities, uranium mines and mills, to ensure that any change or amendment to a licence including the licensing basis does not generate disproportionate amounts of work that would not be commensurate with the potential hazard of the change being proposed.
S5	<u>Suggestion:</u> As part of the licence reform project CNSC should consider if alternative approaches with longer term licences and greater use of delegated powers would improve efficiency and effectiveness.
R5	<u>Recommendation:</u> CNSC should consider how to introduce effective arrangements for undertaking periodic safety reviews (PSRs) for these Class-1 facilities. Such PSRs should be proportionate and commensurate to the hazards to be controlled.
S6	<u>Suggestion:</u> Such PSRs should follow all of the elements set out in IAEA guides including the adoption of PSA (probabilistic safety analysis) for nuclear power plants (IAEA NS-G-2.10 or other appropriate safety guidance).
S7	<u>Suggestion:</u> The CNSC should complete the project for Safe Operating Envelope (SOE) and consider including its results into the licence limiting conditions for operation (LCOs) as an extension to Operating Policies and Principles (OP and P) for nuclear power plants.
S8	<u>Suggestion:</u> CNSC should review and continue adopting a consistent process for confirming competence of operators of facilities commensurate with the risks / hazards posed by the facilities.

Findings from the 2011 follow-up mission

Recommendation 4: Licence reform is one of CNSC's corporate priorities in its endeavours to improve clarity in regulatory oversight and requirements. It is meant to ensure that all licences issued under the responsibility of the CNSC have a uniform format with simplified concise licence conditions. The licence and the licence conditions handbook (LCH) together provide the framework for assessing compliance with the Licensing Basis. The licence reform initiative is managed under the existing management programme (Harmonized Plan) and consists of two phases.

Phase 1 on NPP licences is complete and the reformed licences and LCH are being implemented when NPP licences are renewed. LCHs are living documents, evolving to allow for new insights or specific needs.

Phase 2 on nuclear cycle facilities is being implemented as new format licences and LCHs, based on the NPP model, are being introduced at licence renewals.

A recent example of a draft licence to be issued to the uranium processing facility of Cameco in Blind River in the new format was made available to the IRRS Team. The licence itself is limited to five pages; and supporting information and detailed compliance criteria are contained in a separate LCH.

In conclusion, the CNSC has made satisfactory progress in this area.

Recommendation 4 (R4): is closed.

Suggestion 5: Document CMD 02-M12, *New Approach to Recommending Licensing Periods*, outlines the approach taken by CNSC staff in recommending licence periods for more than the normal five years for a Class I nuclear facility. This document provides guidance to CNSC staff to recommend to the Commission a licence period consistent with a risk-informed basis. Increased flexibility to recommend longer licence periods enables the CNSC to regulate in a more risk-informed manner through the adjustment of the licence period to the risk profile of the licensed activity and to the compliance-verification activities that are required for the facility. Longer licensing periods may be considered if the envisaged lifetime of the facility is much longer than five years. Longer periods can also be recommended on the basis of a good history of operating experience and compliance with the licence conditions.

In conclusion, the CNSC should continue to look for opportunities for delegation where appropriate, commensurate with potential hazards. Within the licence reform project, the application of longer terms and delegated powers is being implemented.

Suggestion 5 (S5): is closed.

Recommendation 5: In response to this recommendation, CNSC management undertook an initiative to introduce PSRs to Class 1 facilities (commensurate with the hazards posed by the respective facilities). The decision on the use of PSRs in Canada will ultimately lie with the Commission Tribunal.

Since the initial mission in 2009, CNSC staff has been actively engaged with the Commission Tribunal to provide the necessary supporting information and background to allow the Commission Tribunal to arrive at a decision. A technical briefing on PSRs, describing the purpose, advantages, possible application in the CNSC framework, and experience around the

world, was first presented to the Commission Tribunal in April 2008 (CMD 08-M23). Subsequently, in a November 2008 briefing, staff addressed the Commission Tribunal's request for additional clarifications with respect to:

- Advantages of PSR to the CNSC, to the public, and to industry;
- The compatibility of the CNSC regulatory oversight programme with a PSR approach; and
- Other countries' experience with applying PSR.

The PSR concept and intent are not new to the CNSC approach to NPP licensing; the CNSC requires NPP licensees to perform an Integrated Safety Review (ISR) of the plant in support of life extension projects. The ISR is a one-time comprehensive assessment of plant design, condition and operation (the objectives, scope and elements of an ISR are essentially the same as those for a PSR); see Suggestion 6. This approach has also been applied beyond NPPs. An ISR was conducted to support continued operation of the National Research Universal (NRU) reactor in 2011. Furthermore, during the Day 1 Public Hearing of the Pickering-A Nuclear Generating Station licence renewal in February 2010, an assessment fulfilling the same need was requested by the Commission Tribunal to determine reasonable and practicable modifications that should be made to allow for long term operation.

CNSC staff has prepared (but not submitted) a Commission Member Document (CMD 11-M63) including a formal recommendation on the implementation of PSRs for NPPs including implementation timelines. This document sets out the background and rationale for the recommendation and emphasizes that “If the Commission agrees to proceed, a detailed implementation plan will be developed, on the basis of the concept described in this CMD, to effectively disposition IAEA recommendations made by the 2009 Integrated Regulatory Review Service mission and lessons learned from the 2011 Fukushima event.”

In conclusion, CNSC staff has been effective at completing the necessary deliverables within their control to complete and close this recommendation, albeit the recommendation to the Commission Tribunal for the introduction of PSRs is limited to NPPs. However, as recognized at the outset, the ultimate decision rests with the Commission Tribunal. As that decision has yet to be taken, the Recommendation remains open.

Recommendation 5 (R5): is open.

Suggestion 6: Is a supplemental item to Recommendation 5 (R-5). In response to R-5, CNSC Management undertook to introduce PSRs to Class 1 facilities (commensurate with the hazards posed by the respective facilities, starting with NPPs). The decision on the use of PSRs in Canada will ultimately lie with the Commission Tribunal.

The ISR process applied in Canada to life extension of NPPs contains the same elements as are allocated to PSR in the IAEA safety document NS-G-2.10. These elements cover PSA levels 1 and 2. It can be stated that related to Suggestion 6, the content requirement is fulfilled but the periodicity of review requirement is not.

On the basis that Recommendation R5 remains open, it is concluded that S6 can be closed.

Suggestion 6 (S6): is closed.

Suggestion 7: In 2009, the CNSC started the Safe Operating Envelope (SOE) project in order to establish regulatory requirements for setting the operating limits and conditions within which the nuclear facility must be operated. Phase 1 of the Project, completed in 2010, covers the definition of SOE and sets the project objectives. Phases 2 and 3, related to monitoring of SOE implementation and its regulatory implementation, respectively, are proceeding in parallel.

As part of the process, a Canadian Standards Association (CSA) standard N290.15-10 “Requirements for the safe operating envelope of nuclear power plants” was published in August 2010.

In February 2011, a joint industry/regulator working group was created to assess the implication of removing the operating limits and conditions from the OP and P and including them in the LCH for NPPs.

A pilot, type 1 regulatory inspection of the SOE was conducted at Pickering A Nuclear Generating Station in May 2011.

All the licensees are scheduled to modify licence limiting conditions accordingly by 2013. The OP and P may then be deleted as redundant. Some licensees may, however, like to maintain them as introductory and training material.

The transition phase requires due diligence from the regulatory side to confirm that no gaps remain in the system.

In conclusion, a consistent approach which meets the requirements of this suggestion has been agreed with the licensees and a programme for its implementation is being undertaken.

Suggestion 7 (S7): is closed on the basis of progress and confidence.

Suggestion 8: The *General Nuclear Safety and Control Regulations* have always required licensees to have a sufficient number of qualified workers.

Currently, a CNSC certification process is in place for NPP Shift Managers, Control Room Shift Supervisors, Authorized Nuclear Operators, and responsible Health Physicists, Non-Power Reactor Operators, Exposure Device Operators, and Class II facility Radiation Safety Officers.

For all other fuel cycle facilities, a risk-informed approach is applied. Under this risk-informed approach, the CNSC requires that licensees apply some aspects of a certification process. The concept of Regulatory Document RD-204 “Certification of Persons Working at Nuclear Power Plants” is applied albeit RD-204 cannot be officially referenced in licences except for NPPs. Instead, the applicable requirements are explicitly written out in the licences. In certifying personnel of other fuel cycle facilities, the RD-204 requirements are applied to a depth that depends on the risk significance, staff impact, etc.

The CNSC has conducted a thorough risk ranking of the fuel cycle facilities taking into account all the activities present. Among these facilities, the Port Hope Conversion Facility ranks high, due to its location and the nature of its activities; therefore, the licensee has implemented a qualification process with orientation training, area specific training, on-the-job-training, and practicum. The verification of the evaluations and a management interview finalize the qualification for five year periods.

The licensees are applying the same procedure in all fuel cycle facilities, adapted commensurate to the risk, and are very cooperative.

The CNSC monitors the implementation of the operator qualification programme and periodically revisits the risk ranking of the facility to identify possible changes.

In conclusion, a consistent approach is now being applied throughout the industry, grading the depth of measures according to the risk involved.

Suggestion 8 (S8): is closed.

New findings from the 2011 follow-up mission

No new findings were identified.

4.2. New build

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
R6	Recommendation: CNSC should continue and complete its preparation of relevant documentation to support the authorization process (licensing process) for new build.
S9	Suggestion: The CNSC should refine existing plans and confirm its organizational readiness (e.g. structure, staffing, skills) to support the transition from the project planning phase to the technical review of new design applications, inspection of construction activities and oversight of the start-up and operations.

Findings from the 2011 follow-up mission

Recommendation 6 and Suggestion 9: The CNSC is implementing a comprehensive Life Cycle Project for new build. Although tailored for the Darlington New Build Project (the only current new build project), this project will provide the basis for a comprehensive Life Cycle Project Plan for all licensing and compliance activities to be carried out for any future new build reactor facility project(s). Industry is also showing a growing interest for new build in other parts of Canada, including possible construction of new small modular reactor designs.

The overall philosophy and intent for the current phase of the programme is summarized in the Directorate of Regulatory Improvement and Major Project Management (DRIMPM) New Nuclear Power Plant — Lifecycle Project Phase II Project Plan. Phase II specifically involves the characterization of all regulatory activities needed for the Darlington New Build Project, from initial submission of the Project Description, through the Environmental Assessment up to turnover to commercial operation under a Licence to Operate. In conjunction with, and closely tied to, this project are separate regulatory framework development support projects necessary to ensure proponents have clarity of CNSC expectations in specific technical and

licensing areas as well as projects for the preparation of the necessary internal CNSC Assessment Plans and Review Procedures.

The Life Cycle and supporting projects are being conducted using the existing processes, tools and governance arrangements in CNSC's Management System. In addition, resource planning information from the Life Cycle project is input into the CNSC's planning process.

In conclusion, as the existing processes, tools and governance arrangements in the CNSC's Management System have been found to be robust, and are being followed for the Life Cycle project, there is confidence that the Life Cycle Project will be appropriately controlled and resourced.

Recommendation 6 (R6): is closed on the basis of progress and confidence.

Suggestion 9 (S9): is closed on the basis of progress and confidence.

New findings from the 2011 follow-up mission

No new findings were identified.

5. REVIEW AND ASSESSMENT

5.1. Nuclear installations: NPPs, RRs and FCFs

5.1.1. Reporting requirement and operating experiences for operating NPPs

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

S10 **Suggestion:** CNSC should review regulatory documents to resolve conflicts associated with updating the final safety analysis report and maintaining the licensing basis. *(see recommendation R4)*

Findings from the 2011 follow-up mission

Suggestion 10: The response by the CNSC was that the issue was reviewed and that it was concluded that all documents referenced in the Licensing Basis of any nuclear facility are subject to version control and an approved document change control process. It was further stated that the Final Safety Analysis Report (FSAR) has been confirmed to be managed within that process; this approach prevents conflicts between updating the FSAR and maintaining the Licensing Basis. No actions were proposed to address this suggestion. This reaction on S10 suggested that there was a mismatch or at least a difference in interpretation of the suggestion.

During the mission discussions between the IRRS Team and CNSC staff, it became clear that this was indeed the case. CNSC regulatory document S-99 requires licensees of NPP's to update the FSAR every three years. The IRRS Team mission of 2009 interpreted this as a major modification which would affect the context of the Licensing Basis, which would be subject to prior approval of the CNSC. However, as the licence duration was for five years, there were specific examples where the most up to date versions of the FSAR were not referenced in the licence(s).

As part of the licence reform project, the CNSC now includes the FSAR as part of the LCH with appropriate controls to ensure the tracking of the current version of the FSAR.

CNSC staff provided the IRRS Team with a generic template for a nuclear power reactor operating licence in which the reference to document S-99 is included.

In conclusion, the suggestion has been addressed through the implementation of the licence reform project.

Suggestion 10 (S10): is closed.

New findings from the 2011 follow-up mission

No new findings were identified.

6. INSPECTION AND ENFORCEMENT

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

S11 **Suggestion:** CNSC should maintain progress in further developing IT tools for action tracking under the Harmonized Plan.

Findings from the 2011 follow-up mission

Suggestion 11: The CNSC has completed the Action Tracking Core of the Regulatory Information Bank/Banque d'information réglementaire (RIB/BIR), which forms the foundation for an effective licensing and compliance management control tool. The concept provides a consistent approach to tracking of licensing and compliance commitments, conditions and actions including their safety significance and priority. The RIB/BIR connects facts from the regulatory activities, findings on regulatory conclusions and compliance with regulatory references. The implementation of the Action Tracking Core commenced in June 2011, as the authoritative source for information pertaining to tracking actions across all service lines. Key features are the standardization of action tracking; improvements in timely response to and from licensees and CNSC personnel; and improved ability to identify and track actions taken in response to licensing and compliance facts and findings. Management believes that this system is very effective and is currently assessing the integration of workflow management and tracking of internal actions.

In conclusion, the CNSC has demonstrated effective progress in developing IT tools for action tracking.

Suggestion S11: is closed.

New findings from the 2011 Mission

No new findings were identified.

6.1. Nuclear installations: NPPs, RRs and FCFs

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- R7 **Recommendation**: CNSC should include in the baseline inspection plan how the licensee executes the supervision of safety system operability status as defined in the Licensing Basis.
- R8 **Recommendation**: CNSC should review and establish coherent and consistent arrangements for the conduct of inspections in Class I Facilities between and within the service lines.
- R9 **Recommendation**: CNSC should establish a process for maintaining continuity of actions and consistency of priorities following changes to the CNSC staff.
- S12 **Suggestion**: Strategies, processes and methods should be established to ensure the objectivity and independence of the site inspector. Consideration should be given to changing the site to which they are assigned from time to time or giving them general duties at headquarters.

Findings from the 2011 follow-up mission

Recommendation 7: CNSC's response to R7 is that the action was completed at the outset, as the CNSC reviews and revises its baseline inspection plan on an annual basis to ensure that the licensees verify correctly the operability of the special safety systems of nuclear power plant (being Shutdown System 1, Shutdown System 2, Emergency Core Cooling System and Containment). In the discussions, it became clear that there were different interpretations of the 2009 recommendation. The IRRS Team wanted to confirm there were adequate controls around the operating status of special safety systems.

The system used by the licensee to determine or assess the safety system operability status when a non-conforming condition (impairment) is identified was demonstrated to be well organized. Regulatory Document S-99 "Reporting Requirements for Operating Nuclear Power Plants" specifies how and when the licensee must report to the CNSC. There are requirements for routine reporting as well as for unscheduled reporting in case of unexpected findings related to the safety systems' condition. The licensee maintains a Station Condition Record (SCR) database, reviewed daily. In case of impairment of a special safety system, the licensee may carry out a Technical Operability Evaluation (TOE) process and defines possible corrective actions. CNSC Site Inspectors participate in the TOE meetings and keep CNSC Headquarters in Ottawa informed. The impairments are divided into three groups, allowing a repair time with duration depending on the severity of the finding. In case of disagreement between the licensee and the CNSC inspector on duration of the repair period, the issue will be handled at the management level.

In conclusion, the actions and procedures utilized by the CNSC satisfactorily address the issue raised in the recommendation.

Recommendation 7 (R7): is closed.

Recommendation 8: A CNSC Process Document “How to Conduct Inspections” has been drafted, defining a generic CNSC inspection process applicable on all service lines and technology fields. It covers inspection activities from the planning of the inspection to the follow-up and dispositioning of any action items resulting from the inspection.

During the development of this document, domestic and foreign experience was considered. In the later phases, the service line specific processes and procedures were integrated. The draft document was consulted across the operations staff of all service lines, assuring that all the views are reflected in the document. Existing good practices were collected and organized into a common structure. The document was formally approved at a management meeting on December 13. Full implementation and transition to operations including relevant training is scheduled to be completed by May 2012.

The very first of the fundamental principles listed in the document is that the inspections are consistent and transparent (“Consistent: taking a similar approach in similar circumstances to achieve similar results”). Based on the familiarization with the material, the team felt confidence that coherence and consistence will be achieved in the CNSC Class 1 Facilities inspections. The team also noted that the CNSC actions exceeded the original recommendation by developing guidelines that are applicable to the inspection of all facilities and licensed activities, not just Class 1.

In conclusion, the actions taken by the CNSC satisfactorily address the issue raised in the recommendation.

Recommendation 8 (R8): is closed on the basis of progress and confidence.

Recommendation 9: The Action Tracking Tool, called Regulatory Information Bank/Banque d’information réglementaire (RIB/BIR) has been completed and is implemented for day-to-day management and is the official registry to track licensing and compliance actions (see Suggestion 11).

The use of RIB/BIR was demonstrated during the mission and the system proved to contain features to convey information to new inspectors enabling them to maintain continuity of actions and consistency of priorities.

In conclusion, effective actions have been implemented by the CNSC to address this recommendation.

Recommendation 9 (R9): is closed.

Suggestion 12: As the regulatory body responsible for oversight of the Canadian nuclear industry, CNSC relies on a highly skilled cadre of inspectors. It is critical that the inspectors are objective and independent from the licensees they regulate. Site-based inspectors work and live in close proximity with the staff of the facilities they regulate.

CNSC does not have a policy for mandatory site inspector reassignment to other sites or responsibilities after a set time. However, a continuous flow of staff into, out of, and around the organization, including moves from the sites to CNSC Headquarters (HQ) in Ottawa, has in most cases, limited the time inspectors have been assigned to a site. Other policies, programmes and activities are in place to ensure the quality of inspector activities and inspector objectivity and independence.

CNSC has implemented an inspector training and qualification programme to ensure inspectors are aware of their roles and responsibilities, understand the operational programmes, policies and procedures, and ensure they have sufficient knowledge and skills to perform their work.

The management structure includes two levels of supervision for each of the NPP sites; the head quarter-based Regulatory Program Director and the Site Supervisor. CNSC practice has been to regularly rotate the Regulatory Program Directors. Regulatory Program Directors visit their assigned site periodically and, as a part of the visits, meet with the site staff and seek feedback from the licensee on the performance of the CNSC site team. In 2011, CNSC strengthened the roles and responsibilities of the Site Supervisors in a manner that further ensures the quality of the site inspector performance. Regulatory Program Directors and Site Supervisors maintain a general awareness of the length of time inspectors have been assigned to their site. In some cases, CNSC management has taken action to move inspectors. It is common practice for inspectors to participate in inspections at sites other than their own, in order to broaden their experience and to improve consistency between sites.

Significant inspections conducted at the sites often include technical expert inspectors from either HQ or other sites as part of the team; and, certain focused inspections are led by staff who are not a part of the site team. These mechanisms ensure that technical perspectives independent from the site team are an integral part of the inspection programme. Areas of technical responsibility for inspectors are routinely reviewed and changed. All inspection reports are reviewed and approved by the Regulatory Program Director.

Other management controls that ensure quality and objectivity include: standardized approaches for planning and conducting inspections; and, the Compliance Monitoring Division in DPRR, established within CNSC in 2008 to monitor activities across NPP sites and assess standardization, performance trends, and quality of activities.

CNSC has established a Values and Ethics Code and a Conflict of Interest Policy that all staff must follow as a condition of employment. The Value and Ethics Code emphasizes the importance of integrity and avoiding real, apparent or potential conflicts of interest between official duties and personal interests; maintaining ethical relationships with licensees and the nuclear industry; and maintaining an arms-length regulatory relationship with licensees. The Conflict of Interest Policy is currently being updated. The Draft revision provides guidelines on issues such as: accepting gifts and other benefits; solicitation of donations, and prizes, and sponsorship of activities; preferential treatment; and relationship with licensees during and post-employment.

As a condition of employment, inspectors must also receive a security clearance. This security clearance process helps ensure that there are no significant financial liabilities or other

vulnerabilities that could in some way be exploited in a manner that would compromise objectivity.

In 2011, an internal audit was conducted to assess the risk associated with fraudulent activities including risk associated with inappropriate influence of the inspectors. While the assessment was focused on the programmes and controls to protect against fraud and made a number of recommendations for improvement, there were no findings of fraud having occurred at the CNSC.

In conclusion, appropriate controls are in place to ensure the objectivity and independence of the site inspectors.

Suggestion 12 (S12): is closed.

New findings from the 2011 follow-up mission

No new findings were identified.

6.2. Waste facilities, uranium mines and mills

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

R10	<u>Recommendation</u> : The Licensing and Inspection Mapping System should be integrated into the CNSC action tracking tool to assist planning and compliance monitoring activities.
-----	---

Findings from the 2011 follow-up mission

Recommendation 10: As noted in the review of Suggestion 11 and Recommendation 9, the Action Tracking Tool, called Regulatory Information Bank/Banque d'information réglementaire (RIB/BIR), has been implemented. The legacy systems, including the content from Licensing and Inspection Mapping System, have been migrated into the new system.

The use of RIB/BIR was demonstrated during the mission and the system proved to have features enabling fast, reliable and all-round tracking of the actions.

In conclusion, effective actions have been implemented by CNSC to address this recommendation.

Recommendation 10 (R10): is closed.

New findings from the 2011 follow-up mission

No new findings were identified.

7. DEVELOPMENT OF REGULATIONS AND GUIDES

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- S13 **Suggestion:** CNSC should review and adopt a consistent terminology for its regulatory guides.
- S14 **Suggestion:** CNSC should systematically carry out regular periodic review of the published regulations and guides. Then the need for revision of the all regulation and guidance material should be evaluated and on the basis of the evaluation the defined revision steps should be taken.
- S15 **Suggestion:** To support knowledge management, the CNSC should extend the concept of its internal staff review guides to cover all key areas of its function.

Findings from the 2011 follow-up mission

Suggestion 13: CNSC has formalized its nomenclature for regulatory guides. The same nomenclature is used for all documents for all service lines. The new classifications of publically available documents are: Regulatory Documents (RD) and Guidance Documents (GD) or a combination of RD/GD when applicable. For a revised document, the document number is carried forward from the old to the revised document for continuity. For a new document, the reference number is assigned sequentially when document development is initiated. Once the regulatory guides are updated, the old guides are removed from the website, but are archived by CNSC. CNSC has developed internal staff procedures for the document revisions.

In conclusion, CNSC has taken effective actions to address this suggestion.

Suggestion S13: is closed.

Suggestion 14: CNSC has a Regulatory Framework Plan for the development and revision of regulations, information documents, regulatory documents (RD) and guidance documents (GD). The plan identifies the project, proposed document type, lead directorate, priority area, status, comments, and proposed publication timeframe. The plan is supported by the Regulatory Framework Steering Committee composed of the Director Generals of the Technical Support Branch and the Regulatory Operations Branch and the Director General for Regulatory Framework Directorate. Document priority is determined by four objectives: the need for clarity of requirements; the need to respond to a current event that has impact on the people or environment of Canada (e.g. medical isotope production); the need for continuation of on-going projects (e.g. new nuclear power projects); and the need to update or eliminate existing documents.

Currently, the Regulatory Framework is a three-year plan. CNSC plans to expand the Regulatory Framework Plan to five years and incorporate a formal review of all regulations, information documents, regulatory documents and guidance documents within the five-year cycle.

In conclusion, CNSC has developed a plan for systematic review of published regulations and regulatory guidance.

Suggestion S14: is closed.

Suggestion 15: The designation of the Staff Review Guide was changed to the Staff Review Procedure in order to avoid confusion with guidance documents directed to the licensee.

In order to ensure all staff follows the same process, a CNSC process document “How to Conduct a Technical Assessment” has been created. A step within the process for technical assessment integration was developed based on fundamental principles from IAEA safety documents.

Under the Harmonized Plan, the development was resourced through in-kind contributions from each operational directorate. The concept and implementation of technical assessment are comprehensive and are initiated through licensing, certification and compliance actions. The technical assessments are performed by Subject Matter Experts (SME) for each area, through a broad three phase process using a pre-established plan and work tools. The scope of the assessment is based on the graded approach and is risk-informed, according to the complexity (ranging from a single reviewer/single division to a multiple reviewer multiple division/directorate review). The result is a technical assessment that provides technical conclusions and regulatory recommendations. Within the second phase of the process, there are five consecutive activities including a sufficiency check, performing the review, conducting peer review, integration of results and approval.

The technical assessment process (see Recommendation 3) was approved and endorsed on 15 November 2011 by the Operations Management Committee (OMC). Currently, CNSC staff is working on communication, training and integration of the new process with management support. However, the framework of the approved technical assessment has already been used in the evaluation of NPP new builds. All future applications for regulatory assessment (licensing, certification and compliance) will use the approved technical assessment process.

Future phases of the technical assessment initiative under the Harmonized Plan will include capturing, communicating and using the key principles for conducting technical assessments in current documents; completing the identification of specific areas and topics for each safety and control area to meet the needs of each regulated facility and activity; development of technical assessment work instructions (including Staff Review Procedures) and acceptance criteria for each specific area or topic; reviewing the need for and appropriate use of an information management system to organize and track technical assessment workflow, including common supporting tools such as IT programmes and documentation templates for consistency; and clarifying the roles and responsibilities, including accountability, within line management when conducting technical assessments across all the safety and control areas.

In conclusion, CNSC has demonstrated effective progress in satisfying this suggestion.

Suggestion 15 (S15): is closed on the basis of progress and confidence.

New findings from the 2011 follow-up mission

No new findings were identified.

7.1. Waste facilities, mines and mills

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

R11 **Recommendation:** CNSC should improve its regulatory framework including regulatory documents and guides with respect to radioactive waste management to ensure that radioactive waste is managed in a consistent manner.

Findings from the 2011 follow-up mission

Recommendation 11: CNSC staff undertook a gap analysis and presented a plan with recommendations on the development of new or updated regulations and guides in the area of radioactive waste management. The plan includes three high priority recommendations relating to the following areas: a) waste management programmes for all licensees; b) update and review of existing radioactive waste management regulatory guidance; and c) regulating radioactive waste management repositories. A fourth recommendation with a medium priority relates to amending the radioactive waste classification and a draft proposal for a new class of licence for waste. All of the recommendations have been assigned a timeframe for their implementation.

Short term recommendations are captured in the Regulatory Framework Plan. This ensures that these recommendations are being managed under the existing management programme. Seven documents on varying aspects of radioactive waste management are now scheduled for publication under the Framework Plan 2011–2014, as was highlighted by the President of CNSC in a presentation at a Canadian waste conference.

A draft proposal on the revision of the radioactive waste classification has been completed, as was a draft proposal for a new class of licence for waste. It will be circulated for review both by CNSC staff and affected stakeholders according to a structured approach.

In the new simplified licence format for NPP's as well as in CNSC's LCH (see Recommendation 4), waste management is included as a separate section with reference to waste management regulation, guides and supporting documents.

In conclusion, major steps have been made to improve the regulatory framework with respect to radioactive waste management.

Recommendation 11 (R11): is closed.

New findings from the 2011 follow-up mission

No new findings were identified.

8. MANAGEMENT SYSTEM

8.1. Identification and monitoring of improvement actions

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
R12	<u>Recommendation:</u> CNSC should more clearly envelope and timeframe the remaining efforts to complete the Management System according to GS-R-3 and for that purpose update the Harmonized Plan.
R13	<u>Recommendation:</u> CNSC should develop a methodology and implement Management System reviews to be conducted at planned intervals by internal or/and external resources. This programme should ensure the continuing suitability and effectiveness of the Management System as a whole and its ability to enable the objectives of the organization to be met. One important factor to be reviewed in this perspective is the application of the graded (risk-informed) approach to the regulation of facilities and activities
S16	<u>Suggestion:</u> CNSC should continue integration of its strategic and annual planning processes as well as its in year control and monitoring processes for better invoices to licensees and to ensure alignment and reallocation of resources according to corporate priorities. For this purpose CNSC should consider the integrated use of performance indicators for each programme activity and related processes.
S17	<u>Suggestion:</u> CNSC should supplement the internal audit programme in order to provide feedback to senior management on the development and implementation and output of the Management System processes. To support this programme, a number of internal auditors representing different parts of the organization could be used. In connection with the audit programme, a systematic approach to the management of non-conformances and potential non-conformances of processes and products should be developed and formalized
R14	<u>Recommendation:</u> CNSC should implement a mechanism to regularly identify opportunities for improvement of the Management System and should evaluate the effectiveness of the improvement actions.

Findings from the 2011 follow-up mission

Recommendation 12: According to CNSC, their current Management System meets the requirements of GS-R-3. All key elements are claimed to be in place. This is substantiated by a gap-analysis. The IRRS Team also finds that in substance CNSC has implemented what is required in GS-R-3 of a process based Management System that covers all activities of the organization. All the management processes, the core processes and the enabling processes

are defined and described to some extent. The documentation pyramid further contains written procedures and guidance for all planned activities. What remains to be done is to complete and harmonize descriptions of the processes across the organization and to standardize the terminology. The current documentation approach has been developed to fit the needs of the Operational and Technical Support branches. The Corporate Services Branch and to some extent the Regulatory Affairs Branch use a somewhat different terminology and approach to providing guidance to staff and for documenting processes. Their approach is based on the Program Activity Architecture required for reporting plans and performance to Parliament. In order to minimize this internal inconsistency, CNSC has decided to allow more flexibility in the process descriptions, as long as essential requirements are met, and to merge the management-oriented process structure of the current Management System based on GS-R-3 with the Program Activity Architecture, and to incorporate the requirements of the Government of Canada Management Accountability Framework (MAF) (management excellence). This direction to incorporate MAF requirements into the Management System, and to use a single framework for both managing the CNSC and for reporting externally on its performance, is seen as a milestone for creating a common understanding of the key management processes and responsibilities across the organization. This revision of the Management System is managed under the Harmonized Plan and is planned for the first quarter of 2012. The full implementation of the revised system will follow a stepwise approach supported by information activities and training. All steps will be managed under the Harmonized Plan with clear timing and resourcing. In order to drive corporate wide initiatives even more efficiently, the Harmonized Plan Steering Committee has been extended to include all the Director Generals of CNSC. This is seen as an important reinforcement of the Committee and the Harmonized Plan.

In conclusion, CNSC has demonstrated effective progress in satisfying this recommendation.

Recommendation 12 (R12): is closed.

Recommendation 13: Since the IRRS mission 2009, CNSC has conducted several assessments of its Management System and practices in a broad perspective. An assessment against the Government of Canada Management Accountability Framework was completed in 2009. A gap-analysis of the CNSC Management System against the IAEA GS-R-3 was completed in 2010. A third party review of the CNSC approach to management system documentation was completed in 2010. A comprehensive third party review of the CNSC management system and its implementation status was completed in 2011. Both the third party reviews, done by consultants, resulted in a number of recommendations for improvement and further development of the Management System. All recommendations have been assessed by senior management and resulting actions have been or will be managed under the Harmonized Plan.

CNSC plans to conduct a full Management System review over a five-year period. For this purpose, a discussion paper has been developed and a process description was adopted in October 2011. This review, conducted by or on behalf of the Senior Management team, will take as inputs all audits, assessments and evaluations conducted of the Management System over the five-year period. Resulting initiatives for improvement of the Management System will be managed under the Harmonized Plan. Currently, CNSC has no specific time plan for implementation of the regular Management System reviews. Further discussions among the senior managers may be needed in order to clarify the added value, review intervals and to

specify the methodology. However, based on the good experiences gained by CNSC of the reviews mentioned above and the planning already done, the IRRS Team is confident that regular Management System reviews will be implemented as soon as practicable.

In conclusion, CNSC has demonstrated effective progress in satisfying this recommendation.

Recommendation 13 (R13): is closed based on progress and confidence.

Suggestion 16: The overall framework for the CNSC annual planning and follow-up processes has not changed since the 2009 IRRS mission. Management processes exist for strategic and annual planning. This planning is to a large extent controlled by Government of Canada requirements. The basic document is a five-year strategic rolling plan based on an environmental scan of possible regulatory challenges. This strategic plan, together with updated environmental as well as management inputs, provides the basis for the annual update of the three-year Report on Plans and Priorities sent to Parliament in February. This plan uses a Program Activity Architecture that corresponds to the Management System key processes. The plan contains planned spending and full time equivalents (labour) for the different programme activity areas. Expected results are specified as well as performance indicators and targets, and description of benefits to Canadians.

Annual planning, which is aligned with the Report on Plans and Priorities, includes the development of Regulatory Activity Plans which are the basis for cost recovery fee estimates that are sent to the licensees. Within the CNSC, this resource planning is coordinated by planners in each directorate in a combination of top down, bottom up approaches. Based on this annual plan, each division (technical area) knows how many working hours that are planned to be spent on tasks within the defined types of work. Individual work plans are completed on that basis by the division head in communication with the staff members. Reserve time is kept for unforeseen events.

Much effort has been done over the last two years to simplify the complicated and detailed planning process. The planning now starts earlier in the fall when most of the regulatory tasks for the coming year can be predicted. It is not anymore necessary to specify time for every planned project, inspection or safety review. Instead, the planning of staff effort is done on a main task basis (regulatory and broad programme areas) such as licensing, assessment and compliance activities for a specific facility. This model is also used to establish budgets and licensing fees for the coming year. The Operations Work Plan Steering Committee has decided to use a Standard Planning Format for this purpose. The model was tried for the first time during FY (Fiscal Year) 2010/11. Experiences are good and the planning for FY 2012/13 will be an opportunity to consolidate and further improve the process.

Significant modifications have been introduced in the follow-up of the annual plan. Changes in regulatory efforts during the year, due e.g. to licensee compliance performance or operational changes, no longer require immediate adjustments in the fee invoices to licensees. The adjustments can wait until the next FY. A new process description for this Fee Management Process was issued in October 2011 (see also suggestion S2). The new procedure has considerably reduced the workload for the organization, especially for the planners and the financial divisions. The in-year activity follow-up has moved from a mid-year to a quarterly basis and is now more focused on integrating performance management information with the information of the use of financial resources. An official Departmental Performance Report (DPR) is prepared in September for the Parliament on achievements and

outcomes as well as the financial records. The DPR is also laid out in the standard Program Activity Architecture. In addition, as required by the *Nuclear Safety and Control Act* (NSCA), an Annual Report is prepared for the minister of Natural Resources Canada. This report is aimed at the Canadian public and is published in an attractive and more informative format.

An internal audit by the Office of Audit and Ethics was conducted 2010 of the CNSC performance measurement and reporting frameworks. The audit concluded that the performing measurement and reporting frameworks are adequate to support annual departmental accountability for external reporting requirements, but the performance information is not optimally used to support the monitoring and management of corporate resources. CNSC currently monitors 38 performance indicators of which 11 are officially reported (e.g., in the DPR). CNSC is aware that this information can be more efficiently used in the continuous improvement of its activities and processes and is taking action to that effect.

In conclusion, CNSC has demonstrated effective progress in satisfying this suggestion.

Suggestion 16 (S16): is closed.

Suggestion 17: Independent audits of CNSC activities are conducted by the Office of Audit and Ethics which reports directly to the President. This office performs internal audits with a dedicated staff of four persons according to an audit plan. The audits are done according to well established procedures including management of non-conformances. Furthermore, CNSC has a high level Audit Committee according to the internal audit policy of the Government of Canada composed of three external members and the CNSC President and the Commission Secretary. The Committee has a general supervisory function of the overall performance of the organization and provides direction to the CNSC. In the opinion of the 2009 IRRS Team, it seemed that this audit organization primarily satisfied governmental requirements on administrative efficiency and effectiveness and not necessarily provided feedback according to CNSC's own needs to support the further development and implementation of its Management System.

In order to supplement the formal audit organization and provide more flexibility in the assessment of the processes, CNSC has decided, in line with the recommendation, to introduce a process for Self-assessment of CNSC processes. For implementation of this process, CNSC will train and develop internal self-assessment teams across the organization. These teams will form a resource pool from which a specific assessment team can be drawn when needed.

The introduction of the new Self-assessment process has been an initiative under the Harmonized Plan. A process description and supporting tools such as templates, plans, checklists etc. were completed in June 2011. Roll out is planned in March 2012 after training, communication and the adoption of lessons learned from a pilot test. The Directorate of Assessment and Analysis volunteered to do the pilot test. The self-assessments will be administered by the Internal Quality Management Division but essentially be driven by a sponsor, normally a Director General directly responsible for the process being self-assessed. The sponsor is also responsible for analyzing and implementing proper actions after the assessment.

In the opinion of the IRRS Team, this initiative has a great potential to assist the CNSC management in the continuous improvement of its Management System processes.

In conclusion, CNSC has demonstrated effective progress in satisfying this suggestion.

Suggestion 17 (S17): is closed.

Recommendation 14: In addition to the internal audits, evaluations and the new self-assessment process (see Suggestion 17), CNSC has, in line with the recommendation, added feedback buttons to all BORIS pages for convenient use by the staff. (BORIS is the CNSC intranet site containing a large number of web pages with information to assist the staff, including the Management System pages). Additional feedback buttons (contact us) have been added to the Management System and Harmonized Plan web pages to solicit feedback on their contents. Comments by the staff are automatically directed to the responsible manager or to the Internal Quality Management Division. A procedure is in place to assess the comments and provide responses to those who made the comments provided they identified themselves.

In conclusion, CNSC has demonstrated effective progress in satisfying this recommendation.

Recommendation 14 (R14): is closed.

New findings from the 2011 follow-up mission

No new findings were identified.

9. CODE OF CONDUCT ON SAFETY AND SECURITY OF RADIOACTIVE SOURCES

9.1. National strategy of gaining and regaining control over orphan sources

2009 RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

S18 **Suggestion:** In order to encourage bodies and persons likely to encounter an orphan source to promptly report it, CNSC could consider offering a cost-free recovery service to ensure that found sources are not re-orphaned, recognizing that this would require additional funds so as not to impose a financial burden on CNSC.

Findings from the 2011 follow-up mission

Suggestion 18: Since the 2009 IRRS mission, CNSC has conducted a full review of its regulatory oversight regarding orphan sources¹, with particular reference to IAEA's *Code of Conduct on the Safety and Security of Radioactive Sources*.

The CNSC risk-informed regulatory strategy for dealing with the discovery of orphan sources is built on three pillars: regulatory oversight; promotion and communication; and response and recovery, as described below.

With regard to the first pillar, the comprehensive nature of CNSC's 'Regulatory Oversight' programme for radioactive sources (including an outstanding source tracking system that merited a 'good practice') was fully described in the 2009 IRRS Mission Report. Essentially, the CNSC exercises regulatory control of radioactive sources using a "cradle-to-grave" approach, where licensing and compliance verification occur throughout the life cycle of the sources, starting at their point of manufacturing through their use and final disposal. Hence, under the CNSC's regulatory regime, licensees are responsible at all times for the safe care and control of their sources. Licensees are required to take appropriate measures to prevent the loss or theft of sources and take prompt action to recover the sources in such cases. If orphan sources are discovered in Canada, the responsible licensee or previous 'owner' will be traced whenever possible and will be liable to assume the costs for dealing with the sources in a safe manner, including their disposal. In addition, CNSC has taken the opportunity to prevent sources from becoming orphan in the future, and in 2012 will introduce requirements for financial guarantees for licensees of radioactive sources, hence diminishing the risk of orphan sources being discovered in the public domain.

With regard to the second pillar 'Promotion and Communication', noting that orphan sources may inadvertently be mixed with scrap metal, CNSC favours a collaborative approach with industry as a means of ensuring that the discovery of orphan sources are promptly reported to the CNSC and that appropriate measures to bring these sources under proper regulatory control are taken. In this regard, CNSC has a particularly active and on-going dialogue with

¹ CNSC definition of an orphan source is a radioactive source that is not under proper regulatory control.

the metal recycling industry through its trade association. The same applies to the operators of waste facilities, where there is also a likelihood of discovering orphan sources. CNSC's outreach programme is further supported by information leaflets (such as 'Alarm Response Guidelines for Radiation Portal Monitoring Systems'), and large format posters describing actions to be taken when discovering an orphan source. These information products were distributed at various outreach sessions held with industry associations to promote awareness of radioactive sources, and are also available on the CNSC's external Web site.

With regard to the third pillar 'Response and Recovery', CNSC Transport Licensing and Strategic Support Division (TLSSD), Radiation Protection Division (RPD) and Operations Inspection Division (OID), have worked together to develop a response procedure to assess reports of lost, stolen or found radioactive sources to assure that a consistent response will be provided across all Divisions. CNSC maintains updated information about lost, stolen and found sources on its Web site. By conducting a physical examination of a discovered source or by examining the device that contains the source to identify its origin, CNSC can then contact the source or device licensee, or otherwise attempt to trace back the 'owner', both of whom would ultimately be responsible for the safe handling and disposal of the source, including the costs associated with its disposal. When the licensee, or otherwise the source 'owner', is not identified, the recycling/waste facility operator or other person finding the source would be responsible for it under the *Nuclear Safety and Control Act*. Experience demonstrates so far that there have been only a few cases where orphan sources have been found in Canada over the last decade, and that industry is more than willing to pay for the safe handling and disposal of orphan sources in order to act responsibly and in a timely manner in this regard. In all instances, CNSC will and has provided technical and financial assistance where necessary to safely dispose of orphan sources.

In conclusion, CNSC has demonstrated effective progress in satisfying this suggestion.

Suggestion 18 (S18): is closed.

New findings from the 2011 follow-up mission

No new findings were identified.

10. TRANSPORT OF RADIOACTIVE MATERIAL

10.1. Introduction and background

The transport of radioactive material in Canada is well-established and a governmental, legal and regulatory framework commensurate with the large scope of transport of radioactive material is in place to protect people and the environment.

More than a million packages containing radioactive material are transported in Canada each year, of which the majority are shipments of radiopharmaceuticals, uranium ores, and Cobalt 60. Radioactive material is transported in excepted packages, industrial packages, Type A packages and Type B(U) packages which are of Canadian or foreign origin, by various modes of transport, i.e. road, rail, air, sea, and inland waterways.

The review undertaken for transport safety as part of this IRRS mission was based upon the information provided by CNSC staff through the IAEA Self-Assessment Tool, presentations, reports, interactions, discussions and visits to representative facilities. Transport was not included in the scope of the IRRS mission held in 2009.

The CNSC is the Nuclear Safety Authority in Canada responsible for the regulation of the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information; and the dissemination of objective scientific, technical and regulatory information to the public concerning the activities of the Commission and the effects on the environment and on the health and safety of persons. These functions are established in the *Nuclear Safety and Control Act*.

The work of the CNSC in the area of transport of radioactive material includes, among other items, the assessment of applications and the associated technical documentation for licensing, assessment of applications and associated technical documentation for issuing approval certificates for Type B(U) packages and different types of packages containing fissile material, verification and validation of approval certificates for different package types, issuing licences for transport related activities, inspection of facilities and enforcement as required.

The responsibility for ensuring the safe transport of nuclear substances is jointly shared between the CNSC and Transport Canada. Transport Canada's *Transportation of Dangerous Goods (TDG) Regulations* deal with the transport of all classes of dangerous goods, while the CNSC's *Packaging and Transport of Nuclear Substances (PTNS) Regulations* are primarily concerned with health, safety and security of the public, and protection of the environment related to the special characteristics of radioactive material. Both the TDG and PTNS Regulations apply to all persons who handle, offer for transport, transport or receive nuclear substances. There are currently over 100 transport certificates valid in Canada, which are normally issued for a five-year period.

10.2. Legislative and governmental responsibilities in transport

The CNSC is responsible for regulating the safe transport of radioactive material under the *Nuclear Safety and Control Act* (NSCA) and its regulations. The PTNS Regulations take into consideration the IAEA Safety Series TS-R-1 *Regulations for the Safe Transport of Radioactive Materials, 1996 Edition (Revised)*. The NSCA and PTNS regulations are

complemented by the *Transportation of Dangerous Goods Act* (TDGA) in Canada and its *Transportation of Dangerous Goods Regulations* (TDG Regulations).

The PTNS Regulations are established pursuant to Paragraph 44(1)(b) of the NSCA and the TDG Regulations are created pursuant to the TDGA. The TDGA and TDG Regulations establish classes of dangerous goods, provide an identification list of common dangerous goods and the safety requirements for identification, packaging and shipment of these dangerous goods in a manner similar to the *United Nations Recommendations on the Transport of Dangerous Goods*. The NSCA and the PTNS Regulations cover specific requirements of health and safety protection for packaging and transport of radioactive material. For international air and sea transport, the TDG Regulations refer to the appropriate international regulations of the *International Civil Aviation Organization* (ICAO) and the *International Maritime Organization* (IMO) administered in Canada by Transport Canada. In addition, to meet the requirements of these regulations, consignors and consignees, who are usually CNSC licensees, must abide by any conditions attached to their licence.

The existing Memorandum of Understanding between Transport Canada and the CNSC (MOU) was identified as a good practice in the 2009 IRRS mission. It specifies the coordination, responsibilities and functions of Transport Canada and CNSC in the field of safe transport of radioactive material where both have shared responsibilities. The 2011 follow-up mission review identified a number of ways in which the MOU could be enhanced during its next revision. The review of this document together with CNSC and Transport Canada led to the conclusion that, for the implementation of items 3.5 (establish mechanism and links for sharing information) and 4.4 (consultation and cooperation with each other in the development of regulations) of the MOU, specific procedures should be developed within the next review of the MOU. The IRRS Team noted that the current MOU will expire in December 2012.

In addition, a clarification related to “Regulating the Handling of Shipments” as outlined under item 2 in the Appendix to the MOU is suggested to avoid overlap and duplication. For example, overlap and duplication can be found in documentation and marking. These MOU changes will need to be preceded by changes to TDG and PTNS regulations as discussed in Section 10.7 of this report.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS: GSR – Part 1, Req. 7:** Coordination of different authorities with responsibilities for safety within the regulatory framework for safety

Where several authorities have responsibilities for safety within the regulatory framework for safety, the government shall make provision for the effective coordination of their regulatory functions, to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties.

- SF1 **Suggestion:** CNSC, in conjunction with Transport Canada, should consider enhancing the MOU and its implementing procedures in its next revision to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties.

10.3. Regulatory body responsibilities and functions

According to paragraph 307 of the IAEA Transport Regulations TS-R-1, the competent authority is responsible for assuring compliance with these Regulations. For this purpose an appropriate compliance assurance programme should be in place at CNSC for examining and reviewing all aspects of the transport of radioactive material within its jurisdiction or area of influence to provide evidence that the provisions of these Regulations are being met in practice. Even after a compliance assurance programme has been developed and introduced, it should not be considered to be complete. Rather, the compliance assurance programme should be reviewed periodically by the competent authority in the light of regulatory changes and with account taken of the experience with its performance of users of the Transport Regulations since the establishment of the compliance assurance programme. The CNSC is developing an organization-wide approach to conducting inspections, which will be part of the consolidated document that describes an integrated compliance assurance programme. The CNSC has procedures and measures in place that are intended to ensure that the provisions of the Transport Regulations are complied with in practice. The CNSC intends to link these procedures and measures to the integrated compliance assurance programme. In reviewing these procedures and measures, it was concluded that CNSC addresses all aspects of the compliance assurance programme as outlined in Fig. I-1 in Annex I of TS-G-1.5, except for on-site witnessing of the manufacture of packaging. The CNSC approves the Quality Assurance Programme as part of the licensing basis. It is the responsibility of the licensee to carry out the activity in accordance with its Quality Assurance Programme.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS: TS-R-1, para. 307.** “The competent authority is responsible for assuring compliance with these Regulations. Means to discharge this responsibility include the establishment and execution of a programme for monitoring the design, manufacture, testing, inspection and maintenance of packaging, special form radioactive material and low dispersible radioactive material, and the preparation, documentation, handling and stowage of packages by consignors and carriers, to provide evidence that the provisions of these Regulations are being met in practice.”
- (2) **BASIS: TS-G-1.5 (2009), para. 4.91** “The competent authority should ensure that, before the first shipment of a packaging, the manufacturer has fulfilled the requirements of para. 501 of the Transport Regulations....The competent authority may confirm the manufacturer’s verification of compliance by own inspection.”
- (3) **BASIS: GSR Part 1 Req. 27** “The regulatory body shall carry out inspections of facilities or activities to verify that the authorized party is in compliance with the regulatory requirements and with the conditions specified in the authorization.”
- (4) **BASIS: TS-G-1.5 (2009), para. 4.4** “Even after a compliance assurance programme has been developed and introduced, it should not be considered to be complete. Rather, the compliance assurance programme should be reviewed periodically by the competent authority in the light of regulatory changes and with account taken of the experience with its performance of users of the Transport Regulations since the establishment of the compliance assurance programme. The compliance assurance programme should be updated in a timely fashion when

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

there is any specific change to the Transport Regulations, and should be also reviewed periodically to ensure that it continues to achieve the goals that it was designed to achieve.”

SF2 **Suggestion:** CNSC should consider including the witnessing of manufacturing as an action within its measures and procedures to demonstrate compliance assurance according to para. 307 of TS-R-1, and the consolidated compliance assurance programme should be documented and be subject to regular review.

According to paragraph 308 of TS-R-1, the CNSC should arrange for periodic assessments of the radiation doses to persons arising from the transport of radioactive material. The CNSC explained that such a study on radiation doses to persons resulting from transport was last performed in 1998/1999. Since that time, such studies have been replaced by inspections of radiation protection programs of carriers which are used by CNSC to derive the respective information on radiation doses to transport workers. An assessment of doses to members of the public is not performed because most of the doses received by transport workers are already so low that any dose to the public is considered by CNSC to be negligible. The assessment and analyses of the radiation protection programs of all carriers with regard to paragraph 308 is a good practice. It provides a complete and regularly updated database of radiation doses to workers, regardless of their occupational exposure designation, without performing additional studies. This arrangement allows CNSC to not only meet the requirements of paragraph 308 but it also provides information on options for optimizing protection.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

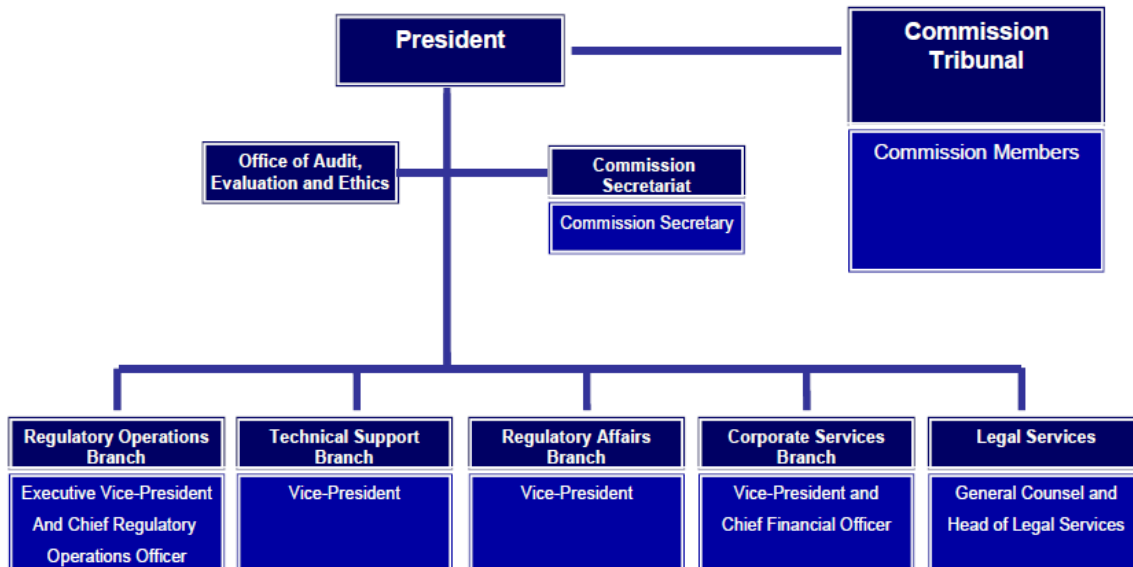
(1) **BASIS: TS-R-1, para. 308** “The relevant competent authority shall arrange for periodic assessments of the radiation doses to persons due to the transport of radioactive material, to ensure that the system of protection and safety complies with the Basic Safety Standards”

GPF1 **Good practice:** The CNSC’s use of systematic inspections of Radiation Protection Programs of carriers to facilitate the periodic assessments of radiation doses to transport workers, as required by para. 308 of TS-R-1, is considered to be a good practice.

10.4. Organization of the regulatory body

The CNSC is accountable to the Canadian public, and reports to Parliament through the Minister of Natural Resources Canada.

The CNSC’s current organizational structure is shown below.



Within the CNSC, responsibility for regulating the transport of nuclear substances falls to the Transport Licensing and Strategic Support Division within the Directorate of Nuclear Substance Regulation belonging to the Regulatory Operations Branch. The Division regulates the shipment of nuclear substances destined for use in industry, medicine and research, as well as highly radioactive material such as spent nuclear fuel.

10.5. Authorization process, review and assessment

The NSCA gives authority to CNSC to certify and de-certify prescribed equipment, which includes transport packages and special form radioactive material. The Commission may designate qualified persons as Designated Officers and authorize them to perform certain duties, which may include: issuing a licence upon receipt of an application; renewing or suspending licences in whole or in part; amending, revoking or replacing a licence; and certifying and de-certifying persons and prescribed equipment.

The CNSC issues certificates for special form radioactive material, low dispersible radioactive material, package designs of Type B(U), Type B(M), and Type C and package designs containing fissile material. Currently there are no provisions specified in the regulations or in the certificates for CNSC to be notified of changes to package designs made during their usage. However, as part of the CNSC compliance verification program, in the event that CNSC inspectors find that a package has been modified during use and no longer complies with the approved package design under the CNSC certificate, the CNSC will take appropriate action to limit or prohibit the use of the modified package or de-certify the package entirely. The CNSC may consider certifying the modified package only upon receipt of an updated application for certification.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS: TS-G-1.5 (2009), para. 4.30** “Any deviations from the requirement and specifications should be declared, justified and recorded by the applicant, and presented to the competent authority for agreement.”

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(2) **BASIS:** TS-G-1.5 (2009), para. 4.98 “Any packages undergoing such repairs, modifications or changes should not be returned to use until the competent authority has agreed to or approved the change.”

SF3 **Suggestion:** The CNSC should consider establishing requirements for ensuring that any design changes/modifications made after the package design is approved do not invalidate the approved design.

The CNSC also has the responsibility for issuing special arrangement certificates. A ‘Special Arrangement’ is a type of radioactive material consignment within the scope of the IAEA Transport Regulations TS-R-1 which is equivalent in safety to other specified types of radioactive material consignments in which radioactive material has to be shipped in a specified type of package (excepted package, IP-package, Type A package, Type B(U) package, Type B(M) package, Type C package or packages containing fissile material). This is illustrated by the fact that radioactive material transported under special arrangement has a dedicated UN number for class 7 (radioactive material), in the same way as radioactive material that is transported in a specific type of package.

Special Arrangements are used in cases where the radioactive material cannot practicably be transported by using one of the package types defined in the IAEA Transport Regulations. Such a case includes the transport of large components from decommissioning or maintenance operations, such as steam generators or reactor pressure vessels, for which, due to their size, mass and construction, an outer packaging in the usual sense, is not feasible. In these cases, the IAEA Transport Regulations contain regulatory provisions under which these large components may be authorized for transport (ie. under Special Arrangement) following a rigorous technical review to determine that they meet a level of safety equivalent to that which would be attained if they had been suitable to be transported in a type of package already provided under the same regulations.

The CNSC had issued such a Special Arrangement authorization recently for the shipment of steam generators from Canada to Sweden. Taking this as an example, the IRRS Team reviewed CNSC’s procedures and criteria, and found them to be in accordance with the IAEA Transport Regulations TS-R-1.

The CNSC’s experiences on this particular topic were shared during the policy issue discussion on Special Arrangement activities. The opportunity was also taken to discuss possible future international initiatives in relation to transport and re-use of radioactive material.

The CNSC is responsible for issuing approvals for special form radioactive material, low dispersible radioactive material, package designs of Type B(U), Type B(M), Type C and package designs containing fissile material. The issuance is subject to the CNSC procedure C-SOP-0002.01 “Certification of Transport Packages, Radiation Devices and Class II Prescribed Equipment”. This procedure includes the administrative process to be followed for the issuance of a certificate of approval. An electronic database is used to produce all package design approval certificates which is aimed to ensure consistency. Several types of CNSC package design certificates have been reviewed and it has been found that, despite the use of the electronic database, some inconsistencies between certificates exist, the database is somewhat restricted regarding requested extension of the format of the certificates and the contents of the certificates do not fully meet the requirements of the IAEA Transport

Regulations. For example: activity limit restrictions on the modes of transport were missing from some certificates (TS-R-1 2009 paragraph 833(d)); and the description of the containment system was not always included (TS-R-1 paragraph 833(m)).

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	<u>BASIS:</u> TS-R-1 (2009), para. 833 “Each approval certificate of the design of a package issued by a competent authority shall include the following information: (a) – (w)”.
RF1	<u>Recommendation:</u> CNSC should review, and revise as necessary, its process and procedures to ensure that the contents of all types of package design certificates meet the requirements of para. 833 of TS-R-1 (2009). Such a review should also be conducted for other types of CNSC certificates which are subject to TS-R-1 requirements.
SF4	<u>Suggestion:</u> CNSC should consider reviewing the application of its electronic database to create package design approval certificates to verify full consistency of all produced certificates and to allow for options for extensions of a certificate like the addition of information on previous revisions of the certificate as an annex to it.

The review and assessment of package design applications are performed within the CNSC by transport specialists with the assistance of other experts e.g., in the field of radiation safety and nuclear safety, as required. A tool called the ‘Job Management System’ is used to track the work to be performed by specialists within other parts of the organization.

The assessment is based on the requirements of the IAEA Transport Regulations TS-R-1 and on the CNSC Regulatory Document RD-364 “Joint Canada-United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages”, which is consistent with TS-R-1 regarding requirements for Type B(U) packages and packages containing fissile material. The document provides comprehensive and very detailed guidance on administrative and all technical aspects to be considered in such approval procedures. It contributes considerably to the harmonization of documentation, assessment procedures as well as assessment criteria. As such, it is a very good tool for enhancing the level of safety for this type of package design. In addition, the transport specialists use their professional engineering judgment while performing assessments. The elements reviewed by the specialists are recorded in a summary evaluation and a peer review is performed. Once completed, the summary evaluation with a recommendation is submitted to the Designated Officer who may issue the approval certificate. There is an initiative currently under way for reviewing and standardizing how technical assessments are being performed at the CNSC (Conduct of Technical Assessment). This initiative needs to be extended to complete the procedures and guidance relative to transport.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GSR Part 1, Req. 32 “The regulatory body shall establish or adopt regulations and guides to specify the principles, requirements and associated criteria for safety upon which its regulatory judgements, decisions and actions are based.”
- GPF2 **Good practice:** The CNSC Regulatory Document RD-364 “Joint Canada-United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages” is a very detailed and comprehensive guide to assist applicants to demonstrate compliance with the Regulations as well as to assist competent authorities in the review and approval of applications. As such it contributes to a harmonized practice between Canada and the U.S. in the field of package design assessment and approval.
- SF5 **Suggestion:** The CNSC should consider developing specific assessment procedures, assessment criteria and decision sheets to be used by its transport specialists for all types of package design assessments based on the Regulatory Document RD-364. The CNSC should also consider the specific guidance on this subject given by IAEA in ‘Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material’ (TS-G-1.1). Consideration should also be given to applying the same approach to assessment procedures for other types of approvals related to TS-R-1.

10.6. Inspection and enforcement

The CNSC has duties related to the inspection of all modes of transport of radioactive material. Due to the federal system in Canada, local authorities also perform road transport inspections of vehicles transporting radioactive material. Currently, there is no procedure in place to obtain systematic feedback from local authority inspection activities. Feedback would allow CNSC to obtain a more comprehensive understanding of compliance in Canada and provide additional opportunities for programme improvements.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** TS-G-1.1, para. 309.5 “An effective compliance assurance program should, as a minimum, have objectives related to non-compliance detection and analysis, including:
- a) Providing feedback to the regulatory process as a basis for improvements in the Transport regulations and the compliance assurance program;
 - b) Ensuring that adequate and appropriate communications and feedback are facilitated between the consignor, consignee and appropriate competent authorities concerning any non-compliance so as to ensure that such occurrences are eliminated in the future.”

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

SF6 **Suggestion: The CNSC should consider options to systematically obtain, and utilize where applicable, feedback from inspection activities and results from local authorities.**

Packages which have been manufactured and which are used in accordance with a package design approval certificate issued by CNSC are subject to a maintenance and servicing program as specified in the package design approval certificate. Such maintenance and service activities must be performed by the user within a certain time frame to guarantee that the package design continues to meet all applicable requirements as specified in the package design certificate. Currently, the CNSC does not require that such dates for performing maintenance and service activities be indicated on the packaging itself.

In addition to the interviews and discussions, observations of inspections were performed during the IRRS mission, as described below.

An announced inspection of a road transport was observed at the facility site of MDS Nordion in Kanata. According to the responsibilities in Canada, it was a joint inspection by CNSC and the Ministry of Transport of Ontario. The truck that was inspected was loaded with two Type B(U) packages containing Cobalt 60 sources for road transport from MDS Nordion to the Port of Montreal. The inspector from the Ministry of Transport of Ontario examined the driver related aspects (e.g. training certificate and driving hours) and all technical requirements related to the vehicle. The CNSC inspector inspected class 7 related aspects regarding the packages, the placarding of the vehicle and the transport documentation. He also performed independent measurements of dose rates to verify documented data and compliance with dose rate limits. Compliance with all applicable requirements was verified by both inspectors.

An inspection of packages containing radioactive material stored at the Port of Montreal was also observed, where the correct labelling and marking of packages containing natural uranium hexafluoride and freight containers loaded with drums of yellowcake were verified.

A CNSC inspection at Draximage was also observed. This facility is mostly involved in the production of products for radio-diagnoses. The CNSC inspectors verified the correct categorization and corresponding labelling of packages. It was observed how one carrier was verifying the consignment before shipment (acceptance check). In addition, documentation related to training of personnel, dose records and demonstration of compliance with requirements for Type A packages was requested by CNSC inspector. All required documentation was found to be adequate.

CNSC inspections were also observed at a Purolator facility in Montreal, which is a large Canadian courier company. The methodology of training of personnel was examined as well as records of such training and worker doses. The procedure for receiving packages, verifying documentation and dispatching radioactive material consignments was explained.

In all cases of inspections, an open and constructive interaction between CNSC personnel and users, and a willingness of the users to show additional documentation or perform additional activities, if necessary or required, was observed. An open and collaborative interaction was also noted between the CNSC and Provincial authority inspectors.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- | | |
|-----|--|
| (1) | BASIS: TS-G-1.5 (2009), para. 4.96 “It should be indicated on the packaging when the last maintenance or service operation was done or, preferably, when the next maintenance or service operation is due.” |
| SF7 | Suggestion: The CNCS should consider specifying in their package design approval certificates that the date of the next maintenance or servicing operation, according to the approved maintenance or servicing program, should be indicated on the packaging. |

10.7. Development of regulations and guides

Regarding the implementation of TS-R-1 into the Canadian regulations “*Packaging and Transport of Nuclear Substances Regulations*” (PTNS) it was found that the current PTNS regulations have implemented TS-R-1 Edition 1996 (Revised 2000) together with some changes resulting from the TS-R-1 Edition 1996, as amended in 2003. In addition, they contain deviations and modifications from TS-R-1 resulting from older versions of the IAEA Regulations as well as established practices in Canada. Furthermore, the PTNS regulations do not explicitly contain the requirements from TS-R-1 but instead refer to the appropriate paragraphs of TS-R-1, which makes it difficult for the user to find the real requirements to be met. Beyond this, it was also found that some definitions in PTNS regulations do not fully comply with TS-R-1 definitions, for example the definitions of consignor, consignee, and low specific activity materials LSA-I and LSA-II.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- | | |
|-----|--|
| (1) | BASIS: GSR Part I, Req. 33: Review of regulations and guides. Regulations and guides shall be reviewed and revised as necessary to keep them up to date, with due consideration taken of relevant international safety standards and technical standards and of relevant experience gained. |
| RF2 | Recommendation: The CNSC should revise the PTNS regulations by implementing the current 2009 Edition of TS-R-1, and changes resulting from the latest edition of TS-R-1 expected to be published in 2012 should be taken into account. |
| SF8 | Suggestion: The CNSC should consider options to increase clarity and user-friendliness of the PTNS regulations, including ease of access to TS-R-1 text, and to investigate enhanced harmonization between definitions in the PTNS regulations and definitions of TS-R-1. |

The TS-R-1 regulations are implemented in Canada via the PTNS regulations and the *Transport of Dangerous Goods* (TDG) regulations. Therefore, the PTNS regulations are very closely linked to the TDG regulations and vice versa, which is reflected by many cross references to each other. This is current practice in the Canadian legislative framework. In

In addition, there are also references to other CNSC regulations included in the PTNS regulations. Care must be exercised by CNSC to ensure that any consequential amendments introduced by other legislation do not result in inconsistencies in the PTNS regulations. An inconsistency was identified for NORM where different exemption values are specified in the PTNS regulations and in the *General Nuclear Safety and Control Regulations*.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	<u>BASIS:</u> GSR - Part 1, Req. 7: Coordination of different authorities with responsibilities for safety within the regulatory framework for safety. Where several authorities have responsibilities for safety within the regulatory framework for safety, the government shall make provision for the effective coordination of their regulatory functions, to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties.
RF3	<u>Recommendation:</u> The CNSC, in conjunction with Transport Canada, should establish a formal procedure which provides for a parallel review and revision process of their regulations for Class 7 material to implement revised editions of TS-R-1 consistently.
RF4	<u>Recommendation:</u> The CNSC should identify and resolve inconsistencies in different CNSC regulations regarding transport during the process of revising and updating the PTNS regulations.

For international shipments which fully comply with the latest edition of the ICAO instruction for air transport or with the latest edition of the IMDG code for sea transport, the TDG regulations explicitly allow the shipment within Canada according to these international regulations. The PTNS regulations do not contain such an option which creates an inconsistency between these two regulations for international shipments and which could result in denial of shipments in Canada, even though such shipments fully comply with the latest international modal regulations for air or sea transport.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	<u>BASIS:</u> GSR - Part 1, Req. 33: Review of regulations and guides Regulations and guides shall be reviewed and revised as necessary to keep them up to date, with due consideration taken of relevant international safety standards and technical standards and of relevant experience gained.
RF5	<u>Recommendation:</u> The CNSC should ensure consistency between the TDG regulations and the PTNS regulations with regard to international shipments by implementing an adequate requirement as contained in the TDG regulations into the PTNS regulations which allow such shipments according to the latest edition of the applicable international modal transport regulation.

The review of all approval requirements contained in the PTNS regulations led to the conclusion that the need for competent authority approval for certain shipments according to para. 802 (c) of TS-R-1 and for the calculation of radionuclide values according to para. 802 (e) of TS-R-1, are not part of the PTNS regulations.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS: TS-R-1, para. 105.** “In the transport of radioactive material, the safety of persons and the protection of property and the environment are assured when these Regulations are complied with. Confidence in this regard is achieved through quality assurance and compliance assurance programmes.”
- TS-R-1, paras 802.** “Competent authority approval shall be required for the following: ...
- (c) Certain shipments (see paras 820–823)...
- (e) Calculation of radionuclide values that are not listed in Table 2 (see para. 403).”
- RF6 **Recommendation: The CNSC should ensure that the next revision of the PTNS regulations is consistent with competent authority approval requirements according to TS-R-1.**

10.8. Emergency preparedness for transport

CANUTEC is the Canadian Transport Emergency Centre operated by Transport Canada to assist emergency response personnel in handling dangerous goods emergencies including radioactive material. This national advisory centre is one of the major programs instituted by Transport Canada to promote public safety during movement of peoples and goods in Canada. It has set up a comprehensive scientific data bank on dangerous goods including material data sheets and is staffed by professional scientists specialized in emergency response and experienced in interpreting technical information and providing advice. For emergencies related to radioactive material (Class 7 dangerous goods) that are initially reported to CANUTEC, CANUTEC contacts the CNSC Duty Officer who contacts the appropriate CNSC specialist to provide advice to CANUTEC and emergency response personnel on site. CNSC can also send their staff on site as needed to provide technical and advisory assistance to emergency response personnel, and provide regulatory oversight during recovery and cleanup operations.

In addition, Emergency Response Assistance Plans (ERAPs) are required by Part 7 of the TDG regulations for certain dangerous goods that, in general, necessitate special expertise and response equipment. The plans are intended to assist local emergency responders by providing them with technical experts and specialized equipment at an accident site. These plans are supplied by consignors and supplement those of the carrier and of the local and provincial authorities, and must be integrated with other organizations to help mitigate the consequences of an accident. ERAPs are required for fissile material and for low specific activity material and are subject to Transport Canada approval. Beyond this, the Government of Canada has in place the Federal Nuclear Emergency Plan (FNEP) to assist the provinces in managing major emergency situations. This established system of emergency response provides: immediate response in case of an incident or accident, links to all involved parties to communicate and cooperate accordingly and a very comprehensive database in CANUTEC. This database contains information on material properties, first actions important for proper emergency response, and also details on involved consignors who can be contacted immediately for assistance or action.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS: TS-G-1.4, para. 304:** “In the event of accidents or incidents during the transport of radioactive material, emergency provisions, as established by relevant national and/or international organizations, shall be observed to protect persons, property and the environment.”
- GPF3 **Good practice: The Canadian Transport Emergency Centre (CANUTEC) together with the CNSC’s ability to provide technical assistance and regulatory oversight 24 hour/7 days a week, the Emergency Response Assistance Plans (ERAPs) of consignors and the Federal Nuclear Emergency Plan (FNEP) provide an excellent system for emergency response.**

10.9. Management systems for regulatory bodies

The CNSC has established and implemented a management system based on IAEA Standard GS-R-3. The CNSC reported that its management system conforms to the general requirements of ISO 9001 and meets management requirements as directed by the Government of Canada through the Treasury Board. The Management System Manual describes for CNSC employees the integrated Management System used to manage all work across the organization to ensure consistent quality results. It is the top level document in the Management System document hierarchy and identifies the high-level policies, principles, and processes by which the CNSC achieves its goals and objectives. The Management System is supported by processes and procedures that provide details on how CNSC performs its work. There are activities currently being undertaken through CNSC's Harmonized Plan to include specific transport related procedures and guidance within the management system.

11. REGULATORY IMPLICATIONS OF THE TEPCO FUKUSHIMA DAIICHI ACCIDENT

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

A. IMMEDIATE ACTIONS TAKEN BY THE REGULATORY BODY

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

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

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

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

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

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

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

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

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

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

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

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

- Capability of installed equipment (including procedures) to mitigate conditions that result from beyond-design-basis accidents;
- Capability to mitigate station blackout conditions, including robustness of backup power and the emergency power supply systems;
- Capability to mitigate consequences of external events;
- Identification of important equipment needed to mitigate consequences of external events;
- Identification of any potential scenarios that could compromise the equipment’s function during seismic events;

- Ability of units to rapidly reduce reactor power following a loss of offsite power, the duration of battery backup, and fuel supply to emergency generators.

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

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

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

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

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

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

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

CNSC established an External Advisory Committee in August 2011 to review CNSC's actions related to the TEPCO Fukushima Daiichi accident. The Committee was comprised of three experts in safety and incident investigation, not related to the nuclear field, selected by the President of CNSC. At the request of the Committee, the team met with the Committee to discuss its actions and any issues the team had identified regarding the regulatory implications of the accident. The team discussed the purpose of the IRRS programme, the scope of the IRRS mission in 2009, the scope of the IRRS follow-up mission including the methodology used for the review of the regulatory implications of the TEPCO Fukushima Daiichi accident,

and its preliminary findings. The team responded to questions from the Committee regarding preliminary findings from this part of the mission. Additionally, the Committee asked questions related to other international activities ongoing regarding the accident, as well as providing their opinions on issues related to the CNSC Fukushima accident response.

CONCLUSION

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

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

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

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

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

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

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

The IRRS Review Team considers the numerous efforts of the CNSC to both provide information to the public in an open and transparent way, as well as to invite public comment

at various developmental stages, to be an effective method to promote public trust in the nuclear oversight provided by the CNSC.

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

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

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

CONCLUSION

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

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

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

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: <i>GSR Part 1, 2.18 states:</i> 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)	Basis: <i>GSR Part 1, Requirement 14: International obligations and arrangements for international cooperation states:</i> The government shall fulfil its respective international obligations, participate in the relevant international arrangements, including international peer reviews, and promote international cooperation to enhance safety globally.
SF9	<u>Suggestion:</u> The Government of Canada should consider inviting an international peer review mission for emergency preparedness and response.

FUKUSHIMA MODULE 3: RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

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

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

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

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

Within CNSC, the Emergency Management Program Division (EMPD) is tasked with emergency preparedness planning. The CNSC Emergency Response Plan describes what the CNSC must be prepared to do when an emergency occurs. In case of an emergency, the EOC is activated and the Nuclear Emergency Organization (NEO) is formed by CNSC staff. In the CNSC Emergency Response Plan and additional detailed work instructions, the tasks of the NEO and the special positions/functions within this organization are described.

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

The CNSC Strategic Communications Directorate deals with public communication. It is staffed with about 25 people with expertise in communications and communication systems. This directorate works closely with technical experts all over CNSC in order to ensure that information given to the public is factual and technically correct. Some regulatory and technical staff members are specially trained in media contact and are spokespersons for the CNSC. Refresher training is also provided. During an emergency, NEO communication positions are staffed with communication experts. Templates for press releases and

information dissemination exist. The public website provides information covering topics of general interest, such as the design of CANDU reactors, basics of radiation protection, etc. This information has been enhanced in light of lessons-learned from the Fukushima accident. Pre-designed web pages, which could be posted on the web in case of a major accident, are in preparation. The interfaces to public communication groups of the licensee and governmental emergency centres are clear and practiced during exercises.

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

CONCLUSION

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

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

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

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

CONCLUSION

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

MODULE 5: AUTHORIZATION – FUKUSHIMA ASSESSMENT

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

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

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

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

CONCLUSION

The IRRS Team concluded that CNSC has adequately addressed the authorization process in its review of the implications of the lessons learned from the TEPCO 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)	<p>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></p>
GPF4	<p>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.</p>

FUKUSHIMA: MODULE 7: INSPECTION

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

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

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

- Licensees’ accident management programmes and provisions, including station accident manuals and procedures;

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

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

CONCLUSION

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

FUKUSHIMA: MODULE 8: ENFORCEMENT

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

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

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

For situations deemed to be serious and considered to pose an imminent radiological hazard to workers, the public or the environment, the CNSC has the authority and will take whatever actions are necessary to restore an adequate level of safety and prevent unreasonable risk to the health, safety, security and the environment. This can range from a verbal request to cease the activities that are causing the situation, up to an order by an inspector or Commission Tribunal to cease activities and/or take whatever actions are deemed necessary to eliminate

the hazardous situation or mitigate its impact. Following an enforcement action, the CNSC follows up to ensure that the licensee has effectively implemented the necessary corrective actions. Action items or items of non-compliance are entered into the CNSC's Regulatory Information Bank/Banque d'information réglementaire (RIB/BIR) and include the licensee's commitments for corrective action. Each item entered has an action owner and closure criteria. Before closing an action item, CNSC staff first verifies that the action(s) taken by the licensee have been adequate to correct the identified non-compliance or deficiency. This is accomplished by: inspections; review of documents submitted by the licensee; interviews of licensee staff; reviews of performance; or any combination of the above techniques.

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

CONCLUSION

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

FUKUSHIMA: MODULE 9: REGULATIONS AND GUIDES

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

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

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

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

Improvements will be made as a result of recommendations arising from the CNSC Fukushima Task Force Report. The CNSC Fukushima Task Force has performed a review of

key regulations under the *Nuclear Safety and Control Act*, as well as key CNSC regulatory documents and guidance documents, including the topics of siting and licensing process; external hazards, including seismic and tsunami risks assessment; and emergency preparedness and response which are particularly relevant in the light of the Fukushima accident.

The main finding of the Task Force is that there is no overall need for the regulatory framework to be revisited in order to identify the minimum, necessary and sufficient number of Regulatory Documents (RDs) and Guidance Documents (GDs) to support the power reactor regulatory programme. However, the Fukushima Task Force Report made a number of recommendations for revisions to individual RDs and GDs. The Task Force concluded that RDs should be revised to update selected requirements and expectations for design-basis and beyond-design-basis accidents to ensure that lessons learned are built into the regulatory oversight programme for existing reactors and for new builds. The regulatory documents and guides that need to be revised include RD-337 “Design of New Nuclear Power Plants”, RD-310 “Safety Analysis for Nuclear Power Plants”, S-294 “Probabilistic Safety Assessment (PSA) for Nuclear Power Plants”, G-306 “Severe Accident Management Programs for Nuclear Reactors”, G-225 “Emergency Planning at Class I Nuclear Facilities and Uranium Mines and Mills” and RD-353 “Testing the Implementation of Emergency Measures” (Recommendation 9 in Appendix D of the Task Force Report). A revision of RD-337 “Design of New Nuclear Power Plants” is already underway with draft content awaiting CNSC management approval for release to internal review which will be followed by public consultation, Commission Tribunal approval, and publication. When the framework is revisited by the Regulatory Framework Steering Committee, the templates for the power reactor operating licence (PROL) and the associated NPP LCH should be used as the basis for identifying needs for RDs or GDs. The PROL and LCH templates currently contain some regulatory requirements or expectations that are not found in RDs or GDs. When the framework is revised, the opportunity will be taken to remedy this.

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

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

CONCLUSION

The IRRS Team concluded that CNSC conducted an appropriate review of their regulations and regulatory guides in the aftermath of the 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

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



APPENDIX I: LIST OF PARTICIPANTS

INTERNATIONAL EXPERTS		
VIRGILIO , Martin	United States Nuclear Regulatory Commission (USNRC), USA	Martin.Virgilio@nrc.gov
GRAY , Robert	Office for Nuclear Regulation, UK	rcjogray@aol.com
NITSCHKE , Frank	Federal Office for Radiation Protection, Germany	fnitsche@bfs.de
JENDE , Erik	Swedish Radiation Safety Authority, Sweden	erik.jende@ssm.se
CIUREA-ERCAU , Cantemir	National Commission for Nuclear Activities Control, Romania	cantemir.ciurea@cncan.ro
SELLING , Hendrik	NL Agency, Netherlands	henk.selling@agentschapnl.nl
GLOECKLE , Walter	Ministry of the Environment, Climate Protection and the Energy Sector Baden-Württemberg, Germany	Walter.Gloeckle@um.bwl.de
REPONEN , Heikki	Radiation and Nuclear Safety Authority - STUK, Finland	heikki.reponen@stuk.fi
SANFILIPPO , Nathan	United States Nuclear Regulatory Commission (USNRC), USA	nathan.sanfilippo@nrc.gov
LEVANON , Ishay	Israel Atomic Energy Commission, Israel	levanone@netvision.net.il
IAEA STAFF MEMBERS		
GRAVES , Graves	Division of Nuclear Installation Safety	D.Graves@iaea.org
WHEATLEY , John	Division of Radiation, Transport and Waste Safety	J.Wheatley@iaea.org
GILLEY , Debbie	Division of Radiation, Transport and Waste Safety	D.Gilley@iaea.org
CAPADONA , Nancy	Division of Radiation, Transport and Waste Safety	N.Capadona@iaea.org
AL-MADHI , Balsam	Division of Nuclear Installation Safety	B.Al-Madhi@iaea.org
OFFICIAL CNSC LIAISON OFFICER		
GRACIE , Brian	Canadian Nuclear Safety Commission (CNSC)	Brian.Gracie@cnscccsn.gc.ca

APPENDIX II: MISSION PROGRAMME

26 November - 2 December 2011

26-27 Nov	28 Nov	29 Nov	30 Nov	1 Dec	2 Dec
Sat - Sun	Monday	Tuesday	Wednesday	Thursday	Friday
26 Nov: IRRS team arrives	AM: Entrance Meeting IRRS Team, CNSC Management & Staff (Webcast)	Morning meeting of Team Leader (TL), Deputy Team Leader (DTL) & Team Coordinator (TC) with CNSC Management	Morning meeting of TL, DTL & TC with CNSC Management	Morning meeting of TL, DTL & TC with CNSC Management	Morning meeting of TL, DTL & TC with CNSC Management
27 Nov: 14:00 – 18:00 Initial IRRS Team meeting in hotel, plus CNSC Liaison Officers	PM: Counterpart interviews at CNSC HQ for: Follow-up; Fukushima & Transport	Counterpart interviews at CNSC HQ (Follow-up & Fukushima) Transport interviews at CNSC Telesat Offices	Counterpart interviews at CNSC HQ (Follow-up & Fukushima) Meeting at Transport Canada/ CANUTEC	Counterpart interviews at CNSC HQ (Follow-up & Fukushima) Transport interviews at CNSC Telesat Offices	Counterpart interviews at CNSC HQ (Follow-up & Fukushima) Observation of transport inspections at Draximage & Purolater in Montreal PM: Fukushima team departs for Point Lepreau
	IRRS daily team meeting 17:00	IRRS daily team meeting 17:00	IRRS daily team meeting 17:00	IRRS daily team meeting 17:00	IRRS daily team meeting 17:00

3 – 9 December 2011

3 Dec	4 Dec	5 Dec	6 Dec	7 Dec	8 Dec	9 Dec
Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
<p>IRRS team draft text for report</p> <p>Fukushima team return ~9 PM</p>	<p>IRRS team draft text for report</p>	<p>Morning meeting of TL, DTL & TC with CNSC Management</p> <p>IRRS team prepare draft report</p> <p>Observation of transport inspection at Nordion, Kanata</p>	<p>Morning meeting of TL, DTL & TC with CNSC Management</p> <p>IRRS team discuss draft report prior to giving to CNSC for review</p> <p>Fukushima Expert Advisory Committee (to CNSC President) meet with TL, DTL, and Fukushima review team</p> <p>COB: Draft report to CNSC for review</p>	<p>Morning meeting of TL, DTL & TC with CNSC Management</p> <p>CNSC review draft report and provide feedback</p> <p>Policy discussion on ‘Special Arrangements for Transport’: IRRS team plus CNSC President and Management</p> <p>IRRS team prepare draft press release and exit meeting presentation</p>	<p>Joint review of draft IRRS draft report by IRRS team and CNSC management</p> <p>IRRS team finalize press release and exit meeting presentation</p> <p>IRRS team meet with CNSC president</p>	<p>AM: Exit Meeting</p> <p>PM: IRRS Team depart</p>
		<p>IRRS daily team meeting 17:00</p>	<p>IRRS daily team meeting 17:00</p>	<p>IRRS daily team meeting 17:00</p>		

APENDIX III: SITE VISITS

SITE VISITS IRRS CANADA		
	Name of the Place	IRRS Experts
1.	Montreal Port Authority Port of Montreal, 2100 Pierre-Dupuy Avenue, Wing1 Montreal, QC, H3C 3R5	Frank NITSCHÉ Nancy CAPADONA
2.	Jubilant DraxImage Inc. 16751 Trans-Canada Highway Kirkland, QC, H9H 4J4	Frank NITSCHÉ Nancy CAPADONA
3.	Purolator 5000 Cote Vertu Ouest Saint Laurent, QC, H4S2E6	Frank NITSCHÉ Nancy CAPADONA
4.	Nordion 447 March Rd Ottawa, ON, K2K 1X8	Frank NITSCHÉ Nancy CAPADONA John WHEATLEY
5.	NB Power Point Lepreau Nuclear Generating Station 122 County Line Rd. Maces Bay, NB, E5J 1W1	Walter GLÖCKLE Cantemir CIUREA-ERCAU Nathan SANFILIPPO Ishay LEVANON

APPENDIX IV: LIST OF MISSION COUNTERPARTS

Name	Title	Subject Area
Michael BINDER	President, CNSC	Executive Counterpart
Ramzi JAMMAL	Executive Vice-President and Chief Regulatory Operations Officer, CNSC	Executive Counterpart
Brian GRACIE	Senior Regulatory Program Officer, Licensing Support Division, Directorate of Power Reactor Regulation, CNSC	Liaison Officer for IRRS Follow-up Mission
Barclay HOWDEN	Director General Directorate of Regulatory Improvement and Major Projects Management, CNSC	Follow-up counterpart
Greg RZENTKOWSKI	Director General Directorate of Power Reactor Regulation, CNSC	Fukushima Counterpart
André RÉGIMBALD	Director General Directorate of Nuclear Substance Regulation, CNSC	Transport Counterpart
Mark DALLAIRE	Director General Regulatory Policy Directorate, CNSC	Regulatory Framework Counterpart
Sylvain FAILLE	Director Transport Licensing and Strategic Support Division Directorate of Nuclear Substance Regulation, CNSC	Transport Delegate
Philip WEBSTER	Regulatory Program Director Darlington Regulatory Program Division Directorate of Power Reactor Regulation, CNSC	Fukushima Delegate

APPENDIX V: RECOMMENDATIONS AND SUGGESTIONS FROM THE 2009 IRRS MISSION THAT REMAIN OPEN

Section	Areas	R: Recommendation S: Suggestion	Recommendations/Suggestions
2	RESPONSIBILTIES AND FUNCTIONS OF THE REGULATORY BODY	S1	Suggestion: Consideration should be given to updating the 1998 Memorandum of Understanding with Health Canada. This update should also define the roles and responsibilities of the Federal Provincial Territorial Radiation Protection Committee to ensure that there is a comprehensive and consistent safety regulation and oversight.
4	AUTHORIZATION	R5	Recommendation: CNSC should consider how to introduce effective arrangements for undertaking periodic safety reviews (PSRs) for these Class-1 facilities. Such PSRs should be proportionate and commensurate to the hazards to be controlled.

APPENDIX VI: RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES FROM THE 2011 IRRS FOLLOW-UP MISSION

Section	Areas	RF: Recommendation SF: Suggestion GPF: Good Practice	Recommendations, Suggestions or Good Practices
10	TRANSPORT OF RADIOACTIVE MATERIAL	SF1	Suggestion: CNSC, in conjunction with Transport Canada, should consider enhancing the MOU and its implementing procedures in its next revision to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties.
		SF2	Suggestion: CNSC should consider including the witnessing of manufacturing as an action within its measures and procedures to demonstrate compliance assurance according to para. 307 of TS-R-1, and the consolidated compliance assurance programme should be documented and be subject to regular review.
		GPF1	Good practice: The CNSC's use of systematic inspections of Radiation Protection Programs of carriers to facilitate the periodic assessments of radiation doses to transport workers, as required by para. 308 of TS-R-1, is considered to be a good practice.
		SF3	Suggestion: The CNSC should consider establishing requirements for ensuring that any design changes/modifications made after the package design is approved do not invalidate the approved design.
		RF1	Recommendation: CNSC should review, and revise as necessary, its process and procedures to ensure that the contents of all types of package design certificates meet the requirements of para. 833 of TS-R-1 (2009). Such a review should also be conducted for other types of CNSC certificates which are subject to TS-R-1

Section	Areas	RF: Recommendation SF: Suggestion GPF: Good Practice	Recommendations, Suggestions or Good Practices
			requirements.
		SF4	<u>Suggestion:</u> CNSC should consider reviewing the application of its electronic database to create package design approval certificates to verify full consistency of all produced certificates and to allow for options for extensions of a certificate like the addition of information on previous revisions of the certificate as an annex to it.
		GPF2	<u>Good practice:</u> The CNSC Regulatory Document RD-364 “Joint Canada-United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages” is a very detailed and comprehensive guide to assist applicants to demonstrate compliance with the Regulations as well as to assist competent authorities in the review and approval of applications. As such it contributes to a harmonized practice between Canada and the U.S. in the field of package design assessment and approval.
		SF5	<u>Suggestion:</u> The CNSC should consider developing specific assessment procedures, assessment criteria and decision sheets to be used by its transport specialists for all types of package design assessments based on the Regulatory Document RD-364. The CNSC should also consider the specific guidance on this subject given by IAEA in ‘Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material’ (TS-G-1.1). Consideration should also be given to applying the same approach to assessment procedures for other types of approvals related to TS-R-1.

Section	Areas	RF: Recommendation SF: Suggestion GPF: Good Practice	Recommendations, Suggestions or Good Practices
		SF6	<u>Suggestion:</u> The CNSC should consider options to systematically obtain, and utilize where applicable, feedback from inspection activities and results from local authorities.
		SF7	<u>Suggestion:</u> The CNCS should consider specifying in their package design approval certificates that the date of the next maintenance or servicing operation, according to the approved maintenance or servicing program, should be indicated on the packaging.
		RF2	<u>Recommendation:</u> The CNSC should revise the PTNS regulations by implementing the current 2009 Edition of TS-R-1, and changes resulting from the latest edition of TS-R-1 expected to be published in 2012 should be taken into account.
		SF8	<u>Suggestion:</u> The CNSC should consider options to increase clarity and user-friendliness of the PTNS regulations, including ease of access to TS-R-1 text, and to investigate enhanced harmonization between definitions in the PTNS regulations and definitions of TS-R-1.
		RF3	<u>Recommendation:</u> The CNSC, in conjunction with Transport Canada, should establish a formal procedure which provides for a parallel review and revision process of their regulations for Class 7 material to implement revised editions of TS-R-1 consistently.
		RF4	<u>Recommendation:</u> The CNSC should identify and resolve inconsistencies in different CNSC regulations regarding transport during the process of revising and updating the PTNS regulations.

Section	Areas	RF: Recommendation SF: Suggestion GPF: Good Practice	Recommendations, Suggestions or Good Practices
		RF5	<u>Recommendation:</u> The CNSC should ensure consistency between the TDG regulations and the PTNS regulations with regard to international shipments by implementing an adequate requirement as contained in the TDG regulations into the PTNS regulations which allow such shipments according to the latest edition of the applicable international modal transport regulation.
		RF6	<u>Recommendation:</u> The CNSC should ensure that the next revision of the PTNS regulations is consistent with competent authority approval requirements according to TS-R-1.
		GPF3	<u>Good practice:</u> The Canadian Transport Emergency Centre (CANUTEC) together with the CNSC's ability to provide technical assistance and regulatory oversight 24 hour/7 days a week, the Emergency Response Assistance Plans (ERAPs) of consignors and the Federal Nuclear Emergency Plan (FNEP) provide an excellent system for emergency response.
11	REGULATORY IMPLICATIONS OF THE TEPCO FUKUSHIMA DAICHI ACCIDENT	RF7	<u>Recommendation:</u> The Government of Canada should assure that the review and assessment of off-site emergency plans for nuclear power plants includes all relevant authorities, are comprehensive, and that the relevant organizations which implement those plans are capable of performing the assigned duties.
		SF9	<u>Suggestion:</u> The Government of Canada should consider inviting an international peer review mission for emergency preparedness and response.

Section	Areas	RF: Recommendation SF: Suggestion GPF: Good Practice	Recommendations, Suggestions or Good Practices
		GPF4	<p><u>Good Practice:</u> The CNSC has performed a systematic and thorough review of the implications and the lessons learned from the Fukushima 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.</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>

APPENDIX VII: REFERENCE MATERIAL PROVIDED BY CNSC

(Unless otherwise noted, documents are CNSC documents)

Follow-up References:

Module 2

- Memorandum of Understanding with Health Canada

Module 3

- RSP Three Year Distribution
- Research and Support Program Plan
- Integrated CSSP-RSP Three Year Plan
- Management Committee Decision June 30 2011
- Cost Allocation Model: Fee Charging Regime
- Management Committee Decision March 18, 2010
- ROB-TSB Regulatory Program Leadership Committee Terms of Reference
- Briefing Note for Management Committee on Safety and Security at the CNSC
- How to Establish Communication Protocol between CNSC and Licensee
- ToR External Advisory Committee Japan Nuclear Lessons Learned

Module 4

- HP Update to Management Committee June 23, 2011
- HP Update to Management Committee August 29, 2011
- Close-Out Report: Class 1 Facilities Licence Improvement Project
- Licensing Basis Objective and Definition – INFO 0795
- DPRR Working Group's Recommendations on Generic PROL and LCH
- Generic New Proposed PROL Template
- HP Initiative Dashboard – Licence Reform Phase II Implementation of Lessons Learned
- CMD 11-M63: Periodic Safety Reviews of Nuclear Power Plants
- Regulatory Framework Plan
- New Nuclear Power Plant - Lifecycle Project Plan Phase II
- Definition of Safe Operating Envelope
- Cameco's Fourth Response to the CNSC November 25-27 09 Type II
- CNSC Assessment of Cameco proposal
- Project Plan Lifecycle Project
- New Nuclear Power Plant - Lifecycle Project Plan Phase II

Module 5

- Generic template for Nuclear Power Plant Operating Licence

Module 6

- Baseline plan for Nuclear Power Plants
- HP Initiative Dashboard - Conduct of Inspections
- How to Conduct Inspections
- HP Initiative Dashboard – ATT-RIB/BIR
- RIB/BIR Project Close-out Report (July 2011)
- RIB/BIR Phase 1 Operations Implementation Strategy

Module 7

- Regulatory Framework on Radioactive Waste Management-Gap Analysis and Plan for New or Updated Regulations or Guides
- Regulatory Framework Plan
- BORIS and CNSC website under Regulatory Document
- Conduct of Technical Assessment Phase 1 Final
- Briefing Note Update on Management Response to IRRS S15

Module 8

- HP Update to Management Committee - June 23, 2011
- HP Update to Management Committee - August 29, 2011
- CNSC Review of Documentation Approaches and Methodologies Final Report (M. Hart Report)
- CNSC Management Response to M. Hart Report
- An Assessment of the CNSC Management System - John Pacigas Report
- Harmonized Plan and Management System ‘contact us’ links
- Management review of priorities and risks
- ToR: Audit of Performance Measurements and Reporting
- ToR-Draft Performance measurement and Reporting
- CNSC Strategic Outlook Framework
- FAD 2010 CNSC Investment Opportunity MC Recommendation
- Mid-year review process improvement 10(OWPSC-02) Documentation-August 25, 2010

- Operations Work Plan Steering Committee 10(OWPSC-02) Minutes-August 25, 2010
- HP Initiative Dashboard-Self-Assessment of the Management System Processes
- How to Conduct a Self-Assessment of CNSC Processes (June 2011)

Code of Conduct

- Briefing Note for OMC Orphan Source Program
- Orphan Source Program OMC Presentation August 24, 2010

Transport References:

Module 1

- *Nuclear Safety and Control Act*
- *Packaging and Transport of Nuclear Substances Regulations*
- *Transportation of Dangerous Goods Act* (source: Justice Canada)
- *Transportation of Dangerous Goods Regulations* (source: Transport Canada)
- Memorandum of Understanding with Transport Canada
- *General Nuclear Safety and Control Regulations*
- *Ontario Dangerous Goods Transportation Act* (source: Province of Ontario)
- *Radiation Protection Regulations*
- *Statutory Instruments Act* (source: Justice Canada)
- *Cabinet Directive on Streamlining Regulation* (source: Treasury Board of Canada – Secretariat)
- Work Description Form for Transport Specialist

Module 2

- *Packaging and Transport of Nuclear Substances Regulations*
- *Nuclear Security Regulations*
- *Nuclear Safety and Control Act*
- Federal Nuclear Emergency Plan (source: Health Canada)
- Memorandum of Understanding with Transport Canada
- *Transportation of Dangerous Goods Act* (source: Justice Canada)
- *Transportation of Dangerous Goods Regulations* (source: Transport Canada)
- Agreement with USNRC and USDOT
- CNSC Management System Manual
- CNSC guide G-208, Transportation Security Plans for Category I, II or III Nuclear Material

Module 3

- *Nuclear Safety and Control Act*
- *Radiation Protection Regulations*
- *Packaging and Transport of Nuclear Substances Regulations*
- CNSC regulatory document RD/GD-314, Radiation Protection Program Design for the Transport of Nuclear Substances
- *Transportation of Dangerous Goods Regulations* (source: Transport Canada)
- *Cost Recovery Fees Regulations*
- CNSC Management System Manual
- *Transportation of Dangerous Goods Act* (source: Justice Canada)
- Memorandum of Understanding with Transport Canada
- Type I Inspection Procedure
- CNSC Information Classification Structure
- CNSC Process Document Select and Apply Enforcement Tools
- Transport Inspection Checklist

Module 4

- *Transportation of Dangerous Goods Regulations* (source: Transport Canada)
- *Class I Nuclear Facilities Regulations*
- *Uranium Mines and Mills Regulations*
- *Nuclear Substances and Radiation Devices Regulations*
- Federal Nuclear Emergency Plan (source: Health Canada)
- *Nuclear Safety and Control Act*
- *Packaging and Transport of Nuclear Substances Regulations*
- *Transportation of Dangerous Goods Act* (source: Justice Canada)
- *General Nuclear Safety and Control Regulations*
- Emergency Response Guidebook 2008 (source: Transport Canada and US Department of Transport)
- Memorandum of Understanding with Transport Canada
- CNSC Emergency Response Plan CAN2-1
- Copy of certificate CDN/5244-X-96
- Letter to the Montreal Emergency Preparedness Centre
- CNSC policy P-325, Nuclear Emergency Management
- Memorandum of Understanding with Emergency Management Ontario

- Sample plan for ERAP (<http://www.tc.gc.ca/tdg/menu.htm>) (source: Transport Canada)
- Training material developed for First Responders (source: Government of Canada)
- CNSC regulatory document RD-353, Testing the Implementation of Emergency Measures
- ERAP Site Assessment Report (Source: Transport Canada)
- Emergency Response Assistance Plan Demonstration/Exercise Summary Form

Module 5

- *Packaging and Transport of Nuclear Substances Regulations*
- *Transportation of Dangerous Goods Regulations* (source: Transport Canada)
- C-7001.00 DNSR Event Response Procedure
- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- *Nuclear Substance and Radiation Devices Regulations*
- *Radiation Protection Regulations*
- CNSC regulatory policy P-211, Compliance
- CNSC Process Document Select and Apply Enforcement
- Memorandum of Understanding with Transport Canada
- *Transportation of Dangerous Goods Act* (source: Justice Canada)
- HazMat Team Emergency Response Manual for Class 7 Transport Emergencies - INFO-0764 Rev. 2
- Federal Nuclear Emergency Plan (source: Health Canada)
- CNSC Emergency Response Plan

Module 6

- *Packaging and Transport of Nuclear Substances Regulations*
- *Transportation of Dangerous Goods Regulations*
- CNSC regulatory document RD/GD-314, Radiation Protection Program Design for the Transport of Nuclear Substances
- Inspector Training and Qualification Program
- CNSC guide G-129, Keeping Radiation Exposures and Doses “As Low as Reasonably Achievable (ALARA)
- Emergency Response Guidebook 2008 (source: Transport Canada and US Department of Transport)
- Training material developed for First Responders (source: Government of Canada)
- *Nuclear Safety and Control Act*
- DNSR Newsletter

- Fact Sheet on Regulating the Packaging and Transport of Nuclear Substances in Canada
- Transport of Dangerous Goods Newsletter (source: Transport Canada)
- Memorandum of Understanding with Transport Canada
- *Transportation of Dangerous Goods Act* (source: Justice Canada)

Module 7

- *Packaging and Transport of Nuclear Substances Regulations*
- *Class I Nuclear Facilities Regulations*
- *Uranium Mines and Mills Regulations*
- *Class II Nuclear Facilities and Prescribed Equipment Regulations*
- CNSC Management System Manual
- *Nuclear Safety and Control Act*
- Copy of Type B(U) Certificate

Module 8

- *Packaging and Transport of Nuclear Substances Regulations*
- CNSC regulatory document RD-364, Joint Canada - United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages
- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- CMD 01-M17 Establishing Classes of Licences
- CMD 08-M10 Designated Officers List
- Example of Designated Officer Certificate
- C-SOP-0002.01 Certification of Transport Packages, Radiation Devices and Class II Prescribed Equipments
- T-0008.00 Peer Review Process
- Examples of Approval Certificate issued for Type B(U) packages
- Copy of Type B(U) Certificates
- Copy of Special Arrangement Certificates

Module 9

- *Packaging and Transport of Nuclear Substances Regulations*
- CNSC regulatory document RD-364, Joint Canada- United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages
- Inspection Checklist

- Copy of Type B(U) package certificate and correspondence

Module 10

- *Packaging and Transport of Nuclear Substances Regulations*
- CNSC regulatory document RD-364, Joint Canada - United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages
- *Nuclear Safety and Control Act*
- *Radiation Protection Regulations*
- CNSC Annual Report
- Work Description Form of Transport Specialists

Module 11

- *Packaging and Transport of Nuclear Substances Regulations*
- CNSC regulatory document RD-364, Joint Canada - United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages

Module 12

- *Packaging and Transport of Nuclear Substances Regulations*
- Correspondence with applicant on opportunity to witness testing F-458 transport package
- CNSC regulatory document RD-364, Joint Canada - United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages
- Correspondence regarding the design of the F-423 Transport Package
- Example of a report documenting the drop test F-458

Fukushima References:

SECTION 11.1 CNSC'S ACTIONS IN AFTERMATH OF FUKUSHIMA ACCIDENT

- *General Nuclear Safety and Control Regulations*, Presentation by Dr. Binder, President of CNSC, to International Nuclear Regulators Association
- *Nuclear Safety and Control Act*,
- CMD 11-M15, CNSC Staff Briefing
- CMD 11-M30. Status Report on Power Reactors

SECTION 11.3 SIGNIFICANCE OF REGULATORY IMPLICATIONS OF FUKUSHIMA ACCIDENT

Module 1:

- *Nuclear Safety and Control Act*
- Federal Emergency Response Plan (source: Public Safety Canada)
- Federal Nuclear Emergency Plan (source: Health Canada)
- *Canadian Nuclear Safety Commission Rules of Procedure*
- *Class I Nuclear Facilities Regulations*
- *General Nuclear Safety and Control Regulations*
- CNSC regulatory document RD-353, Testing the Implementation of Emergency Measures
- *Canada Labour Code* (source: Department of Justice)
- *Transportation of Dangerous Goods Act* (source: Transport Canada)
- *Canadian Environmental Protection Act* (source: Environment Canada)
- *Canadian Environmental Assessment Act* (source: Department of Justice)
- *Species at Risk Act* (source: Department of Justice)
- *Migratory Bird Convention Act* (source: Department of Justice)
- *Navigable Waters Protection Act* (source: Department of Justice)
- *Fisheries Act* (source: Department of Justice)
- *Emergencies Act* (source: Department of Justice)
- *Emergency Management Act* (source: Department of Justice)
- *Canada Water Act* (source: Department of Justice)
- Fukushima Task Force Report
- Nuclear Power Plant Safety Review Criteria

Module 2:

- Canadian National Report for the Convention on Nuclear Safety

- Code of Conduct on the Safety and Security of Radioactive Sources (source: IAEA)
- 2009 IRRS Report to Canada
- CNSC regulatory document RD-360, Life Extension of Nuclear Power Plants
- CNSC regulatory document RD-367, Design of Small Reactor Facilities
- *Packaging and Transport of Nuclear Substances Regulations*
- *Cabinet Directive on Streamlining Regulation* (source: Treasury Board of Canada Secretariat)
- CNSC regulatory document RD-337, Design of New Nuclear Power Plants
- CNSC regulatory document RD-346, Site Evaluation for New Nuclear Power Plants

Module 3:

- *Nuclear Energy Act* (source: Department of Justice)
- *Department of Natural Resources Act, 1994*
- *Nuclear Safety and Control Act*
- *CNSC's Cost Recovery Fees Regulations*
- Federal Nuclear Emergency Plan (source: Health Canada)
- CNSC Emergency Response Plan
- CNSC regulatory policy P-325, Nuclear Emergency Management

Module 4:

- Harmonized Plan of Improvement Initiatives
- HP dashboards (October 2011)
- Draft CNSC Process Document: How to Conduct a Self-Assessment
- Taking the Pulse survey – Learning
- Taking the Pulse survey – Senior Management
- Taking the Pulse survey – Work Environment
- Public Service Employee Survey (source: Statistics Canada)
- Staff Survey – Towers Watson

- Management responses to formal audits / assessments / evaluations:
 - Departmental Performance Reports (annual results-based accountability reporting)
 - Evaluation of management practices against Management Accountability Framework (Treasury Board Secretariat and CNSC, 2010)
 - Audit of Sealed Source Controls (CNSC Office of Audit and Ethics, 2009)
 - Audit of Staffing (CNSC Office of Audit and Ethics, 2010)
 - Audit of Contracting and Procurement (CNSC Office of Audit and Ethics, 2010)
 - Audit of Revenue Management (CNSC Office of Audit and Ethics, 2010)
 - Audit of Compliance Enforcement (CNSC Office of Audit and Ethics, 2011)
 - Preliminary Survey of Risk Management Audit, (CNSC Office of Audit and Ethics, 2010)
 - Review of Approaches and Methodologies used for Documentation of CNSC Management System (3rd-party M. Hart, 2010)
 - An Assessment of the CNSC Management System (3rd-party J. Paciga, 2011)
 - Employee Engagement Pulse survey (3rd-party Towers Watson 2010)
 - Employee ‘Taking the Pulse’ surveys on the Working Environment (2010), Senior Management (2011) and Learning (2011)
- Public Sector Employee Survey – 2011 (source: Statistics Canada)
- Harmonized Plan of Improvement Initiatives

Module 5:

- *Nuclear Safety and Control Act*
- CNSC draft regulatory document RD/GD-368.1 Licence Application Guide - Licence to Prepare Site for a Class I Facility: Nuclear Power Plants and Small Reactors
- CNSC Info-doc 0756 (Revision 1), Licensing Process for New Nuclear Power Plants in Canada
- CNSC regulatory document RD/GD-369, Licence Application Guide - Licence to Construct a Nuclear Power Plant
- CNSC regulatory document RD-360, Life Extension for Nuclear Power Plants
- CNSC regulatory document RD-346, Site Evaluation for New Nuclear Power Plants
- CNSC regulatory document RD-337, Design for New Nuclear Power Plants
- Staff Review Procedures – Licence to Prepare a Site
(http://www.nuclearsafety.gc.ca/eng/licenseesapplicants/powerplants/newapplicants/staff_review_procedures/cnsc_staff_review_procedures_list.cfm)
- Staff Review Procedures – Environmental Impact Statement
(http://www.nuclearsafety.gc.ca/eng/licenseesapplicants/powerplants/newapplicants/staff_review_procedures/cnsc_staff_review_procedures_list.cfm)

- *Cabinet Directive on Streamlining Regulation* (source: Treasury Board of Canada Secretariat)

Module 6:

- *General Nuclear Safety and Control Regulations*
- Fukushima Task Force Nuclear Power Plant Safety Review Criteria
- *Nuclear Safety and Control Act*
- Multi-national Design Evaluation Programme (<http://www.oecd-nea.org/mdep>)
- Nuclear Power Plant Safety Review Criteria
- *Access to Information Act* (source: Department of Justice)
- *Privacy Act* (source: Department of Justice)
- CNSC Fukushima Task Force - Project Charter
- Management Response to the Fukushima Task Force Report
- Regulatory Framework Steering Committee – Terms of Reference

Module 7:

- CNSC regulatory document S-99, Reporting Requirements for Operating Nuclear Power Plants
- *Nuclear Safety and Control Act*
- CNSC Staff Briefing - CMD 11-M15
- Darlington staff activities for a commission meeting
- Status Report on Power Reactors - CMD 11-M30
- CNSC Fukushima Task Force Report

Module 8:

- CNSC regulatory policy P-211 Compliance
- *Nuclear Safety and Control Act*
- CNSC process document Select and Apply Enforcement Tools

- CNSC regulatory guide G-273 Making, Reviewing and Receiving Orders
- *Canadian Nuclear Safety Commission Rules of Procedure*

Module 9:

- Regulatory Framework Plan
- Regulatory Framework Steering Committee – Terms of Reference
- *Nuclear Safety and Control Act*
- Fukushima Task Force Report
- Regulatory Framework Steering Committee – Terms of Reference
- CNSC regulatory document RD-337, Design of New Nuclear Power Plants
- CNSC regulatory document RD-310, Safety Analysis for Nuclear Power Plants
- CNSC regulatory document S-294, Probabilistic Safety Assessment (PSA) for Nuclear Power Plants
- CNSC guidance document G-306, Severe Accident Management Programs for Nuclear Reactors
- CNSC guidance document G-225, Emergency Planning at Class I Nuclear Facilities and Uranium Mines and Mills
- CNSC regulatory document RD-353, Testing the Implementation of Emergency Measures
- *Class I Nuclear Facilities Regulations*
- CNSC regulatory document RD-346, Site Evaluation for New Nuclear Power Plants

Module 10:

- Disaster Financial Assistance Arrangements (source: Public Safety Canada) (<http://www.publicsafety.gc.ca/prg/em/dfaa/index-eng.aspx>)
- Federal Nuclear Emergency Plan (source: Health Canada)
- CNSC Fukushima Task Force report
- Federal Emergency Response Plan (source: Public Safety Canada)
- *Nuclear Safety and Control Act*

- CNSC regulatory document RD-353, Testing and implementation of Emergency Measures
- CNSC guidance document G-225, Emergency Planning at Class I Nuclear Facilities and Uranium Mines
- Fukushima Task Force Report
- CNSC regulatory document P-325, Nuclear Emergency Management
- *Nuclear Safety and Control Act*

Modules 5-9:

- CNSC regulatory document RD-346, Site Evaluation for New Nuclear Power Plants
- CNSC regulatory document RD/GD-368.1, Licence Application Guide - Licence to Prepare Site for a Class I Facility: Nuclear Power Plants and Small Reactors
- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- Fukushima Task Force Report
- Nuclear Power Plant Safety Review Criteria
- CNSC regulatory document RD-310, Safety Analysis for Nuclear Power Plants
- CNSC regulatory document RD-337, Design of New Nuclear Power Plants
- Fukushima Task Force Report
- Nuclear Power Plant Safety Review Criteria
- CNSC regulatory document GD-310, Guidance on Safety Analysis for Nuclear Power Plants
- *Class 1 Nuclear Facility Regulations*
- CNSC regulatory document S-294, Probabilistic Safety Assessment for Nuclear Power Plants
- Tutorial on Unit Service Power (<http://canteach.candu.org/library/20042901>)
- *Radiation Protection Regulations*
- Fuel transfer background information (<http://canteach.candu.org/library/20054405.pdf>)
- INFO-0795 Licensing Basis Objective and Definition

- CNSC guidance document G-225, Emergency Planning at Class I Nuclear Facilities and Uranium Mines and Mills
- CNSC regulatory document RD-353, Testing the Implementation of Emergency Measures
- Nuclear Power Reactor Operating Licence, Pickering Nuclear Generating Station A
- Licence Conditions Handbook, Pickering Nuclear Generating Station A
- CNSC regulatory document RD-334, Aging Management for Nuclear Power Plants
- CNSC management response to Task Force report
- CNSC Regulatory Information Bank (source: BORIS webpage)
- Draft Building Performance Objective Criteria- Handout
- Building Performance Objective Criteria-Handout
- CNSC Regulatory Information Bank (source: BORIS webpage)

APPENDIX VIII: IAEA REFERENCE MATERIAL USED FOR THE REVIEW

- [1] INTERNATIONAL ATOMIC ENERGY AGENCY, Governmental, Legal and Regulatory Framework for Safety, Safety Standards Series No. GSR Part 1, IAEA, Vienna (2010).
- [2] INTERNATIONAL ATOMIC ENERGY AGENCY, Preparedness and Response for a Nuclear or Radiological Emergency, Safety Standards Series No. GS-R-2, IAEA, Vienna (2002).
- [3] INTERNATIONAL ATOMIC ENERGY AGENCY, The Management System for Facilities and Activities, Safety Standards Series No. GS-R-3, IAEA, Vienna (2006).
- [4] INTERNATIONAL ATOMIC ENERGY AGENCY, Regulation for the Safe Transport of Radioactive Material, Safety Standards Series No. TS-R-1, IAEA, Vienna (2009).
- [5] INTERNATIONAL ATOMIC ENERGY AGENCY, Site Evaluation for Nuclear Installations, Safety Requirements, Safety Standards Series No. NS-R-3, IAEA, Vienna (2003).
- [6] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Power Plants: Commissioning and Operation, Specific Safety Requirements, Safety Standards No. SSR-2/2, IAEA, Vienna (2011).
- [7] INTERNATIONAL ATOMIC ENERGY AGENCY, Periodic Safety Review of Nuclear Power Plants, Safety Standards Series, Safety Guide, No. NS-G-2.10, IAEA, Vienna (2003).
- [8] INTERNATIONAL ATOMIC ENERGY AGENCY, The International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, Safety Series No. 115, IAEA, Vienna (1996).
- [9] INTERNATIONAL ATOMIC ENERGY AGENCY, Code of Conduct: Code of Conduct on the Safety and Security of Radioactive Sources, and supplementary Guidance on the Import and Export of Radioactive Source, IAEA, Vienna (2006).

APPENDIX IX: CNSC ORGANIZATIONAL CHART

