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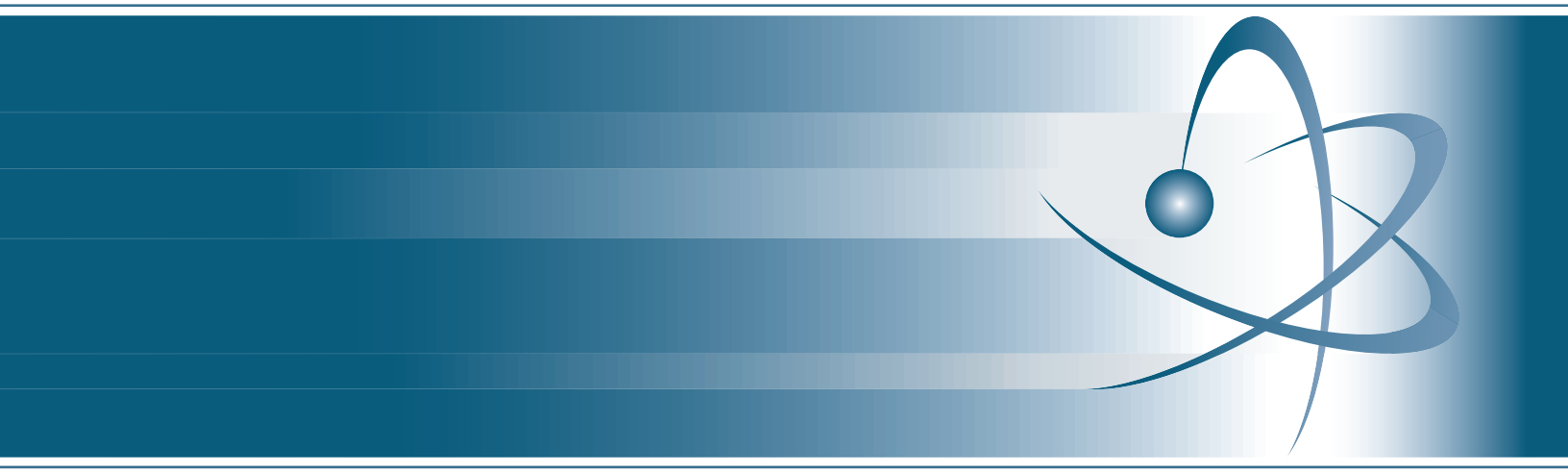
Responses to Questions Raised from Peer Review of Canada's Third National Report for the Convention on Nuclear Safety



Third Review Meeting
April 2005

Canada

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Responses to Questions Raised from Peer Review of Canada's Third National Report For the Convention on Nuclear Safety

Third Review Meeting

April 2005

This document supplements the Canadian National Report for the Third Review Meeting of the Convention on Nuclear Safety. By offering additional and detailed information in response to 129 specific questions received from 15 Contracting Parties, the document demonstrates how Canada has implemented its obligations under the Convention on Nuclear Safety. This document is produced by the Canadian Nuclear Safety Commission on behalf of Canada. Contributions to the document were made by representatives from Ontario Power Generation, Bruce Power, New Brunswick Power, Hydro-Québec, Health Canada, Natural Resources Canada, Foreign Affairs Canada, Atomic Energy of Canada Limited (also representing the CANDU Owners Group), the Canadian Nuclear Association, and the Emergency Response Organizations of the provinces of Ontario, Québec and New Brunswick.

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GENERAL COMMENTS					
1	Belgium	General		General remark: plenty of references are made to the 2nd report. It would more convenient for the reader to have a self-supported document.	That is true; it would be convenient for the reader to have a freestanding document. In preparing its report, Canada has adhered to IAEA guidelines and taken into account other practical measures. Article II of the IAEA Guidelines for National Reports states, in relation to national reports subsequent to the first report, that "the National Report of a Contracting Party at following meetings should contain updated information on matters covered in the first report, noting significant changes in national nuclear safety laws, regulations and practices. It should also address safety issues which have been identified in the country's previous report or which have arisen since the previous report. In particular, it should address progress in safety analysis and improvement programs at existing nuclear facilities. Finally, it should respond to any recommendations adopted at the plenary sessions of the previous Review Meeting of the Contracting Parties," and "a flexible approach can be adopted to the writing of reports, provided that each report strikes a balance between being sufficiently comprehensive to permit genuine evaluation of the extent of implementation of each obligation and being sufficiently concise to make both writing and reviewing the report practicable". The 2005-report submitted by Canada is believed to strike this balance between being sufficiently inclusive, demonstrating the implementation by Canada of its obligations under the Convention, and sufficiently concise, making both writing and reviewing the report practicable. Nonetheless, it may be a good idea that Canada's report for the 2008 Review Meeting be freestanding since it would be updating the information reported almost ten-years previously in the first Canadian report of 1999.
2	United Kingdom	General		The 2005 report refers extensively to previous CNS reports. Whilst this is generally satisfactory, it would have been helpful to reviewers if the references to previous reports had been more specific. Also, it would have been helpful if the 2005 report had at least provides a synopsis of the key issues of the 2002 report thereby making it more freestanding and easier to review. That aside, the report is informative and raises many interesting issues.	Canada appreciates the compliment on its 2005 national report. The 2005-report submitted by Canada is believed to strike a balance between being sufficiently inclusive, demonstrating the implementation by Canada of its obligations under the Convention, and sufficiently concise, making both writing and reviewing the report practicable. Other points mentioned in the question will be kept as invaluable feedback for possible consideration in the 2008 report.

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3	France	General	**p.1**	The reports reviewed by France in view of the third peer-review meeting were all examined according to a standard list of issues derived from the obligations of the Convention. If an issue appeared to be covered in an incomplete way by the report of a Contracting Party, this led to a question or comment. However France recognizes that the corresponding information may be available in other existing documents.	Canada notes the system used by France in reviewing country reports.
4	France	General	**p.1**	Canada has chosen not to address it its third report the aspects that remain unchanged from the previous report. However the fact that the regulation has not changed does not necessarily mean that there has been no progress in its implementation. In that sense a more self-standing report would have been appreciated, which would have allowed to clearly highlight the trends, progress and difficulties in complying with the regulation.	Canada appreciates this feedback. In preparing its report, Canada has adhered to IAEA guidelines and taken into account other practical measures. In addition, it is believed that the 2005 Canada report includes highlights of trends, progress and challenges in complying with the regulatory requirements and verifying their implementations at nuclear power plant (NPP) sites. That said, the feedback from France would be considered for the 2008 report.
ARTICLE 7: LEGISLATIVE AND REGULATORY FRAMEWORK **Regulatory Approach**					
5	Japan	Article 19.7	**3.19.1, p.49, L.3**	In section 3.19.1, it is mentioned that "National laws, regulations and requirements relating to the operation of nuclear power reactors were effectively unchanged during the reporting period." However, when the CNSC noticed of new safety requirements based on the state of the art technology, what is the legal procedure that requests to the licensees of the modification of structure and components or amendments of operational procedure of licensed NPPs?	The Commission, designated officers and inspectors have several tools at their disposal that could be used depending upon the circumstances. For example, Section 35 (1) of the *Nuclear Safety and Control Act* (NSCA) gives the power to make Orders. Section 12(2) of the General Nuclear Safety and Control Regulations (GNSCR) gives the Commission and staff authorized by the Commission the power to make requests. Section 29 of the GNSCR and subsection 6.3.2.3 of the Canadian Nuclear Safety Commission (CNSC) standard S-99 require that a licensee shall, within 21 days of becoming aware, through research findings or new or revised safety analyses, of a problem or potential problem that represents a hazard or potential hazard to the health and safety of persons, security or the environment, or that is different in nature, greater in probability, or greater in magnitude than was previously represented to the Commission in licensing documents, file a report with the CNSC. Based on the licensee's report, corrective actions could be taken either by the licensees or regulatory actions could be enforced by the CNSC. The CNSC commonly asks the licensee to request a licence amendment to permit the inclusion of new regulatory standards or licence

	Country	CNS Article	Report Reference	Question	Answer
					conditions. When the threat to safety of the NPP is sufficient, the Commission may modify the licence under Section 25 of the NSCA that states, "the Commission may, on its own motion, renew, suspend in whole or in part, amend, revoke or replace a licence under the prescribed conditions." The prescribed conditions are found in Section 8 of GNSCR.
6	Australia	Article 11		Australia appreciates the information on electricity market deregulation and its impact on plant safety. Is it likely that other provinces will also deregulate their electricity markets? Will the current deregulation have any impact on the CNSC's regulatory approach and financial resources for the foreseeable future?	Deregulation of provincial electricity markets is expected to be a condition of future participation in the broader electricity market, particularly as regards sales to the USA. As such, several provinces are expected to move towards deregulation and restructuring of any provincially owned vertically integrated electrical utilities. The market in Ontario was first deregulated in May 2002 to both retail and wholesale competition. For a discussion of the impact, please see the 2nd Canadian Report; subsection 11.4 on "Impact of Electricity Market Deregulation and Privatization in Canada." On December 9, 2004, the Ontario government passed legislation, Bill 100, which will implement broad plans to restructure the electricity sector to address the issue of supply and demand in the province. Under this proposal a hybrid market is established incorporating a mix of regulated and market based assets. This approach is unique to Ontario. The supply base will consist of so called heritage assets - which will be paid a regulated rate of return. Other generation will be paid market based rates while others will have long-term 'capacity' contracts with the Government. Consumers will pay the true cost of power based on the relevant costs associated with the mix of regulated assets, assets contracted with the Government and merchant plant. The implementation of the hybrid market is planned for spring of 2005 with many of the key steps already in place. New Brunswick Power (owned by the New Brunswick provincial government) was restructured late in 2004 into generation, transmission, customer service and nuclear generation subsidiaries and a holding company. Deregulation provides for an open market approach to electricity sales, transmission and purchase. However in New Brunswick only the larger municipal and industrial customers will have an open choice of electricity supplier in the near term. Deregulation is expected to affect the CNSC's review of the financial qualifications of applicants. Previously there have not been privately operated facilities in Canada. The licensing of Bruce Power changed that circumstance. The CNSC responded by including in the Bruce Power licences requirements for the maintenance of financial assurances. These assurances provide the CNSC with confidence that Bruce Power,

		CNS Article	Report Reference	Question	Answer
					or any other prospective private operator, will have access to the funds necessary to ensure the safe operation of the facilities. With respect to the CNSC's financial resources, CNSC licensing of nuclear generating facilities is undertaken on a cost recovery basis. In principle, cost recovery fees are not dependent on the nature of the nuclear generating industry structure or the actual sales of electricity. They are based per facility on the cost of licensing and regulating the facility, hence deregulation and restructuring should have no impact on financial resources available to the regulator.
ARTICLE 7: LEGISLATIVE AND REGULATORY FRAMEWORK **Regulatory Requirements**					
7	United Kingdom	Article 7	**3.7.1**	Although the 2002 report gave an overview of the legal and regulatory framework, it is difficult to see the total picture. This list of CNSC regulations in the 2002 report does not seem to be comprehensive. For example how does the regulatory authority exercise control over routine plant operation, plant operating parameters (technical specifications), maintenance, plant modifications and updating the final safety analysis report?	Most of the regulatory control over operation is based either on conditions in the licence, or on documents that are included in the licence by reference. If a regulatory standard such as S-99 or a national consensus standard is referenced in a licence condition, compliance with that standard can be enforced through the licence, with essentially the same regulatory effect as if that standard were imposed by regulation. The regulations are quite general and high-level. They specify things such as what kinds of program information must be submitted by the proponent as part of an application for a licence. Regulatory guidance documents give detailed direction on the expected contents of these program documents. Much of the regulatory control is based on documents that were submitted by the licensee as part of the licence application. For example, the CNSC's high level requirements for quality assurance (QA), staffing, training, maintenance, plant modification and so on are supported by references in licence conditions to the licensee's own program documents, which thereby become enforceable by the regulator. In general, control over routine plant operation, plant operating parameters, maintenance and minor plant modifications is the responsibility of the licensee. Key policies and principles and settings for certain key operating parameters are stated in the Operating Policies and Principles (OP&Ps) that are referenced in the operating licence. Changes to the OP&Ps must be approved by the CNSC. The OP&P document sets the Safe Operating Envelope (SOE). It is functionally similar to but not the same as the Technical Specifications (Tech Specs).

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					With respect to requirements for updates to the Safety Report, these are given in regulatory standard S-99, which is referenced in the licences. (See Attachment 1).
8	Finland	Article 7	**3.7.2.3.3**	A new regulatory standard S-99 was issued in 2003, and it was made mandatory by incorporating it into operating licences (section 3.7.2.3.3). Could you please inform which other regulatory documents, standards, guides, policies or consultative documents have been made mandatory through regulatory decisions?	The following CNSC regulatory documents are currently referenced in the nuclear power reactor operating licences: • S-99 Reporting Requirements for Operating Nuclear Power Plants (2003) • S-298 Nuclear Response Force Standard (2003) • R-7 Requirements for Containment Systems for CANDU NPPs (1991) - *Darlington only* • R-8 Requirements for Shutdown Systems for CANDU NPPs (1991) - *Darlington only* • R-9 Requirements for Emergency Core Cooling Systems for CANDU NPPs (1991) - *Darlington only* Several other regulatory standard documents are in preparation or at the public consultation stage. Some of these documents may in the future be referenced in licences. In some cases these documents are intended to take the place of licensee program documents in order to improve the level of regulatory consistency among licensed facilities and to simplify the process of keeping the licences in step with current practice. If and when a new standard is incorporated in a licence, it becomes legally enforceable at that facility.
ARTICLE 7: LEGISLATIVE AND REGULATORY FRAMEWORK **LICENSING - Rating System**					
9	Japan	Article 7.2.3	**3.7.2.3.2, p.17, L.8**	In the first paragraph of section 3.7.2.3.2, it is explained that "Since the release of the Canadian 2nd Report, the CNSC instituted a new rating system for use in conjunction with licensing and compliance activities, as well as in producing the annual industry report." What kinds of data are used in a new rating system? Are those data supplied by licensees or the CNSC has own database for the rating system? What regulatory actions will be taken based on the result of rating evaluation?	The information used by the CNSC staff in rating the licensee's performance comes from two sources: 1) the licensee's submitted documents pursuant to regulatory requirements, and 2) the CNSC's inspection findings. The CNSC staff considers such information to form an opinion as to whether the licensee is or is not in compliance with the regulatory requirements, as well as the risk-significance of any non-compliance. Situations of non-compliance that do not affect the risk to the public, environment, or workers do not, generally, result in any change in the ratings. For regulatory actions resulting from rating, please see Attachment 2.
10	United States of America	Article 7.2.3	**3.7.2.3.2**	Section 3.7.2.3.2 states that the A-E rating system Report Card is evaluated for licensing purposes. How are the grades used specifically in the licensing and	For the use of ratings in the regulatory oversight, please see Attachment 2. From Table A3.14.4.3 of the 3rd Canadian Report, it can be seen that the response to results that are "Below Requirements" is a graduated enforcement approach that optimizes the necessary

	Country	CNS Article	Report Reference	Question	Answer
				oversight process? What are the consequences for a plant that is consistently below requirements in an area, and what is the timeline for improvement?	regulatory oversight and ensures that the licensee expeditiously addresses the shortcomings and returns to conformance with the requirements. In all cases, timelines are determined as appropriate to the risk associated with the non-compliance.
11	China	Article 14	**14, p.89**	Table A3.14.4.2 CNSC safety areas, program, review topics and performance measures used in rating Canadian NPP performance, please provide more detailed information on how to rate Class A, B, C, D, E.	The ratings of the various programs and safety areas are reviewed as a whole for each licensee to ensure that the compilation of the ratings represents a fair overall assessment of the licensee and the risk associated with the licensed activity. Please see Attachment 2 for detailed information.
ARTICLE 7: LEGISLATIVE AND REGULATORY FRAMEWORK **LICENSING – Licence Renewal and Licence Period**					
12	Korea, Republic of	Article 7	**3.7.2.1, p.13**	In your national report, it is stated that a set of factors such as hazards associated with the facility, presence and effective implementations of licensee's quality assurance programs, etc., are compiled for the recommendations on licence period. Please provide a brief sketch of the major or important criteria, other than those factors stated in the subsection 3.7.2.2.3, to be reviewed for the recommendation of licence period longer than 2 years.	The criteria used for recommending a licence period are detailed in Attachment 7. Staff must prepare a recommendation for the Commission on the licence period that is appropriate for the activity to be licensed and the licensee under consideration. As an example of compliance information, please refer to Attachment 2 on the CNSC's evaluation of the licensee performance.
13	Japan	Article 7.2.2	**3.7.2.2.3, p.15, L.25**	In last 5 lines of section 3.7.2.2.3 second paragraph, it is mentioned that "Licence periods longer than two years enable the CNSC to regulate NPPs in a more risk-informed manner through the adjustment of the licence period to the licensee's performance and the findings of compliance-verification activities of the licensed NPP. This means that a shorter licence period will continue to be an option where overall licensee performance is unsatisfactory." Could you explain more specifically how to regulate NPPs in a risk-informed manner? What does "Risk -informed manner" mean? In the second paragraph, it is mentioned that the criteria for decisions on licence length are documented in a CNSC document issued early in 2002(CMD02-M02). Could you explain the outline and the	1) The risk-informed performance-based regulatory oversight at the CNSC is described in detail in Attachment 8. Regulation in a risk-informed manner means that there is a process to make decision and distribute resources using risk information as an input. 2) The criteria used for recommending a licence period are detailed in Attachment 7. 3) Attachment 2 explains how the CNSC currently evaluates the licensee performance using a rating system. For future plans on the use of risk-informed approach please refer to Attachment 8.

	Country	CNS Article	Report Reference	Question	Answer
				decision criteria of CMD02-M02? And in the first line of the last paragraph, we can find "licensee performance evaluation". How do you use risk-information to the present licensee performance evaluation? Could you kindly explain your future plan of using risk-information in licensee performance evaluation, if available?	
14	Japan	Article 14.2	**3.14.1.4, p.31, L.13**	(Sec.3.14.1.4) "In Canada, power reactor operating licences (PROLs) are currently granted by the CNSC for periods of more than two years (see subsection 3.7.2.2.3)." Though two-year licence period "is not consistent with risk-based regulation" as stated on page 29 of the Responses to Questions to the 2nd report by Canada, CNSC currently grants it for more than two years in "a more risk-informed manner". 1) How was the extension period determined? Was a criteria defined to extend the PROL period?	The criteria used for recommending a licence period are detailed in Attachment 7. The recommended licence period is a judgment based on information, such as the compliance information, that is gathered during the previous licensing period. As an example of compliance information, please refer to Attachment 2 on the CNSC's evaluation of the licensee performance.
15	Belgium	Article 7	**3.7.2.2.3**	The standard renewable licence period is 2 years. Do you consider an upper limit (maximum allowed licence length) for the licence period?	The licence period is decided by the Commission, not the Staff. In the Commission Member Document CMD02-12, licence periods of up to 5 years were recommended based on a set of criteria as described in Attachment 7. Longer licence periods could be considered if, for example, Periodic Safety Reviews (PSRs) are introduced as part of the CNSC regulatory framework. On the use of PSRs in Canada please refer to Attachment 9.
16	Pakistan	Article 7	**p.15**	The NPP operating licences were used to be issued for a renewable period of two years. Recently, in 2002, the CNSC has introduced flexible licensing periods which are generally longer than two years. What are the main criteria for making decisions on licence length? What are the submissions required from the licensee with the renewal application?	The main criteria for making decisions on a licence period are detailed in Attachment 7. The information required from the licensee with a licence renewal application is given in the section 5 of the General Nuclear Safety and Control Regulations, which is available on the CNSC website (www.nuclearsafety.gc.ca). It suffices here to indicate that in addition to the general requirements for an application, the licensee must submit "*a statement identifying the changes in the information that was previously submitted*." Additional information on program descriptions required for licence renewal can be found in Attachment 15.

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ARTICLE 7: LEGISLATIVE AND REGULATORY FRAMEWORK **LICENSING - Power Reactor Operating Licence (PROL)**					
17	Hungary	Article 6	**3.6.2, p.11**	7 licences are issued for 17 operating units. It means some of them refer to (cover) more than one unit. E.g. Bruce A Unit 1&2 are defueled, Unit 3&4 are restarted. How are (were) handled the 4 units in different operating status in one (common) licence?	The Power Reactor Operating Licences (PROLs) for NPPs - including multi-unit NPPs - include generic conditions in the following areas: • Staffing and Organization, • Operations, • Design Modifications and Operational Change, • Pressure Boundaries, • Fire Protection, • Environmental Qualifications, • Radiation and Environmental Protection, • Safeguards, • Security, and • Decommissioning. All of the reactor units in a multi-unit NPP reside within the same protected zone. With minor exceptions, all of the above areas and their constituent requirements apply regardless of the state of the reactor units (that is, defueled, shutdown or operating) unless otherwise stated within the licence as a licence condition. There are also different specific requirements between defueled and operating reactors in the licence conditions. For example, Bruce A Units 1 and 2 are to remain in the defueled guaranteed shutdown state unless otherwise approved in writing by the CNSC. In other words, each unit within a multi-unit licence is treated the same by both the licensee and the regulator except for differences which are explicitly stated in the licence. As to whether a defueled (or laid up) reactor unit can be restarted, a safety case would have to be made to the CNSC. The assessment for refurbishing must be made not only against modern codes and standards, but also against current regulatory requirements. In addition, the regulator must agree that the design and operation changes proposed to address any safety deficiencies or shortcomings are adequate to permit restart of the reactor (that is, the proposed changes adequately address the safety issues / shortcomings that have been identified through the assessment). Several public hearings may need to be scheduled to obtain CNSC approval for the environmental assessment, fuel loading, restart and issuance of amended licences.

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ARTICLE 7: LEGISLATIVE AND REGULATORY FRAMEWORK **LICENSING – Licensing Basis Document**					
18	Pakistan	Planned Activities	**p.55**	It has been stated in section 4.7 that CNSC has undertaken a project to produce a Licensing basis (LB) document to assess the licensability of new reactors in Canada with the objectives of obtaining closer alignment of Canadian requirements with international practice and adoption of a more risk informed approach to licensing. What are the major areas identified of current interest in which the there are differences in the Canadian Licensing Philosophy as compared to the current International approach and regulatory practices?	The underlying safety philosophy and the most important issues under consideration in the development of the Licensing Basis document are discussed in detail in Attachment 6.
ARTICLE 7: LEGISLATIVE AND REGULATORY FRAMEWORK **Compliance**					
19	United States of America	Article 7.2.3		Please elaborate on the training and qualification required for resident inspectors. Are both Type I and Type II inspections performed by resident inspectors? What is the process for planning inspections, and approximately how many hours of inspection time are logged per unit annually?	The position of "inspector" and the inspector's powers are described in the *Nuclear Safety and Control Act* (NSCA). Expectations are that resident inspectors must be generalists and develop a working knowledge of all disciplines related to the mandate of the CNSC at the NPP site, typically regrouped as safety areas (Table A3.14.4.2 of the 3rd Canadian Report). This knowledge allows their understanding and participation in evaluating the licensee's activities. A typical training program for an inspector would consist of technical courses such as legal requirements, knowledge of science fundamentals, operations, maintenance, safety analysis, radiation protection, and site-specific knowledge; enabling knowledge such as inspection techniques; and skill-training such as communications, interviewing and investigative techniques and root cause analysis. Resident inspectors also must know the CNSC emergency response plan. Type 1 inspections (coverage of complete programs) are currently led by specialists in Ottawa with participation of resident inspectors. Starting in April 2005, leadership will be exercised by resident inspectors, and specialists will act as participants. Type 2 inspections (smaller scope, coverage of components and specific systems) are

	Country	CNS Article	Report Reference	Question	Answer
					typically planned and conducted by resident inspectors, and they serve to collect the data that assist specialists to verify if a program is delivered appropriately by the licensee. Findings from type 2 inspections assist in making decisions on the need for more in-depth Type 1 inspections. The planning process is a yearly exercise. It starts with a review by both specialists and inspectors of available inspection information and rating of licensee performance in the last licensing period and in each safety area related to the CNSC mandate. For each licensee, this results in a set of regulatory activity plans, an inspection strategy and subjects for a baseline which identifies the minimal subject matter, type of inspection tool and frequency. Where the rating is acceptable, the baseline work is generally sufficient to maintain regulatory oversight. Where the licensee has been rated as less than acceptable, baseline work is supplemented by additional inspections in the given safety area. This oversight is used as a means to compel the licensee into compliance and allows the CNSC to define the area of non-compliance and to measure risk. Further planning steps are taken to ensure staff availability and funding. Quarterly reviews are conducted throughout the year. This provides feedback to ensure that the plan is being followed and to verify if changes are needed. It is important to note that the planning cycle is also part of meeting the Government of Canada's expectations on program planning. Over 2004, an average of 5690 hours of inspection-related effort was recorded per reactor unit of Canadian NPPs. It is important to note that this figure includes time spent in the station, at licensee and CNSC offices undertaking verification, promotion of compliance and enforcement activities. Also included in the total are activities such as event verification, desktop review, inspection follow-up and overhead costs.
20	United Kingdom	Article 14	**3.14.4, p.35**	This section notes a change to the plant modification procedure that gives more autonomy to the licensee to determine whether or not a proposed modification enhances safety, and hence determines whether the proposal needs regulatory agreement. It is stated that CNSC have assessed the licensees change control process to gain assurance that the licensee will make correct categorisation of proposed modifications. This however does not	CNSC site inspectors regard reviewing the categorization of modifications as part of their routine duties. CNSC specialists use information from these reviews to evaluate whether the licensee is following its own processes, and in case of non-adherence by the licensee to these processes, to recommend further enforcement measures. However, CNSC staff has seen over the years a large increase in requests for approval from licensees. In many cases, regulatory approval was not necessary since the proposed modifications were changes resulting in: a demonstrable net increase in safety margins; changes that were not safety significant; or changes that could not impact on the operation of safety systems. Such seemingly unnecessary

		CNS Article	Report Reference	Question	Answer
				guarantee that an individual proposal may not be correctly categorised. Does the CNSC site inspector look at the categorisation of modifications as part of his/her routine duties? What peer review system does the licensee have to ensure that modifications are correctly assessed and implemented?	requests for approvals were consuming time that CNSC staff could have spent more effectively on safety-related work. The CNSC wants to ensure that licensees do not regard CNSC staff as part of their process and quality control loop. The categorization of modifications is in the first place a responsibility of the licensee. Licensees have change control processes that include multi-disciplinary reviews for impacts of modifications on plant operation, maintenance, reactor safety, radiological safety and industrial safety. Also, change control processes require independent verification of design activities such as design calculations. A condition in the operating licence requires an independent review of changes affecting fire protection by a third party. The results of the review must be submitted to the CNSC.
21	Bulgaria	Article 14	**p.34**	How CNSC is convinced practically that the safety assessments of the concrete modifications made by the licensee are correct and they do not require a permit for their application?	Even though formal approvals are no longer required for certain types of modifications, information on these changes is still submitted to the CNSC. This information is reviewed in its totality as an indication of the performance of the licensee's processes, and those processes are still subject to audits and evaluations.
22	Australia	Article 14	**3.14.1.1**	Does the CNSC's approach to licence holder compliance allow for self-controlled inspections/audits by the licence holder? If so, how does the CNSC verify proper and timely completion of the inspections/audits?	Through the enforcement of its standards, CNSC requires licensees to perform self-assessments, self-audits and independent audits. Peer reviews are encouraged. More specifically, CNSC staff considers that self-assessments and a good corrective action program are essential elements of a quality organization. Quality Management practices at nuclear generating facilities generally include expectations for self-assessment audits/inspections plus a program of internal audits undertaken by an in-house Internal Audit Group or a Quality Assurance group. The CNSC's own audits/inspections cover not only the licensee's operational programs, but also the licensee's internal audit and self assessment programs in terms of scope, findings and follow up actions taken. The CNSC does not rely solely on the licensee's internal assessments for compliance monitoring. CNSC inspections of licensee quality management systems currently follow a baseline period of 2 years. This frequency applies to the inspection of licensee work processes. The quality management oversight is comprehensive, and the CNSC verifies that the internal audits or self-inspections are performed and lead to effective corrections of the self-discovered weaknesses.
23	Korea, Republic of	Article 7	**3.7.2.3.1**	When will the criteria and procedures for significance determination of inspection findings using risk-informed methodology	In 2004, the CNSC has undertaken to improve its regulatory program for power reactor oversight. Improvements in effectiveness and efficiency are being sought based on increased use of risk information.

		CNS Article	Report Reference	Question	Answer
				be completed in Canada?	The improvement program is to be developed more fully during 2005. The regulatory improvement initiatives are prioritized and products of the work groups should be delivered over the next 2 to 3 years. Authorized procedures with criteria should be ready in 2007.
24	Japan	Planned Activities	**4.1, p.53, L.16**	In the third paragraph of section 4.1, "the risk-informed compliance program" is explained. Could you explain some more details of this program? a. What risk do you evaluate and how do you apply to your inspections? b. Do you use risk information in the inspection planning and the assessment of inspection results? c. Does the inspection include the improvement process check? d. Who developed the method and tools for the risk-informed compliance program?	a. The risks that are evaluated are those identified in the *Nuclear Safety and Control Act* (NSCA); that is, health and safety of persons, protection of the environment, and risks to national security. Also considered is the implementation of internationally-agreed control measures to which Canada is party. See Attachment 8 for more information. b. The CNSC uses risk information in inspection planning. Risk information is considered in prioritizing inspections and allocating resources during the planning process. The assessment of inspection results is part of program evaluation, which uses a rating system that is risk-based (as described in Attachment 2). c. Under the safety area of Performance Assurance, CNSC staff verifies the adequacy of the corrective action programs and licensee identification and resolution of problems (see Attachment 2 for additional information) d. CNSC staff developed the compliance program, based on guidance from CNSC Compliance Policy and using input from federal government information on compliance programs. Using risk information in the compliance program is ongoing and much of the change is being implemented through updates to the planning process. Additional information can be found in Attachment 8.
25	Pakistan	Article 7	**p.17**	Canada may kindly elaborate the specific requirements of CNSC regarding submission of documents by the licensee related to baseline compliance program and focused compliance activities.	Licensee programs are incorporated in licences through the following process: Applications for licences or for renewals of licences must include information about the licensee's programs, activities, structure, organization and work processes, as required by sections 3 and 5 of the General Nuclear Safety and Control Regulations and sections 3 and 6 of the Class I Nuclear Facilities Regulations (both are available on the CNSC website www.nuclearsafety.gc.ca). The CNSC may then include references to some of these submitted documents in licence conditions. During operation, there are further requirements for reporting of information to the CNSC in sections 29 to 32 of the General Nuclear Safety and Control Regulations, as well as in Regulatory Standard S-99, which is referenced in the licence. The regulatory compliance program focuses on compliance with the *Nuclear Safety and Control Act* (NSCA), the regulations and the

	Country	CNS Article	Report Reference	Question	Answer
					conditions of the licence. The licensee documentation which is referred to in licence conditions becomes enforceable through those licence conditions. The regulatory compliance verification program verifies compliance with these licensee programs as well as with the NSCA and regulations. This may be done either through focused inspections and evaluations of specific licensee programs, or in a less in-depth fashion during more general and routine inspection activities. The draft baseline program consists of a list of compliance inspections and strategies aimed at validating the compliance of licensee programs. CNSC currently evaluates and rates each program description as well as its implementation in the field.
ARTICLE 7: LEGISLATIVE AND REGULATORY FRAMEWORK **R&D**					
26	United States of America	Article 8.2		It appears that both licensees and CNSC use the services of AECL for research and development (R&D). If this is correct, how is independence from one decision affecting both organizations assured? Additionally, have any effects of contracted R&D (from OPG to NSS) been detected to date?	Atomic Energy of Canada Limited (AECL) and Nuclear Safety Solution Ltd. (NSS) have the same rights as any other company to bid for research contracts issued by the CNSC. They also are subject to the same federal government conflict of interest guidelines scrutiny as any other company. The conflict of interest review is intended to ensure that a contractor is not paid to perform a review of its own previous work, or to perform reviews of licensing submissions to which it is a party, either as licensee or as a contractor. The application of these conflict of interest procedures ensures regulatory independence. As for contacts let by licensees, there has been no change in the quality of R&D performed on behalf of the industry as a consequence of the creation of new support organizations by Ontario Power Generation (OPG) such as NSS and Kinectrics. Regardless of who performs the work, it is required to meet the applicable quality assurance standards under the licences. The licensees remain responsible for ensuring that their contractors meet or exceed these requirements.
ARTICLE 8: REGULATORY BODY **The "Commission"**					
27	Finland	Article 8	**3.8.1**	In section 3.8.1 it is mentioned that the Commission makes independent licensing decisions and establishes legally binding regulations. Could you please clarify in more detail which licensing decisions are granted by the Commission, and which are the legally binding regulations issued by the Commission? Are the members of the	For general information on the Commission please refer to Attachment 3. For licensing matters, CNSC staff prepares recommendations for Members of the Commission, who make final independent decisions after hearing from all interested parties. Matters before the tribunal, and therefore heard in the context of public hearings, are usually those of a more complex nature involving nuclear generating stations,

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				Commission all-day workers, or is it so that the Commission works only through meetings and the members of the Commission have their own permanent duties?	uranium mines and mills, nuclear waste facilities and research reactors (referred to as Class I facilities in the CNSC regulations). Decision-making authority with respect to the bulk of other licensing activities, such as with respect to nuclear substances, has however been delegated by the tribunal component to CNSC staff. Under the authority granted by the *Nuclear Safety and Control Act* (NSCA), the Commission has made a number of legally binding regulations in accordance with a Government of Canada regulatory process. Both the NSCA and the CNSC Regulations can be found on the CNSC website www.nuclearsafety.gc.ca. Currently, only the President is a full-time Member. Part-time Members do not have offices at the CNSC. They travel to the CNSC head office or to the site of a hearing of the Commission approximately 9 times per year for 2 or 3 days each time. As the Commission schedules hearings together for efficiency purposes, the Members will typically be involved in approximately 30 hearings per year. Members usually have full-time high-ranking jobs with other organizations (universities, business, consultants, etc. – but not in nuclear industry), and can usually free themselves to attend hearings. They carry out their preparatory work, including review of extensive documentation from the participants, individually from their own premises the weeks prior to the proceedings.
28	United Kingdom	Article 8	**3.8.1, p.19, para. 1**	What competencies do the commissioners need to have? What is a "quasi judicial tribunal"?	Please refer to Attachment 3 for information on the competencies of the Commission Members and the meaning of "quasi-judicial" tribunal.
29	United Kingdom	Article 8	**3.8.1, p.19, para. 2**	As well as developing policy it seems that the role of the 7 person Commission also extends to making licensing decisions and implementing programs. It appears therefore that that the Commissioners carry out the day-to-day management of the regulatory authority. As the Commissioners are appointed by the federal government, their role could be construed as a challenge to the principle of an independent regulatory authority. How much weight does technical safety judgement of CNSC staff have when balanced against the wishes and needs of stakeholders?	For general information on the Commission please refer to Attachment 3. Commission Members are not involved in the day-to-day management of the organization. This is done by the Chief Executive Officer (who is also the President of the Commission) and her executive team. The Members are indeed appointed by the federal government and are independent of the organization. As members of a quasi-judicial tribunal, they are also independent of government, industry, CNSC staff, etc. They are subject to Conflict of Interests and Ethics guidelines. They refrain from engaging in any political or partisan activity during their mandate. On the question of reliance on the CNSC staff advice, Subsection 2(2) of the CNSC Rules of Procedure specifically provides that the Commission may permit or require officers or employees of the Commission to participate in a proceeding in such manner, including presenting information and submissions orally or in writing, questioning participants (applicant and intervenors) and responding to questions

	Country	CNS Article	Report Reference	Question	Answer
					and submissions, as will enable the Commission to determine the matter in a fair, informal and expeditious manner. In practice, the Commission Members always require the participation of the CNSC staff and rely on their technical advice in licensing and regulatory matters. The Commission Members make informed decisions based on all the evidence submitted in the course of a hearing, of which CNSC staff's advice is an important component.
30	Australia	Article 7	**3.7.2.2.3**	Australia would appreciate receiving a brief account of the nature of the public intervention possible during public hearings involving applications for licence renewals. Does the public have any other opportunity to receive information and comment on an application for a licence or renewal of a licence?	For general information on public intervention during a public hearing of the Commission please refer to Attachment 3. The guiding principle, which is stated in the *Nuclear Safety and Control Act* (NSCA), is that all proceedings before the Commission shall be dealt with as informally and expeditiously as the circumstances and considerations of fairness permit. The CNSC Rules of Procedure facilitate and encourage active participation by members of the public. In addition to notifying the applicant or licensee, the Commission gives 60 days advance notice of a public hearing to the public. As a general rule, the notice of public hearing is posted on the CNSC website and is also published in newspapers serving the area in which the facility is located. The notice supplies information on the duration of the hearing, its purpose, dates, time, place and the deadlines for filing documents prior to the hearing. Public hearings are usually well attended by members of the public and of the media, and may include a number of intervenors (e.g., individuals, unions, employees, community and environmental groups). The Commission has a public hearing room in Ottawa but has from time to time conducted hearings at different locations across the country, providing a greater opportunity for the public to participate in or observe its proceedings. In 2002, the Commission introduced teleconferencing and videoconferencing, and plans to continue its move toward a greater use of available technologies. For example, the proceedings conducted in March 2004 were video web-cast to a select group of participants as part of a pilot project. Although various participants in a public hearing before the Commission on a licensing matter may take conflicting positions on some issues, the Hearings are not confrontational in the judicial sense. Lawyers rarely appear before the Commission. Customarily, a public hearing before the Commission does not involve the presentation of formal evidence under oath, followed by argument, in a two-step process. The Commission has the power to require sworn testimony, written or oral, and to allow cross-examination, if necessary. The Commission could also require the production of documents and summon witnesses before it to testify, but it does not normally do so. However, the Commission will informally,

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					from time to time, invite representatives from other government departments or organizations to be in attendance to respond to questions from Members in their areas of jurisdiction. The Commission Members rely on written submissions, hear oral presentations based on those submissions, and ask questions to complete the evidence and argumentation pertaining to each matter. The applicant and any intervenors may question each other and any witnesses, but only with the permission of the Commission and in the manner that the Commission may determine. Questioning is controlled by the Commission through the presiding Member. Apart from their participation in consultations related to environmental assessments which may be required prior to a licensing hearing, there are no other opportunities for the public to comment on licensing matters. With respect to information, the public is invited to attend regular public meetings of the Commission where information related to the performance of licensees is periodically raised. The agenda for these 7 to 8 public meetings (Commission Members attend these meetings) are typically a report on significant developments (e.g., events) since the last meeting, industry performance reports (nuclear reactors), interim reports on individual performance of licensees, special information items, etc. The CNSC website (www.nuclearsafety.gc.ca) contains considerable additional information.
ARTICLE 8: REGULATORY BODY **The CNSC as an Organization**					
31	Finland	Article 8		Could you please describe the authorities and responsibilities (decision making role) of the main divisions of CNSC? Could you also give the numbers of staff members in these divisions?	The main entities that are directly involved in the regulation of nuclear power reactors are the Commission, the Directorate of Power Reactor Regulator and the Directorate of Assessment and Analysis. Their authority and decision-making roles are described in the following paragraphs (the number in brackets after the name of the entity represents the number of positions therein). The Commission (7) functions as a quasi-judicial tribunal, making independent decisions on the licensing of nuclear-related activities in Canada; establishes legally-binding regulations; and sets regulatory policy direction. (See additional information on the Commission in Attachment 3.) The Directorate of Power Reactor Regulation (74) regulates the development and operation of nuclear power reactors in Canada in accordance with the requirements of the *Nuclear Safety and Control Act* (NSCA) and the CNSC Regulations. (See additional information in Attachment 4.)

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					The Directorate of Assessment and Analysis (102) undertakes specialist safety and security assessments in support of the regulation of the power reactors, as well as other nuclear facilities, substances and radiation devices. It also manages the emergency response capacity of the organization. (See additional information in Attachment 4.)
32	Japan	Article 8.1	**3.8.1, p.19, L.7**	As to the CNSC, regulatory body in Canada, please explain the following questions. a. Detail information about the organization of the CNSC b. Number of the staffs of each section belongs to the CNSC c. How is the independency of the budget of the CNSC secured?	For parts a) and b) of the question, please refer to Attachment 4 for information on the CNSC organization and the number of staff in each functional entity. In response to part c), the CNSC is a departmental corporation named in Schedule II of the *Financial Administration Act* and reports to Parliament through the Minister of Natural Resources. The CNSC receives its funding through annual parliamentary appropriations and is therefore not dependent on any other source of funding, e.g. cost recovery from licensees and applicants.
ARTICLE 8: REGULATORY BODY **Quality Management at the CNSC**					
33	Japan	Article 8.2	**3.8.2, p.19, L.28**	In the section 3.8.2, it is mentioned that "The CNSC organizes its regulatory activities relating to nuclear power reactors by creating, implementing, monitoring and adjusting regulatory work plans for each licensed facility." Regarding to the quality management of the CNSC's activities, what kind of approach are you taking, such as applying ISO9001 or other quality management program?	A detailed answer can be found in Attachment 5.
34	Finland	Article 8		Could you please indicate whether CNSC has established its own quality management system? If so could you describe the main features of the system?	A detailed answer can be found in Attachment 5.
ARTICLE 8: REGULATORY BODY **Maintaining Competency at the CNSC**					
35	Argentina	General	**2.4.2, p.8**	In the report it is stated that examples of workforce sustainability strategy (WSS) initiatives are the development of an on-line applicant tracking system for internal and external selection processes and the development of core training plans for operational divisions.	The Application Tracking System (ATS) is targeted at enhancing the CNSC website to allow for on-line application, automated acknowledgement, automated applicant screening and the establishment of an on-line candidate inventory. For core-training planning, the CNSC has implemented a Learning Management System (LMS). The LMS is a web-based tool which

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				Could Canada provide more details of the above mentioned WSS initiatives used by the CNSC?	supports the development of individual learning plans, facilitates the organization of required training courses, maintains a database of sources for subject area training and motivates staff to actively participate in their professional development. Each Division has developed their own knowledge and skills profile for the LMS. Staff and managers work together to establish learning plans so that staff can be offered the best training for their needs, based on the Division.
36	Japan	General	**2.4.2, p.8, L.16**	In section 2.4.2. , national report explains "Workforce Sustainability Strategy at the CNSC". About CNSC's strategy, we would like to ask following questions. a. What qualifications are required to the CNSC's employee? How do you verify the applicant's competence for the work? b. Could you explain about the training program including OJT (on the job training) and training curriculums? c. Do you have the qualification system or something like that for CNSC staff?	a. The CNSC uses a document called a Position Description to describe the duties and responsibilities which are currently being performed by employees. The Position Description also includes a description of position requirements such as job knowledge, education, contacts, leadership of human resources and responsibility for financial resources. Qualifications are established from this information, as well as from future feedback on work activities, responsibilities and organizational needs identified by the line manager. The applicant's competence for the work is verified at first through an examination of the qualifications as described on the candidate's application, followed by an assessment which can take the form of an interview, written tests, simulation exercises and a review of past accomplishments. Other conditions of employment, where needed, will also necessitate verifications such as security and medical examination. b. The CNSC training program has 4 components: i) Leadership/Management Development - consists of courses in both leadership skills and management subjects such as resourcing, financial management, contracting, privacy, staff relations, health and safety. Other aspects of the program include armchair discussions, access to coaching, and a robust reference library. ii) Technical courses – include Science and Reactor courses related to the CANDU Reactor (both introductory and intermediate), Radiation Instrumentation, Radiation Protection, Contamination Control and Orange Badge training iii) Administrative/Soft Skills training – includes a variety of courses such as *Nuclear Safety and Control Act* and *Regulations*, Audit, Lead Auditor, Legal Investigation, Root Cause Analysis, Project Management, Communicating Risk, Media Relations, Communicating at Commission Hearings and Interviewing for Information. iv) Personal Development – this series covers a broad range of subject matter. The content of the series is based on staff input as well as our knowledge of issues that are arising in the organization. Some topics that have been covered include: Work Life Balance, Stress Management, Managing Your Inbox, Dress for Success, and Women and Men's Health Issues. The series also includes a targeted health promotional activity. In 04/05, the health promotion took the form of a

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					walking program. Next year, a Wellness Fair is planned. On-the-job (OJT) training for staff is not a formalized process, at this time. Checklists and guides have been developed in a number of areas in the Operations Branch. These documents ensure consistency in our approaches but are also invaluable tools in support of knowledge transfer/OJT. The Interns at the CNSC are the exception regarding OJT. Interns undergo 6 assignments of 3 months each in which they are given specific work objectives. In carrying out these objectives the interns are lead by a subject matter expert in the field who trains them on-the-job. The current inspection processes and project management initiatives require the formation of teams made up of inspectors and specialists. This teaming proves invaluable for the development of staff members with varying experience in the dynamic environment of a nuclear power plant. Team members also have the opportunity to mentor and evaluate junior staff. *Qualification system* - As indicated in the response to part (a) of the question, individuals are required to meet a certain standard of education and experience before they are appointed at the CNSC. For the technical staff, there are requirements that must be met before they are given an Inspectors Card or a Nuclear Energy Worker Card. These requirements can be met through a combination of training and experience and are validated by the individual's Director before the card is issued.
37	United Kingdom	Article 8	**3.8.1**	This paragraph states that CNSC has approximately 500 staff. This is a significant increase on the 450 staff reported to the CNS in 2002. Also, the 2002 report gives an organizational structure for CNSC but does not identify how many staff are employed in each function. (i) How are the additional 50 staff deployed? (ii) How many of the 500 staff are professional engineers or scientists? (iii) How many are engaged on site inspection duties? (iv) How many are engaged on technical evaluation/support?	i) The position count between January 1, 2002 and December 31, 2004 increased from 497 positions to 565 positions. Generally speaking, there was an increase to staff and management positions within the Operations Branch. The majority of positions created over this time period were in the engineering and scientific fields. ii) Based on the current position count (December 31, 2004), 322 positions out of 565 are in engineering and science fields. (It is not possible nor is it required to identify which incumbents are professional engineers or scientists who belong to professional associations). iii) There are 210 employees at CNSC who carry inspector cards and therefore perform inspection duties at sites of NPPs and other facilities. iv) There are 258 positions at the CNSC that are considered as having technical evaluation roles in their work. These positions may also be the same as those captured in the above sub-question, as many employees performing technical evaluations also hold inspector cards and perform inspection duties

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38	United Kingdom	Article 11	**2.4.3**	It seems from section 2.4.3 that the CNSC intern program is successful. Could CNSC indicate how many interns will be taken on annually and how many will be able to stay with CNSC on completion of the program?	The CNSC's annual intake of interns is 6 engineers and/or scientists depending on the current yearly requirement. At the end of the program all interns will be able to remain with the CNSC.
ARTICLE 10: PRIORITY TO SAFETY - SAFETY CULTURE **Organizational and Management Review Method**					
39	Korea, Republic of	Article 10	**3.10.2, p.23**	1. In the 1st paragraph of 3.10.2(p.23), it is stated that organizational and management review method is an objective and systematic approach. How is the objectivity achieved? 2. 2nd paragraph states that safety performance is measured through the comparison of organizational behaviours that tap the underline assumptions about the organization with the performance indicators. Please elaborate above sentence. What are the organizational behaviours selected by CNSC?	1. The Organization and Management Review Method uses basic scientific data collection principles, measurement "tools" and analysis techniques to achieve objectivity (see Attachment 10 for additional information). The assessment team members are trained in the use of techniques and methods used for data collection, and the analysis is conducted by subject matter experts in the field. 2. A set of 17 organizational behaviours were identified which impact facility safety performance (see Attachment 10 for details). It is generally not necessary to assess all seventeen behaviours to obtain an accurate representation of the safety culture that exists within an organization. Findings about the behaviours can be linked with the safety culture characteristics and performance objectives identified as important for promoting a positive safety culture. The assessment of the claimed values and attitudes that comprise the underlying assumptions must be based upon characteristics that have been identified to be important for the existence of a positive safety culture. If the facility has a positive safety culture, the behaviours that measure the underlying assumptions will agree with the performance objectives.
40	Argentina	Article 10	**3.10.2, p.23**	The CNSC has developed an objective and systematic approach called the Organization and Management Review Method, to evaluate licensees` organizational influence on safety performance. What are the criteria used to develop the performance objectives / indicators? Please, could you provide some example? How it was established the sample performance criteria that should be met to ensure good safety performance? Please, could you provide some example?	Each safety culture characteristic (see Attachment 10) has specific and measurable performance objectives that must be met. Currently, the performance objectives are stated in a qualitative way, but the results of organization and management reviews are reported using both quantitative and qualitative measures. The criteria used to develop the performance objectives are based on research and expert opinion, as well as recent work done by international organizations (e.g. IAEA). Tools for measuring the organizational behaviours are available in CNSC- Research Report RSP-0060 "Development of a Regulatory Organizational and Management Review Method", which can be made available upon request. As an example, for the safety culture characteristic "safety is a clearly recognized value in the organization", a performance objective is "documentation that describes the importance and role of safety in the

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					operation of the organization exists", and a sample criterion would be "safety-related documentation is prominently displayed, referenced, and understood by personnel within the organization." Individual plants can develop their own criteria to demonstrate how achievement of the objectives might be assessed.
41	Belgium	Article 10	**3.10.2**	"During the reporting period, the CNSC employed this approach to conduct baseline measurements of licensees' performance" What are the "baseline measurements"? Can you make some examples available?	Baseline measurements of some of the licensees were obtained by evaluating each facility using the Organization and Management Review Method (see Attachment 10). One licensee facility was re-assessed recently, using the same method. To-date, baseline data have been assessed and compiled for the following facilities: 5 nuclear power plants, 1 research reactor, 1 uranium mine/mill facility, 1 conversion facility, and 1 particle accelerator facility. Comparison of baseline performance results to future performance results helps both the CNSC and the licensees to monitor performance.
42	Japan	Article 10	**3.10.2, p.23, L.7**	In the section 3.10.2, it is mentioned that "The CNSC has developed an objective and systematic management Review Method, to evaluate licensees' organizational influence on safety performance.", "The characteristics were then used to develop performance objectives (or indicators), and sample performance criteria that should be met to ensure good safety performance." and "The Organization and Management Review Method continues to provide the CNSC with the measurement tools needed to examine those behaviours. CNSC staff can now look at the licensees' organizations in terms of the Safety Culture Characteristics and their accompanying performance indicators." Could you kindly explain about the following items and examples? a. Organization and Management Review Method 1) Please explain the method and items for the evaluation of the organizational management, in the review method for organization and management. 2) Please explain the measures (including penalty) to be taken by regulator, based on the results. b. Safety Culture Characteristics. c. Performance Objectives (indicators) d. Measurement method of safety	a. <u>Organization and Management Review Method</u> 1) The Organization and Management Review Method is explained in Attachment 10. Furthermore, it could be added that out of the 17 organizational behaviours that can be measured only 10 to 12 behaviours are chosen to be examine during any evaluation, based on the information about the facility that is reviewed prior to the site visit. Approximately 120 people are interviewed from all levels of the plant with a staff population of about 2,000, and a random sample of approximately 20 % of the site's population is surveyed. For smaller sites, the entire population is usually surveyed. A demographic sheet, indicating the age, education level, work group and other pertinent information that is useful to the plant is collected for each staff member who completes the survey. The data are then analyzed and categorized by organizational behaviour and grouped according to the safety culture characteristic (see Attachment 10) that they measure. It is then determined whether the performance objectives (see Attachment 10) for each characteristics have been met. Once the data are analyzed, feedback is provided to the licensee on the results. 2) In general, if the CNSC determines that performance at any of its licensed facilities is declining, the regulator will intervene primarily by increasing its oversight efforts (for example, conducting more compliance enforcement activities, such as audits, issuing written notices and monitoring corrective actions) until performance improves. Other regulatory enforcement tools are also available, if needed. For example the regulator can also limit the licence period or impose other licence conditions or restrictions, as required. In the past, the results of organization and management evaluations were used mostly for providing a descriptive profile of the organization, and as an oversight tool, and not for taking regulatory actions. In the

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				performance e. Measurement tools of Safety Culture Characteristics and their accompanying performance indicators	future, the CNSC intends to integrate this method in its safety management system approach. b) Safety Culture Characteristics Detailed information is given in Attachment 10 c) Performance Objectives (indicators) Detailed information is given in Attachment 10. d) Measurement Methods of Safety performance The measurement method of safety performance includes many compliance activities that the CNSC performs. Those activities include inspections, audits and assessments and review of events and performance reports. One other way to measure safety performance that complements the other more traditional methods is the Organization and Management Review Method (see Attachment 10), which looks at the organizational influences on safety performance, including safety culture. Research in the area has shown that safety culture drives the other behaviours within the organization. e) Measurement Tools for Safety Culture Characteristics Detailed information can be found in Attachment 10.
43	Belgium	Article 10	**3.10.2**	"… Measurement tools…" Can you explain or give a description of the measurement tools? Are there examples available of corrective actions? Is this implemented in the regulatory framework? Are the measurement tools regularly and continuously upgraded?	For a list of possible tools please refer to Attachment 10. At present, there are no specific examples of corrective actions that have resulted from a Safety Culture evaluation. However, based on the CNSC findings, the evaluation report may recommend, for example, that a facility make improvements to its training programs, which may be inconsistently implemented throughout the facility. Improvements in that area would then be monitored within the CNSC regulatory framework. Another way that CNSC may use the results of safety culture assessments is initiating follow-up audits of specific organizational concerns. The method is part of the regulatory framework, and the CNSC findings are reported to the Commission through a public document. The tools that measure safety culture are not changed from one evaluation to the next.
44	Pakistan	Article 10	**p.23**	It is appreciated that CNSC has developed a regulatory guide for licensees to conduct self-assessments in order to promote safety culture and report their findings to the CNSC on a continuing basis. How does the regulatory body promote safety culture within CNSC and assess it?	At present the CNSC does not directly assess safety culture internally. In March, 2004, the CNSC conducted a safety culture symposium for the nuclear industry and internal staff. The CNSC is in the process of providing training to its staff to assist in the evaluation of safety culture at licensee facilities, and is embarking on an information campaign throughout the CNSC to promote a better understanding of safety culture.
45	United States of America	Article 10	**3.10.2**	Section 3.10.2 states that CNSC developed a regulatory guide for licensees to conduct self-assessments and report findings to CNSC. It was not available on the CNSC	The draft regulatory guide is not available to the public at present. Information on the assessment method and performance indicators is given in Attachment 10.

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				website as of December 2004. Has this regulatory guide been released to the public? Also, what specific performance indicators were developed during the organizational behaviour assessment process?	
ARTICLE 10: PRIORITY TO SAFETY - SAFETY CULTURE **Criteria and Assessment**					
46	Hungary	Article 10	**3.10.1, p.23**	Is there any assessment about safety culture (priority of safety) inside the CNSC as regulatory body? If yes, what are the main findings like?	At present the CNSC does not directly assess safety culture internally. In March 2004, the CNSC conducted a safety culture symposium for the nuclear industry and internal staff. The CNSC is in the process of providing training to its staff to assist in the evaluation of safety culture at licensee facilities, and is embarking on an information campaign throughout the CNSC to promote a better understanding of safety culture. In addition, the CNSC has an active Audit and Evaluation function which is responsible for impartially assessing the CNSC's performance, and for advising on improvement initiatives. These audits and evaluations provide evidence-based information to promote a robust safety culture, but do not focus directly on safety culture as such. The CNSC's 5 year audit and evaluation work plan will assess the design and operation of: management practices and control systems for awareness and understanding of safety issues; and, commitments to safe procedures, activities and actions at nuclear facilities.
47	Bulgaria	Article 10	**p.23**	What are the criteria that the Canadian Nuclear Safety Commission applies to NPP operation safety culture assessment?	Individual plants can develop their own criteria to demonstrate how they might achieve the performance objectives evaluated by the Organization and Management Review Method. For additional information please refer to Attachment 10.
48	Bulgaria	Article 10	**p.23**	Are quantitative (measurable) criteria applied for safety culture assessment and, if so, please, give details about them?	Yes, measurable criteria are applied for safety culture assessment. For detailed information please refer to Attachment 10.
ARTICLE 11: FINANCIAL AND HUMAN RESOURCES **Maintaining Competency at the Licensees**					
49	Japan	Article 11.2	**3.11.1, p.25, L.13**	In the line 8-9 of the section 3.11.1 the second paragraph, it is mentioned that "Over the next five years, the licensees anticipate hiring, in combination, approximately 100 engineering graduates	a) There are several sources of experienced engineers who might qualify under the licensees' hiring programs: • Experienced Canadian engineers from other industrial facilities who want a career change, whose existing facility is reducing staff, or who want change in direction (for example, engineers from the

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				and 100 experienced engineers.". About the experienced engineers who are hired by licensees, where from do they come? In the line 1-2 of the section 3.11.1 the third paragraph, it is mentioned that "Efforts are also underway to manage the potential loss of knowledge as a result of the retiring staff, including efforts to re-document the 'ideal' configurations and operating parameters for the facilities.". Could you give the typical examples of transfer program concerning the senior staffs' knowledge and skills, especially the transfer program of skills which are difficult to write down?	chemical industry, the oil and gas industry, the computer industry, other industries in the nuclear fuel cycle, etc.). • Experienced Canadian nuclear engineers from overseas construction and commissioning programs that are coming to an end (for example, Qinshan in China or Cernavoda2 in Romania) • Immigration of experienced engineers with a variety of backgrounds from other countries. b) Nuclear generating facilities are constantly reviewing their existing training programs and training needs to ensure that programs will be sufficiently comprehensive to meet future requirements. The effort includes documenting information developed by individuals, and then placing such information into databases that are easily accessible. As the question points out, some skills are "difficult to write down" or include in conventional formal classroom or computer-based interactive training programs. In such cases on-the-job training with mentorship by senior experienced staff is undertaken to facilitate the transfer of knowledge to a new hire. It is ensured that there is as long a period of overlap between the new hires and the current experienced staff as possible. In some cases, retired staff are asked to return for short periods to develop and/or deliver training in their areas of expertise. In addition, planned rotations of the staff into various aspects of the business or onto special projects helps ensure a wealth and breadth of knowledge transfer. In areas where there may not be sufficient numbers of candidates expected to warrant in-house training programs at each facility, collaborative industry-wide training programs are being developed (example: Regulatory Affairs training). Finally, the quality assurance programs at NPPs have been a benefit in ensuring that the critical information is available. The quality assurance programs have requirements for the documentation of the engineering and the maintenance of the records.
50	United Kingdom	Article 11	**3.1.1 and 2.4**	The CNS 2002 report described several initiatives in Canada to maintain and develop nuclear competence and infrastructure. The issue was discussed at some length in the closing plenary session. Section 2.4 of the 2005 report describes the progress with these initiatives. What is the Canadian overview and interim conclusion on these initiatives? Do they look as though they will be successful or are more still required?	The initiatives appear to be providing the entry level resources needed by both the nuclear industry and the CNSC. Enrolment in nuclear engineering programs has risen, and candidates from all engineering specialties are now applying to vacancies. For the NPPs, the next focus is the availability of skilled trades, and development programs to ensure the availability of such resources are also underway. In overview, the Canadian perspective is that managing human resources to ensure the availability of appropriate expertise is a long-term activity that will yield long-term results. While all indications are that the on-going initiatives are yielding desirable results, ultimate success requires both attracting and retaining personnel. At this time it appears that many excellent people are being attracted; however, it is too early to establish if these people will be retained or will choose to

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					move to other industries. As such, Canada's interim conclusions are that the initiatives have had a desirable and positive affect and are already demonstrating early success. However, continued monitoring of the situation is necessary and adjustments or additional efforts will be undertaken if this early success is not sustained. Licensees and the CNSC intend to maintain their support for the initiatives, such as funding to the University and College programs that provide the entry level resources for the Canadian nuclear field.
ARTICLE 12: HUMAN FACTORS **Staffing, Training and Certification**					
51	United States of America	Article 12	**4.5**	Section 4.5 mentions that CNSC has decided to withdraw from direct examination of Reactor Operators and Shift Supervisors, relying on the soundness of licensees training and examination, but will continue to certify the candidates. How will CNSC validate the examination results?	As stated in Section 4.5 of the 3rd Canadian Report, the CNSC has decided to transfer direct examination of Reactor Operator and Shift Supervisor candidates to licensees. In the future, the CNSC will rely on the soundness of the training programs and on the certification examinations set by licensees to gain an adequate level of assurance of the initial competence of candidates. The CNSC will obtain the assurance required from regulatory oversight of the licensees' training and examination processes, through a combination of appropriate regulatory guidance and compliance activities. Before the transfer of responsibility of each examination type can take place, the licensee must have in place a training program acceptable to the CNSC, based on a Systematic Approach to Training (SAT). For each training program, CNSC staff confirms the successful implementation of all phases of SAT. Based on inspection findings, licensees must develop and implement action plans to remedy any deficiencies. Successful closure of these action plans is one requirement to be satisfied before the CNSC will consider a program to be ready for transfer. The CNSC's existing processes for conduct of the examinations of Reactor Operator and Shift Supervisor candidates are being developed into Regulatory Guidance documents. Two such documents are: Examination Guide CNSC-EG1, "Requirements and Guidelines for Written and Oral Certification Examinations for Shift Personnel at Nuclear Power Plants"; which is due to be issued in April 2005, and Examination Guide CNSC-EG2, "Requirements and Guidelines for Simulator Based Certification Examinations for Shift Personnel at Nuclear Power Plants"; which has been issued. The CNSC expects each licensee to develop a set of procedures that the

	Country	CNS Article	Report Reference	Question	Answer
					licensee's staff will use to conduct examinations in the future. Successful development of these procedures, which must be acceptable to the CNSC, is a second requirement to be satisfied before the CNSC will consider a program ready for transfer. Finally, when the licensee meets the above requirements, the CNSC will amend the facility licence to allow the licensee to conduct the examinations. The CNSC anticipates that training programs will be transferred on a case-by-case basis as the above requirements are met. Following the transfer, the CNSC will implement a compliance process to ensure the licensee continues to develop and implement certification examinations in a rigorous manner. The CNSC intends to obtain assurance that successful candidates have adequate levels of competence through its ongoing compliance verification and enforcement programs.
52	Belgium	Article 7	**3.7.2.2.2**	"Subsection 9 (2) of the Class I N.F.R stipulates that the CNSC may certify a person for a position at a Class I facility, such as an NPP, when that position is referred to in the facility operating licence." Does it mean that this certification is not an obligation and can be optional? What are the criteria for decision? Are there other authorities who are allowed to deliver such certification?	The *Class I Nuclear Facilities Regulations* do not make certification of persons mandatory unless this requirement has been implemented in the facility licence. The reason for this is that the definition of Class I nuclear facilities includes a wide range of facility types. Many smaller Class I nuclear facilities in Canada, such as radioisotope processing facilities, do not require operators to be certified. At nuclear power plants, certain positions that are critical for safety must be filled by certified persons. The requirement for the licensee to have staff certified for these positions is specified in the licence. The licensee must ensure that these persons have a certification issued by the CNSC for the position. However, before the CNSC will issue such a certification, the licensee must satisfy the CNSC that the person is qualified for the position. If the CNSC does not obtain this assurance, the CNSC has the right to refuse to issue such a certification. If a certification request is refused, the CNSC must provide the licensee and the person with an opportunity to be heard regarding the proposed CNSC decision. The criteria to be satisfied in the application for certification are described in the *Class I Nuclear Facilities Regulations*, and specified in more detail in licence conditions for each facility. These criteria include: - The minimum education and experience qualifications of the person, - The required training, including on-job-training; - The examinations the person must successfully complete, - A specified job co-piloting period, and - Completion of a final interview by licensee management. Finally, the licensee must provide in the application for certification a

	Country	CNS Article	Report Reference	Question	Answer
					statement that the candidate is capable, in the opinion of the licensee, of performing the duties of the position. No authorities other than the CNSC may issue these certifications.
53	Korea, Republic of	General	**2.1.2**	What has been changed after the restructuring of power companies in human resources allocation for plant operation, maintenance and also in operators training program with respect to the utilization of training facilities?	In general, restructuring has mainly impacted administrative and support services, and has had little impact on human resource allocation for plant operation. In some cases, additional human resources have been retained by the NPPs for the operation and maintenance of the facilities, and for the engineering required to support the operations and maintenance of the facilities. The changes have resulted in similar or increased utilizations of training facilities overall, and the construction of additional training facilities at some NPPs. The CNSC considers that restructuring has had no negative effect on plant operation, maintenance and training.
54	Hungary	Article 11.1	**3.11.1, p.25**	What are the possibilities and what is the practice of the nuclear safety regulatory body in supervising the selection of the NPP top management?	The Canadian Nuclear Safety Commission (CNSC) does not participate in the selection of NPP top management. However, for persons occupying the position of Station Manager (or the equivalent) at an NPP, including those delegated to act on behalf of the Station Manager when the Station Manager is absent, the CNSC verifies that the licensee is meeting the following requirements of the *General Nuclear Safety and Control Regulations*: "12.(1) Every licensee shall: (a) ensure the presence of a sufficient number of qualified workers to carry on the licensed activity safely and in accordance with the Act, the regulations made under the Act and the licence; (b) train the workers to carry on the licensed activity in accordance with the Act, the regulations made under the act and the licence;" It is the responsibility of the licensee to ensure that all workers, including persons occupying the position of Station Manager, possess all competencies required for the position, regardless of whether the particular position is one that requires certification or not. Although it does not issue certifications for persons occupying the position of Station Manager, the CNSC considers that persons occupying this position must be qualified to carry out their responsibilities. The CNSC verifies that licensees are meeting the above requirements by interviewing persons licensees propose to appoint to Station Manager positions before the appointment is made final. The objective of the interview is to verify that the licensee's programs of training and qualification have been successful to the extent that the proposed person understands their responsibilities with regard to the CNSC requirements for safe operation of a nuclear facility.

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ARTICLE 12: HUMAN FACTORS					
Lessons Learned					
55	Japan	Article 12	**3.12.1, p.27, L.6**	In the line 2-4 of section 3.12.1 the second paragraph, it is explained that "A human performance improvement program, established for the facilities, encourages assessment of internal and external events and OPEX as opportunities to address problems prior to errors occurring." Could you kindly explain the outline of this "A human performance improvement program"? To take advantage of lessons learned from minor trouble information due to human error, do you have the shared database between the CNSC and licensees? If you have, how do you operate the said database?	The human performance improvement program focuses on improving management oversight and leadership to ensure safe and effective performance of the work. For example, attention was placed on improving the pre and post-job briefings performed by the line supervisors to ensure that the crews understood the work to be performed, the risks associated with the work, and the measures to be taken to avoid those risks. Another example is the use of field simulators that provide the opportunity for the field staff to perform the work on a mock up, prior to undertaking the actual work. The goal of these efforts is to reduce the amount of human error when the work is performed. To track improvement in human performance, the number of events were counted that were discovered that were attributable to human error. The events that occurred were discussed with the line staff so that the errors, and causes, were understood. The performance measure used is also used by other NPPs, allowing comparison and benchmarking of performance. There is no shared database of the human error precursors that are tracked by the NPPs. Significant human errors are shared between licensees as part of the Operating Experience program. Benchmarking visits to other utilities, and conferences, also provide opportunity to the licensees to share among themselves the knowledge that they have gained
56	Hungary	Article 12	**3.12.1, p.27**	Is there any practice in evaluation of precursor events for improving the overall human performance?	Yes. The precursors to potentially more significant events are identified and addressed as part of the improvement programs at the licensees, particularly through the identification of trends.
ARTICLE 14: ASSESSMENT AND VERIFICATION OF SAFETY					
Safety Analysis					
57	Hungary	Article 14	**3.14.4, p. 34**	What are the conditions like for approval of reducing safety margins and is any compensation measure required?	Licensees are required to obtain CNSC approval for modifications that could impact the safety margins. If the CNSC staff is satisfied that the proposed changes and any mitigating or compensatory measures are acceptable, they will approve the licensee's request. Compensatory measures might include reduction in power level, reduction in trip set points, setting limits on specific operating parameters, and establishing administrative limits or interim procedural instructions.

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58	Hungary	Article 6	**3.6.4, p. 12**	What were the effects of correcting actions carried out in different NPPs like for the CDF values?	Licensees have not delivered yet their updated probabilistic safety assessments (PSAs). Therefore the following values for Core Damage Frequency (CDF) are to be considered as an order of magnitude: a) For Pickering A, the CDF passed from 1.4 10-4 to around 3 10-5, b) For Bruce B, the CDF passed from 5 10-5 to around 2 10-5.
59	Germany	Article 14.1	**3.14.1.1, p.31**	The report does not mention safety analyses for low-power and shutdown states. Have such safety analyses been carried out? Are there any regulatory requirements?	Analyses in the safety report ensure trip coverage at all reactor powers between 0 and 100%. CANDU reactors are normally either operated under control of the regulating system or put in the Guaranteed Shutdown State (GSS). Loss of heat sink scenarios are the main concern for low-power and shutdown states. Safety reports include specific analyses for such scenarios. For example, Bruce Power's safety reports for Bruce-A and for Bruce-B both contain descriptions of loss of heat sink scenarios while in a shutdown (that is, low power) state. There are 2 systems which provide fuel cooling while shutdown: Shutdown Cooling System and Maintenance Cooling System. Loss-of-heat-sink scenarios for each of these systems include loss of flow, loss of cooling, loss of inventory, and loss of power, as well as the consequences associated with these losses (that is, radiological, fuel integrity, etc.). Probabilistic safety assessments (PSAs) for shutdown reactors are being prepared by the licensees.
60	Pakistan	Article 14	**p.31**	It has been stated that safety analysis reports are reviewed on a regular basis, typically at a frequency greater than that of operating licence renewal that are currently granted by CNSC for more than two years period. Has there been a change emphasized by CNSC in the format and content of the SAR on the lines of USNRC's R.G. 1.70?	CNSC Regulatory Standard S-99 requires that the licensees submit an updated facility description and safety report every three years. Detailed information on such regulatory requirements can be found in Attachment 1. The format and contents of the safety report is at the licensees' discretion.
61	United Kingdom	Article 14	**3.14.1.1, p.31**	This paragraph states that the safety analysis reports are reviewed on a regular basis – typically at a greater frequency than the licence renewals. Does this infer that the whole NPP safety Analysis report is reviewed? If so, what is the depth and scope of the review? Is it obligatory for the licensee to keep the safety analysis report up-to-date?	CNSC Regulatory Standard S-99 requires that the licensees submit an updated facility description and safety report every three years. Detailed information on such regulatory requirements can be found in Attachment 1. Normally only a small fraction of the safety analysis is changed in the update. CNSC staff does not review the entire report. The review is focused on areas that have changed. The depth of the review depends on the perceived importance of the analysis. More emphasis is given to faults where safety margins are small or uncertainties are large. Under another clause of S-99, see Attachment 11 for details, the licensee is required to report within 21 days on any problems or potential problems that are recognized through research findings or new or revised analysis and that represent a change in the safety analyses previously presented to the CNSC.

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ARTICLE 14: ASSESSMENT AND VERIFICATION OF SAFETY					
Integrated Improvement Projects (IIP)					
62	Japan	General	**2.2, p.6, L.30**	In line 2-4 of section 2.2 paragraph 5th, it is reported as "However, in March 2003, CNSC management decided to discontinue the centrally-coordinated tracking and monitoring of the OPG and Bruce Power IIP projects." Did CNSC participate in planning of the said IIP projects? How did CNSC, as the regulator, track and monitor the licensee's activity? Why did CNSC decide to discontinue the centrally-coordinated tracking and monitoring? Could you explain the grounds of the decision?	The Integrated Improvement Plan (IIP) was a licensee (then Ontario Hydro) initiative. In early 1998, the CNSC assembled a group of senior staff to review the submission of the Nuclear Asset Optimization Plan (NAOP), predecessor of the IIP projects. A formal report was developed by this review group and presented to the Atomic Energy Control Board (predecessor to CNSC) as Board Member Document 98-25. Comments were also provided to the licensee. The CNSC decided to track 44 of the 66 IIP safety significant projects at each of the three nuclear sites and at the licensees' headquarters. For each IIP project, the CNSC management appointed specialists to track the schedule and monitor deliverables, including the review of licensees' progress reports, interviewing IIP project managers and other licensee staff, performing audits and site inspections, and attending licensee meetings. The CNSC specialists would then report on the overall advancement of the IIP project as compared to the submitted licensees' plan. In addition, a central coordination team developed CNSC IIP overview progress reports for the CNSC senior management and the CNSC Commission. The coordination team also kept track of the overall IIP progress by attending IIP oversight monthly meetings, as well as meetings with licensee senior management and staff. Following the discontinuation of the centrally coordinated tracking and monitoring of the IIP, the CNSC has rolled the remaining active IIP projects into its baseline work. A number of factors influenced the decision to discontinue the CNSC centrally coordinated tracking and monitoring of the IIP projects. Most projects were completed or merged into base work at the nuclear power plants. Others were cancelled. Monitoring and tracking of the remaining activities was moved into the CNSC regular compliance activities. At the same time, industry organizational realignment and decentralization, such as the leasing of the Bruce site to Bruce Power and the partitioning of the then Ontario Hydro into several business units (one of them is Ontario Power Generation (OPG)) influenced the CNSC decision to focus more on monitoring licensed activities. Nonetheless, the appropriate level of monitoring was still required as agreed between the CNSC and licensees and continued until the end of 2002.
63	Korea, Republic of	General	**2.2**	What were the lessons learned from the centrally-coordinated tracking and monitoring of the OPG and Bruce Power IIP	Overall, the work accomplished by the IIP resulted in many improvements at the NPPs. These include improvements in Quality Assurance, Environmental Qualification and Fire Protection as well as

	Country	CNS Article	Report Reference	Question	Answer
				projects and corrective actions taken?	ongoing work on Configuration Management. An OSART was carried out by the IAEA at Pickering in 2004 confirmed these improvements. However, several events, such as the Ontario Hydro partitioning and decentralization, were not foreseen during the initial scoping of the CNSC overview of the IIP, which retroactively would have influenced the management of the IIP. Although the CNSC did not conduct a formal lessons-learned review, the central coordination approach was a good project management experience. There were two main challenges: (1) to get many specialists from several disciplines engaged in the review and (2) to provide the framework for a systematic and consistent approach to the review. Both these challenges were addressed by designing review forms where each reviewer was asked to identify milestones, implementation measures and performance indicators for their areas of review. The projects were then tracked and rated against these measures. The results were summarized and became the basis for the progress reports to the CNSC Commission. From the licensees' perspective, initial central co-ordination and monitoring of the projects was essential to ensure that the projects did not overlap and that synergies between the projects could be identified. The central co-ordination resulted in several projects being combined in the interest of efficiency. Once firm plans were in place, and the project or program documentation was established that provided the consistent performance instructions, the projects were transferred to the facilities and managed locally. This ensured that the project work could be integrated through the work management systems with the other planned work at the station.
ARTICLE 14: ASSESSMENT AND VERIFICATION OF SAFETY **Seismic Evaluation and Environmental Qualification**					
64	Japan	General	**2.3, p.6, L.42**	In section 2.3, it is mentioned that "In the assessments undertaken prior to the restart of Pickering A, OPG confirmed that: • An independent panel of experts has concluded that there is no evidence of a continuous earthquake-related fault in the Rouge River Valley in Scarborough, Ontario." Was this independent panel belonged to the licensee or the regulatory? How this conclusion was used in the regulatory action?	The Expert Advisory Panel was completely independent from both the licensee and the regulator. It comprised professional geologists from universities or the Geologic Survey of Canada (an independent body of the Government of Canada). The Expert Advisory Panel concluded that "... the Rouge River faults are non-tectonic in origin and, therefore, do not influence seismic hazard at OPG's nearby nuclear power plants." The conclusion resolved a concern that had been raised by the public. The design and subsequent re-evaluations for Pickering NPPs were based on known existing seismic faults within the Great Lakes Basin. The concern was that the Rouge River Valley, which is in close proximity to Pickering NPPs, was caused by an unknown seismic fault. The geological assessment confirmed that the valley was glacial in origin, and thus the seismic risk to the station was unchanged. Based

	Country	CNS Article	Report Reference	Question	Answer
				What was the position of this panel?	on this conclusion, CNSC staff accepted with no modification the licensee's proposed Review Level Earthquake (RLE) for Pickering-A site.
65	Korea, Republic of	Article 14	**3.14.1**	The construction of several NPPs in Canada started in the early 1970s, when the requirements for seismic design of NPP facilities and seismic qualification of equipment by test were not well established. Therefore the proper re-evaluation of seismic safety for those NPPs might be necessary. 1. Was the seismic re-evaluation of the NPPs carried out in the periodic safety assessment based on new geologic and seismologic information and newly-established seismic requirement? 2. If the re-evaluation was performed, for which NPPs was it done and what was the re-evaluation method and procedure? 3. What kind of new geologic and seismologic information was taken into account in the seismic re-evaluation? 4. What were the corrective actions taken after the seismic re-evaluation?	The seismic re-evaluation of the existing NPPs was due mainly to the fact that the oldest plants, such as Pickering-A and Bruce-A multi-unit stations, were built at a time when no seismic standards for NPPs were in place in Canada and the seismicity of these particular sites was considered extremely low. The rules of the National Building Code of Canada (NBCC) for ordinary and industrial buildings were rather followed for the seismic design. However, the seismic qualification against modern standards and the use of the most updated geological and seismological data became a prerequisite for restart for both Pickering-A and Bruce-A units. The method used for their seismic qualification is Seismic Margin Assessment (SMA). Other plants which were seismically designed and are currently scheduled for refurbishment, such as Point-Lepreau and Gentilly-2 NPPs, are required to perform a Level 2 Probabilistic Safety Assessment that includes a review of external events such as seismic activity. The CNSC informs the licensees of any new information received from the Natural Resources Canada (NRCan) regarding the re-examination of the seismic hazards in order to be accounted for in the evaluation of the stations' seismic capacity. As indicated in Attachment 1, the results of such re-evaluation will be reported as per the requirements of relevant regulatory documents. Re-evaluation, strictly speaking, means that one reconsiders the original evaluation. In such category fall only Point Lepreau and Gentilly-2 NPPs that were originally seismically qualified. In addition, due to their refurbishment activities, they are currently re-assessed. Point Lepreau has already performed such seismic assessment using the Probabilistic Risk Assessment (PRA) based Seismic Margin Analysis, as recommended by US-NRC in Policy Issue SECY-93-87. The Canadian equivalent for such methodology is the Probabilistic Safety Assessment (PSA) based on Seismic Margin Analysis. For Bruce A, the Return-to-Service SMA methodology was based on (a) "Methodology of Assessment of NPP Seismic Margin", EPRI NP-6041-SL, Aug 1991, and (b) "Procedural and Submittal Guidance for Individual Plant Examination of External Events for Severe Accident Vulnerabilities", USNRC, NUREG-1407, June 1991. The Review Level Earthquake considered per EPRI reference had a 10,000 year recurrence and an estimated core damage frequency of less than 2E-5. This compares favourably with seismic-induced core damage frequencies for most US NPPs evaluated in past seismic risk

	Country	CNS Article	Report Reference	Question	Answer
					assessments. For Pickering A, seismic hazard analyses were performed to assess the applicability of the Review Level Earthquake (RLE). The "Seismic Hazard Resolution Project - Southern Ontario", considered three elements as needed for the resolution of the uncertainties in regional hazard affecting the nearby nuclear plants: enhanced seismic monitoring, regional historical seismicity, and Rouge River investigation. The CNSC requested that these three elements be addressed. In addition, the licensee addressed a fourth element: regional geophysics. The CNSC identified a number of 25 seismic upgrades as prerequisite for restart Pickering A restart. For Bruce A, several system components were seismically 'hardened' prior to the restart. Examples are deaerator storage tank, standby generator building, Emergency Boiler Cooling motor starters, and Main Control Room ceiling.
66	Korea, Republic of	Article 14	**3.14.1.4, p.33**	This section describes on five items which are included in the restart project scope of work for Bruce-A. Which one is the item derived from the seismic assessment result? How was the item derived from the seismic assessment?	Of the 5 examples of scope of work which was presented in the 3rd Canadian Report, none were directly initiated as a result of the Seismic Margin Assessment. However, the design of each incorporated seismic design requirements where appropriate: for, example, the new Emergency Power Generator design.
67	Korea, Republic of	Article 17		What are the regulatory procedures for survey and evaluation of capable fault or geological structure suspicious of a capable fault without evidence, found at or near the site area of nuclear facilities in operation or under licensing review process? If there are nuclear facility sites that were (or are) engaged in this procedure, what are the sites and how are the issues resolved?	One of the regulatory means for reporting earthquakes with potential impacts on NPPs is the use of Regulatory Standard S-99, *Reporting Requirements for Operating Nuclear Power Plants*, which states under clause (37) that the licensees have to report to the CNSC "... an earthquake that gives rise to free-field motion, at a nuclear power plant site, that exceeds the trigger range that the Canadian Standards Association publication, CAN/CSA 289.5: *Seismic Instrumentation Requirements for CANDU Nuclear Plants*, specifies for seismic-measurement instruments; or where instruments that meet N289.5 are not available, any earthquake that occurs within 500 kilometres of the nuclear power plant site and is greater than magnitude 5 on the Richter scale". All Canadian NPPs are engaged in fulfilling this regulatory requirement.
68	Hungary	Article 14	**3.14.7, p.35**	What is the EQ status like in the different Canadian NPPs?	A licence condition was added requiring each licensee to establish that, by 30 June 2004, all Special Safety Systems and systems supporting special safety systems, including equipment, components, protective barriers and structures in the nuclear facility are qualified to perform their safety functions under the environmental conditions defined by the nuclear facility's design basis accident. Each licensee was required to re-assure the CNSC that these Environmental Qualification (EQ) requirements were met and that any anomalies with specific equipment or conditions were identified and a remedial action schedule proposed.

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					All licensees attained compliance with this licence condition. In each instance, there is some residual equipment that remains to be environmentally qualified or replaced. This equipment does not pose a risk to safety and has been subject to engineering assessment. EQ on Pickering A Units 1, 2, and 3, and Bruce A Units 1 and 2 will be performed when they are returned to power operations.
ARTICLE 14: ASSESSMENT AND VERIFICATION OF SAFETY **Periodic Safety Review (PSR)**					
69	Japan	Article 14.1	**3.14.1.2, p.31, L.28**	In section 3.14.1.2, it is mentioned that "The IAEA Periodic Safety Review (PSR) Safety Guide NS-G-2.10 introduced the expectation that comprehensive reviews of the safety of an NPP would be conducted from time to time to compare its safety-case against current practices." About the international standards, please explain how the CNSC considers about the IAEA safety standards except NS-G-2.10, mentioned above, with relation to your nuclear safety regulations. Does the CNSC consider the harmonization to the IAEA standards with the domestic standards? If you have any approach for this, please explain.	In the 2nd Canadian Report under Article 7 it states that "The authority and responsibility of the CNSC are specified under Section 9 of the *Nuclear Safety and Control Act* (NSCA) as follows:…achieve conformity with measures of control and international obligations to which Canada has agreed." In the 3rd Canadian Report in section 1.0 Introduction it states that "Canada was one of the first signatories of the Convention on Nuclear Safety …. As one of the promoters of the Convention and one of the staunchest supporters of its objectives, Canada has endeavoured to fulfill its obligations under the Convention as demonstrated in the Canadian 1st and 2nd Reports …" In addition, Canada has had a long history of participating in the development of IAEA safety standards. For example, Canada was a contributor to the earlier version of the IAEA Safety Guide on Periodic Safety Review (PSR) NS-G.10, which was called 50-SG-12 (detailed information on the use of PSRs in Canada can be found in Attachment 9). Another example relates to the development by the CNSC staff of a new licensing basis for possible new reactors in Canada. The draft licensing basis has been developed on the basis of IAEA Safety Standard NS-R-1, Safety of Nuclear Power Plants: Design (detailed information on this topic can be found in Attachment 6). In summary, the CNSC identifies and considers existing standards when developing its regulatory standards. This includes adopting, referencing, using as a basis or harmonizing with IAEA and other standards as appropriate. The resulting regulatory standards support the legal framework within which the CNSC operates by imposing obligations on the licensees, when the standard is referenced in a licence or other legally enforceable instruments.
70	Korea, Republic of	Article 14	**3.14.1**	Please elaborate 'identified gaps' between your current licensing and compliance processes, from the safety point of view, and the IAEA PSR expectations.	Please refer to Attachment 9 for a detailed answer on the Canadian project team that was formed to work on identifying potential gaps between the CNSC safety areas and the IAEA PSR safety factors.
71	Korea, Republic of	General	**2.2**	What were the CANDU specific comments or recommendations made by IAEA Operational Safety Review Team (OSART)?	There were no CANDU design specific recommendations or comments made by the IAEA OSART team. The OSART report was made publicly available in Canada, and a copy can be provided upon request.

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72	Pakistan	Article 14	**p.32**	The Periodic Safety Review (PSR) being a comprehensive re-assessment of safety of an operating NPP is considered worldwide a beneficial activity in view of providing safety assurance with regards to current safety standards and practices. With reference to section 3.14.1.2, could you kindly elaborate the reservations of CNSC and the NPPs to introduce and implement PSRs in Canada?	Canada recognizes Periodic Safety Reviews (PSRs) as a beneficial activity. However, a decision on the use of PSRs in Canada has not been taken. (For detailed information on the use of PSRs in Canada please refer to Attachment 9.) Our main reservations relate to ensuring that any changes made be effective and efficient and that any additional burden to the regulator or the licensees justified.
73	United Kingdom	Article 14	**3.14.1.2, p.31-32**	Has any decision been made regarding the implementation of periodic safety reviews? What has been done up to the present time to confirm that the design basis and licensing assumptions are still valid and that the plant is fit for a further period of operation?	Currently, the CNSC does not use PSR in the licence renewal process. For detailed information on the use of the Periodic Safety Reviews (PSRs) in Canada please refer to Attachment 9. It suffices here to indicate that the elements of the PSR, such as aging management, safety analysis, and design changes, are contained in reports by the licensee and submitted to the CNSC for review and acceptance (see Attachment 11 for additional information). Performance information that compares actual performance against expectations is also provided, as are equipment inspection reports (see Attachment 2 for additional information). This information provides ongoing verification that the licensing assumptions are still valid and the plant is fit for ongoing operation.
74	Japan	Article 14.2	**3.14.1.2, p.32, L.46**	In the line 3-4 of section 3.14.1.2 the last paragraph, it is mentioned that "the CNSC makes the decision to use the PSR, it is anticipated that at least 5 years will be needed to introduce and implement PSRs in Canada.". What is the difference between "the current comprehensive operational safety reviews undertaken as part of the Canadian licensing and compliance processes", described in the third paragraph line 1-2, and the PSR? What is the major reason why at least 5years will be needed to introduce and implement the PSRs in Canada?	(Note: Additional information on the use of PSRs in Canada can be found in Attachment 9.) a) The major difference is in the integration and the timeliness of the licensing information. In the current Canadian licensing context, the information respecting safety changes is not integrated into a single lump-sum assessment. Each of the major topics is assessed independently. The licensing documentation is updated to reflect the changes arising from such assessments. b) Five years is an estimated minimum period to account for changes effected to the legal and regulatory frameworks. Because the introduction and implementation of such changes would occur concurrently with maintaining the continuing independent assessment it is anticipated that it would take about 1.5 years for the CNSC staff to establish its requirements, about 2 years the licensees to perform necessary work and document it, about 1 year for the CNSC to review the licensees' work and prepare recommendations for the Commission, and about 0.5 years to resolve any issues and undertake re-licensing hearing based on satisfactory final PSR report.
75	Romania	Article 7		Periodic Safety Reviews (PSRs) are state-of-the-art in Europe as bases for NPP licensing for long period of time (usually 10 years). Is the PSR one of the future option in	On the current and future use of PSRs in Canada and how it could be related to licence period, please refer to Attachment 9 for details. Canada also recognizes Periodic Safety Reviews (PSRs) as a beneficial activity. However, a decision on the use of PSRs in Canada has not

	Country	CNS Article	Report Reference	Question	Answer
				CANADA for licence renewal and for what period of time?	been taken. Our main reservations relate to ensuring that any changes made be effective and efficient and that any additional burden to the regulator or the licensees justified.
76	Finland	Article 14	**3.14.1.2**	In section 3.14.1.2 the issue of the Periodic Safety Review is discussed. Could you please describe whether any decisions, including justifications, have been made on the use of the Periodic Safety Review?	Canada recognizes Periodic Safety Reviews (PSRs) as a beneficial activity. However, a decision on the use of PSRs in Canada has not been taken. Our main reservations relate to ensuring that any changes made be effective and efficient and that any additional burden to the regulator or the licensees justified. Please refer to Attachment 9 for a detailed answer on decisions on the use of PSRs in Canada.
77	United Kingdom	Article 7	**3.7.2.2.3, p.15**	Regarding the extension of the period between licence renewals, the CNS 2002 report identifies the process for the two-year renewals and the 2005 report identifies the additional measure to justify a longer period. There seems to be no requirement for an updated safety analysis report that reflects the current plant condition and configuration. Would the implementation of periodic safety reviews broadly along the IAEA guidelines remedy this situation?	The CNSC Regulatory Standard S-99 requires updates to the facility description and safety report every three years (see Attachment 1 and Attachment 11 for details). Therefore, since the Canadian approach already ensures that the safety analysis report is updated every three years this appears to exceed the requirements of periodic safety reviews (which are normally performed every ten years). However as mentioned in Attachment 9 on the use of PSRs in Canada, the CNSC is reviewing the current Canadian licensing approach against the IAEA PSRs guidelines to determine if there are any gaps that need to be addressed.
78	Hungary	Article 7.2.2	**3.7.2.2.3, p.15**	Is the extending of the licence period only a possibility or is there an intention to do it for a given length? Has it a relation to the PSR interval? How is assured, that the utilities feel the necessity of thinking for long period?	a) Several Canadian licensees have already been granted licences for periods longer than 2 years. At each licence renewal, the licensee is required to demonstrate to the Commission that they are qualified to operate the facility and will make adequate provision for the protection of the health safety, security and the environment. b) As detailed in Attachment 9, PSRs are not a current requirement in Canada. Regardless of the licence period, the Commission must satisfy itself that the licensee and facility meet the regulatory requirements. As for the long-term assurance, CNSC staff has the authority to evaluate the licensees' performance and to promote, verify and enforce compliance with regulatory requirements including those contained in a licence. Through these ongoing activities CNSC staff and the Commission gain assurance that the licensee is making adequate provisions both in the short and longer term. In addition, assessment over the longer term is assured by plant life management programs (see Attachment 13), including components fitness for service, that have been submitted to the CNSC. These programs identify the expected deterioration of the major components, the likely degradation forces, and the inspections that will be performed to check that the rate of deterioration is meeting the expectations for the life of the component. Unanticipated results or lower than expected degradation is captured in the annual update to the documents.

	Country	CNS Article	Report Reference	Question	Answer
ARTICLE 14: ASSESSMENT AND VERIFICATION OF SAFETY **Probabilistic Safety Assessment (PSA)**					
79	Argentina	General	**2.5, p.9**	The Responsible Organizations are currently being given to PSAs as appropriate tools for a more comprehensive risk-informed evaluation of safety that may eventually both allow the relaxation of overly conservative limits and suggest new limits and conditions in areas that may have inadequately been considered in past deterministic studies. Which criteria will be applied by CNSC to evaluate the potential relaxation and new limits and conditions proposals by the Responsible Organizations as result of PSA application in Canadian NPPs?	Few predefined criteria will be set. Generally, the decision would consider if accepting the request will result in an increase in the risk of accident. In any case, current licensing conditions must be met. When a licensee supports its request by a Cost-Benefit Analysis, a decision will be made in accordance with CNSC Policy P-242 *Considering Cost-Benefit Information* (accessible on the CNSC website www.nuclearsafety.gc.ca), so that: - information on costs and benefits is only one factor that may be considered in making "regulatory decisions" or taking "regulatory actions", and does not displace legal requirements and other valid regulatory considerations, and - information, and consideration of such information, on costs or benefits may be quantitative or qualitative in nature.
80	Romania	Article 14		It is mentioned in the report that for licensees, PSA form a basis for risk-informed decision-making in regard to operational, plant maintenance and outage management strategies. Does CNSC perform any independent calculation in order to be confident about licensees' decision making and what are the tools and arrangement between CNSC and NPP (e.g. usage of the same computer tools, reliabilities indicators and PSA model)?	As part of the regulatory review of licensees' PSAs, the CNSC creates replicas under its own tool (SAPHIRE). This has allowed the CNSC staff to detect errors and/or mistakes in the original PSA. The replicas (so far, only one PSA replica, for Bruce B, has been completed) can also be used to verify the validity of licensees' arguments based on PSA results.
81	Japan	General	**2.5, p.9, L.9**	Consideration is currently being given to PSAs as appropriate tools for a more comprehensive risk-informed evaluation of safety that may eventually both allow the relaxation of overly conservative limits and suggest new limits and conditions in areas that may have inadequately been considered in past deterministic studies. The CNSC is following this development and participating in relevant discussions with the licensees. Progress in this area is continuing. 1) How will CNSC reflect the PSA performed by licensees on a risk-informed regulation,	Licensees' PSA results are not accepted as is. As part of the regulatory review of licensees' PSAs, the CNSC creates replicas under its own tool (SAPHIRE). This has allowed the CNSC staff to detect errors and/or mistakes in the original PSA. The replicas (so far, only one PSA replica, for Bruce B, has been completed) can also be used to verify the validity of licensees' arguments based on PSA results. The review of licensees' PSA is aimed at gaining confidence in the PSA results. The review has included interaction with the licensee and the results of the review have been communicated to the licensees. The results of the PSAs are not expected to be reflected in the regulations. However, the results of the PSAs have been and will be reflected on a case by case basis in regulatory requirements. For example, several regulatory decisions have been made considering PSA results. The results of Pickering A PSA (PARA) have been used by the

	Country	CNS Article	Report Reference	Question	Answer
				assuming that CNSC will apply PSA or PSR to the regulation in future? CNSC's basic policy such as acceptance of licensees' results as is, or re-assessment along to a standard that might be established by CNSC, or independent implementation by CNSC itself, is discussed or determined? 2) Will the insights from PSAs performed by licensees be reflected to the regulation? That is, an accident management to the plant vulnerability identified in voluntary PSA will be considered as a part of the regulation?	CNSC staff to define the scope of accidents to be considered in the corresponding Environmental Assessment. Also, the CNSC staff has required several modifications to be implemented in Pickering A as a condition for restarting laid-up reactors. These modifications addressed the main weaknesses of the plant as detected by the PSA. PSA results have been used by some licensees to support Cost-Benefit Analysis for proposing a course of actions on generic issues (e.g., GAI 95G02) and on plant modifications (Point Lepreau refurbishment project). The CNSC staff has taken this information into account when making their decision.
82	United States of America	Article 14.1	**Annex 3.14.1**	Annex 3.14.1 and the 2002 question responses discuss licensee PSAs and specify Level 3 for Bruce A and B and Pickering A and development for Point Lepreau and Gentilly-2, with a policy in preparation requiring a Level 2 PSA for each installation. What is the timeline for completing a Level 2 PSA of each installation? What is the current status of PSA development and improvement plans at all units? Does CNSC plan to audit the licensee PSAs or perform its own independent risk assessments?	Point Lepreau PSA is in progress and scheduled for completion by the end of 2006. Gentilly-2 PSA is conditional on the decision to refurbish. In the case that refurbishment is not approved, a decision would be made by CNSC on the required schedule. For Pickering A, improvements have been made, reducing the Core Damage Frequency (CDF) by a factor of 5 (from 1.4 10-4 to around 3 10-5). Update of PARA (Pickering A Risk Assessment) is currently projected after completion of Pickering B PSA (PBRA) and Darlington A Risk Assessment (DARA). PBRA is being reviewed by the plant. Darlington original PSA (DPSE – 1993) has been updated into DARA. Plant review has been performed. The final version was just finished and is scheduled to be delivered to the CNSC in February 2005). Bruce B PSA was issued in 1999. It resulted in improvements to the Powerhouse Ventilation System, the Environmental Qualification of some equipment, and the construction of walls and baffles to protect support system from harsh environment. These improvements have reduced the CDF from 5 10-5 to around 2 10-5. Bruce A PSA was issued in 2003; it is currently under CNSC review. The CNSC standard review plan for licensees' PSAs includes follow-up of the PSA development, in-house review and construction of a replica (from the licensee's electronic fault trees and event trees) under SAPHIRE.
83	Japan	Article 14.2	**3.14.1.4, p.33, L.33**	In conducting this comprehensive assessment, Bruce Power reviewed previous and current Safety Reports, as well as the progressing Bruce A seismic assessment and PSA. Bruce Power then conducted a comparison of these assessments against	In 2003, Bruce Power submitted the Main Report of its Bruce A Probabilistic Risk Assessment (BAPRA). This PSA is a Level 3 internal event risk assessment which was undertaken to provide confirmation to Bruce Power and the CNSC that the plant, once operational, would achieve acceptable levels of safety. It was also undertaken to provide risk-informed input for decision-making by Bruce Power on design and

	Country	CNS Article	Report Reference	Question	Answer
				the safety factors of the IAEA PSR (see Annex 3.14.1). Bruce Power concluded that Units 3 and 4 at Bruce A could be operated safely, reliably and in compliance with regulatory requirements for the balance of their useful lives following completion of the restart project scope of work which included. NPP PSAs by licensees may be progressing voluntarily and form a basis for risk-informed decision-making for licensees. 1) According to the report, Bruce Power might apply the PSA results as a part of plant safety assessment, and concluded that the Units satisfied regulatory requirement. This seems to take a potential risk-informed regulatory action in advance. Did CNSC accept the safety assessment results of the Bruce Power? 2) Will the insights from PSAs performed by licensees be reflected to the regulation? That is, an accident management to the plant vulnerability identified in voluntary PSA will be considered as a part of the regulation?	operational issues in preparation for the restart. The PSA methodology, model, and inputs to the model are currently undergoing in-depth review by the CNSC. BAPRA did indeed confirm that Bruce A would meet acceptable levels of safety as assessed against Bruce Power Safety Goals and Limits for Severe Core Damage, Large Release, Early and Delayed Fatality frequencies. Subsequent to the completion of the BAPRA, several design changes were made and operating procedures modified which will reduce Severe Core Damage frequency for Bruce A (e.g., diesel driven pumps into Emergency Boiler Cooling, manual tripping of electrical breakers following breaker handswitch failures). Their input into the BAPRA model and determination as to the extent of their impact on SCD frequency has not yet been undertaken. The results of the PSAs are not expected to be reflected in the regulations. However, the results of the PSAs have been and will be reflected on a case by case basis in regulatory requirements. For example, several regulatory decisions have been made considering PSA results. For example, the results of Pickering A PSA (PARA) have been used by the CNSC staff to define the scope of accidents to be considered in the corresponding Environmental Assessment. Also, the CNSC staff has required several modifications to be implemented in Pickering A as a condition for restarting laid-up reactors. These modifications addressed the main weaknesses of the plant as detected by the PSA. PSA results have been used by some licensees to support Cost-Benefit Analysis for proposing a course of actions on generic issues (e.g., GAI 95G02) and on plant modifications (Point Lepreau refurbishment project). The CNSC staff considered this information in making their decision.
84	China	Article 14.1	**4.1, p.53**	What is the current status of developing PSA application standard (S-294) for Canada's nuclear industry?	Draft Regulatory Standard S-294 was issued in June 2004 for public comment. Public comments were considered and the revised draft is now undergoing final legal and CNSC staff validation. The final version will then be presented to CNSC Senior Management for approval to publish. This is expected in Spring 2005. S-294 can be accessed on the CNSC website www.nuclearsafety.gc.ca.
85	France	Article 7.2.1	**3.7.2.1, p.13**	With its content rather concise, the report makes nonetheless 17 times the use of the expression "risk-informed" regulation, however without providing a clear illustration of the benefit given by this approach. Does this expression mean the systematic use of PSA results or replace what was also called the "engineering judgment"? Could Canada illustrate this approach in revising the regulatory framework by some examples of safety	As explained in Attachment 8, risk-informed regulation is a corporate objective and is not yet completely implemented. In particular, it requires supporting document and procedures. Preparation of such documents is in progress. However, a new licensing basis document (described in detail in Attachment 6) is being prepared for new reactors, featuring a risk-informed approach on a large number of issues. Several regulatory decisions have been made considering PSA results. For example, the results of Pickering-A PSA (PARA) have been used by the CNSC staff to define the scope of accidents to be considered in the

	Country	CNS Article	Report Reference	Question	Answer
				issues, the analysis of which was undertaken or rejected based on such an approach?	corresponding Environmental Assessment. Also, the CNSC staff has required several modifications to be implemented in Pickering-A as a condition for restarting laid-up reactors. These modifications addressed the main weaknesses of the plant as detected by the PSA. PSA results have been used by some licensees to support Cost-Benefit Analysis for proposing a course of actions on generic issues (e.g., GAI 95G02) and on plant modifications (Point Lepreau refurbishment project). The CNSC staff considered this information in making their decision.
86	China	Article 14.1	**14.1, p.53**	Please give a brief introduction on the reliability standard (S-98) being implemented in Canada. How do the nuclear power plants in Canada implement this standard??	CNSC Standard S-98 has been revised. A revised version of this regulatory standard was issued for public comment in January 2005. S-98 can be accessed on the CNSC website www.nuclearsafety.gc.ca. The CNSC reliability standard S-98 requires the licensee to develop and implement a formal reliability program. This program shall include: • Ranking the different systems in the plant according to their risk significance, • Assigning reliability targets to the systems most important to safety, • Optimizing surveillance and maintenance programs, • Reporting annually on systems' reliability performance. The standard was issued in December 2001. Since then, CNSC held three consultation meetings with the industry on the implementation of S-98. The industry has a grace period to implement the requirements of S-98 before it becomes part of the licence (targeted end of 2005). The consultations with the industry revealed a series of technical issues to be clarified (e.g., scope of S-98, flexibility in setting targets, modeling time and demand-dependant failures, support systems modeling). In order to respond to S-98, the industry, under the umbrella of the CANDU Owners Group (COG), set up working groups to discuss and define common grounds such as risk-significant systems and targets, reliability modeling, reliability program, and reliability reporting. These working groups have already drafted documents that are now under industry's revision. At present, each licensee is defining its specific reliability program using the COG group's input as a framework. By the beginning of 2005, CNSC staff visited all licensees (four organizations operating 22 reactors, from which 5 are laid-up) with the objective of evaluating the status of S-98 implementation, discussing the revised standard, and identifying any outstanding issues that may prevent the industry meeting the 2005 target of S-98 implementation. In general, licensees who have developed PSAs have no major difficulties in interpreting the revised standard or implementing the program by the end of 2005. On the other hand, licensees who have

	Country	CNS Article	Report Reference	Question	Answer
					not completed or revised PSAs face certain challenges as they will have to define the list of systems important to safety and the associated reliability targets, etc. Another important factor is the decision to be made on the refurbishment of those plants approaching the end of lifetime, when considering the effort required versus the expected benefits.
87	China	Article 14.1	**14.1, p.53**	Please give a brief introduction on the reliability standard (S-98) being implemented in Canada. How do the nuclear power plants of Canada implement this standard??	(Note: This is a repeated question. China was informed. Same answer was given since China did not correct this situation on the IAEA controlled CNS website). CNSC Standard S-98 is being revised. A revised version of this regulatory standard was issued for public comment in January 2005. S-98 can be accessed on the CNSC website www.nuclearsafety.gc.ca. The CNSC reliability standard S-98 is aimed at focusing the licensees' resources to the most risk significant issues. It requires the licensee to develop and implement a formal reliability program. This program shall include: • Ranking the different systems in the plant according to their risk significance, • Assigning reliability targets to the systems most important to safety, • Optimizing surveillance and maintenance programs, • Reporting annually on systems' reliability performance. The standard was issued in December 2001. Since then, CNSC held three consultation meetings with the industry on the implementation of S-98. The industry has a grace period to implement the requirements of S-98 before it becomes part of the licence (targeted end of 2005). The consultations with the industry revealed a series of technical issues to be clarified (e.g., scope of S-98, flexibility in setting targets, modeling time and demand-dependant failures, support systems modeling). In order to respond to S-98, the industry, under the umbrella of the CANDU Owners Group (COG), set up working groups to discuss and define common grounds to address such as risk-significant systems and targets, reliability modeling, reliability program, and reliability reporting. These working groups have already drafted documents that are now under industry's revision. At present, each licensee is defining its specific reliability program using the COG group's input as a framework. By the beginning of 2005, CNSC visited all the licensees (four organizations operating 22 reactors, from which 5 are laid-up) with the objective of evaluating the status of S-98 implementation, discussing the revised standard, and identifying any outstanding issues that may

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					prevent the industry meeting the 2005 target of S-98 implementation. In general, licensees who have developed PSAs have no major difficulties in interpreting the revised standard or implementing the program by the end of 2005. On the other hand, licensees who have not completed or revised PSAs face certain challenges they will have to define the list of systems important to safety and the associated reliability targets, etc. Another important factor is the decision to be made on the refurbishment of those plants approaching the end of lifetime, when considering the effort required versus the expected benefits.
ARTICLE 14: ASSESSMENT AND VERIFICATION OF SAFETY **Plant Life Management (PLM)**					
88	Japan	General	**2.6, p.9, L.26**	In the third paragraph of section 2.6, it is explained that "Plant life management programs were developed by the licensees to provide for the systematic assessment, timely detection, mitigation, recording and reporting of significant aging effects in SSCs." About the "Aging and plant life management in Canada", how does CNSC communicate with licensees? Would you like to explain the CNSC's action programs concerning the aging and plant life management of licensees? a. Period of the aging and plant life management to be evaluated. b .Evaluation items. Is the aging management program included in those items? c. Method of the inspection.	As with all nuclear safety and regulatory issues, the CNSC has a variety of mechanisms available to communicate with licensees regarding plant ageing and life management. This includes formal correspondence; formal and informal meetings; and action notices and directives. In addition, through the reporting requirements outlined in the Regulatory Standard S-99 “Reporting Requirements for Operating Nuclear Power Plants” and the in-service inspection reporting and approval requirements in CSA standards N285.4, N285.5, and N287.7, CNSC staff remains abreast of developments in licensees’ understanding of ageing degradation. For plant aging and its regulatory surveillance please refer to Attachment 13.
89	Bulgaria	Article 6	**p.11**	What is the nuclear unit lifetime in Canada?	There is no fixed nuclear unit lifetime in Canada; the focus in Canada is on fitness for service of the important systems, structures and components (SSCs) based on current and future condition as determined by inspections and assessments. However, the CNSC continuously evaluates licensees’ assessments of the condition of critical SSCs to improve prediction of their expected lifetime, identify those that must be replaced in support of continued operation, and minimize the risk associated with the regulated activities. For additional information on Plant Life Management (PLM) please refer to Attachment 13.

	Country	CNS Article	Report Reference	Question	Answer
90	Bulgaria	Article 6	**p.11**	Is there a legislative provision that gives an opportunity to prolong the licence of a unit whose design lifetime has expired?	No. The Canadian NPPs are not licensed based on a design lifetime. There are no provisions in the *Nuclear Safety and Control Act* (NSCA) or the CNSC regulations that speak to this issue. The current licensing process used in Canada (described in section 3.7.2.2 of the report) includes the ongoing licensing of nuclear power plants provided that the condition of the facility supports continued safe operation. For additional information please refer to Attachment 13.
91	Argentina	Article 14	**3.14.6, p.35**	The point Lepreau Plant Life Management (PLM) process initiated and documented in 2001 provides the methodology for the development of system-specific and component- specific monitoring programs. Was it a regulatory requirement to the licensees to develop and to implement a PLM program in each NPP? How does the Regulatory Body control the correct PLM program application? Which safety criteria are used by the Regulatory Body to evaluate PLM program application?	Although there was no explicit regulatory requirement to develop and implement a PLM program at each NPP, there are requirements to ensure that important systems, structures and components (SSCs) are fit for continued service. The CNSC staff currently monitors licensee activities related to PLM program performance through its compliance program, which is described in section 3.7.2.3 of the report. In addition, CNSC staff is in the process of developing a regulatory standard that will be used as a regulatory basis for ongoing compliance inspection of ageing management programs and for comprehensive licensing assessments of licensee long term operation applications. Detailed information on PLM in Canada can be found in Attachment 13.
92	Japan	Article 14.2	**3.14.6, p.35, L.24**	The NBPN process for PLM, initiated and documented in late 2001, provides the methodology for the development of system-specific and component-specific monitoring programs. The process includes: Identifying critical SSCs (for example, pressure tubes, feeders, steam generators and valves), Understanding their aging characteristics, Detecting their aging effects, Assessing degradation mechanisms and life prognosis. Are SSCs in BOP included in the aging assessment? If not included, how does CNSC regulate the aging effect to BOP SSCs?	Licensees have programs in place to monitor and predict the effects of flow-accelerated corrosion (FAC) in “conventional” pressure retaining systems. Following the Mihama incident, CNSC staff reviewed these programs to ensure that a similar event would be unlikely to occur in Canadian NPPs. In addition, certain licensees have implemented periodic inspection programs which include some conventional systems whose failure may affect the conditions in the control room. Some licensees have also undertaken life assessments of a number of key conventional piping systems and supports in order to provide assurance that the piping and supports will give reliable service to attain its design life with an option to extend its service life up to 50 years. These assessments included such conventional piping systems as the condensate system, the boiler feed-water system, the condenser steam discharge system, and the auxiliary steam system. The assessments identified some recommendations to provide additional assurance that these systems will perform safely, including implementing a more proactive maintenance approach, a station wide pipe support inspection program, and considering further augmentation to the existing FAC monitoring program for certain systems. Furthermore, CNSC staff has identified the need to further augment in-service inspection requirements for high-energy BOP systems, and has undertaken the production of a regulatory standard to incorporate these and other requirements for both nuclear and conventional pressure

	Country	CNS Article	Report Reference	Question	Answer
					retaining systems. Detailed information on systematic ageing management programs can be found in Attachment 13.
93	United States of America	Article 14.2	**3.14.6**	Section 3.14.6 states that by late 2001, seven of nineteen identified PLM [Plant Life Management] studies had been completed with seven additional studies underway at that time. What insights have been gained from these studies to date, especially in the areas of materials degradation and containment integrity?	There have been a number of insights gained during the development of the Plant Life Management Studies, many regarding the basis on which in-service inspections are carried out. Several of the studies had difficulty in determining initial conditions of equipment from available records. With the benefit of hindsight regarding the types of degradation mechanisms that are important in component lifetime management, it would have been beneficial to ensure more comprehensive equipment condition assessments and measurements were undertaken at the time of initial construction. For example, while pipe material composition and thickness may have been well specified and verified, this did not necessarily include accurate determination of material thickness on the outside radius of pipe bends of various radii, nor the accurate determination of actual composition of steel or other materials (e.g. where specifications are for an acceptable range, and acceptance tests merely verify the value is within the acceptable range.). Licensees have often been unable to determine initial conditions of equipment in sufficient detail to give a clear indication of long term degradation trending, thus requiring more frequent in-service inspections to get baseline data. Regarding the performance of in-service testing, the importance of repeatability and accurate trending of results is another insight. For example, past in-service testing on some components merely verified continued acceptability for service, e.g. with regard to thickness of piping material. A lifetime management program requires trending of results rather than just a comparison of current inspection results with a pass/fail criterion. This in turn requires accurate repeatability of measurements. For example, past practice in some cases had included determination of the thickness of bends on piping subject to erosion/corrosion. It has been found that it is not sufficient just to trend the minimum thickness found, it is also important to ensure that an accurate record is available of thickness trends at a number of repeatable locations on significant bends. The location of minimum thickness may vary with time, leading to a misinterpretation of thickness trending and remaining available life of the bend. Other insights include the issues related to service conditions of cable insulation, testing methods for aged cable, issues regarding influence of long term exposure to low humidity conditions, accurate determination of radiation fields seen during the service lifetime etc. Issues related to

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					elastomers have been another area of interest, including shelf life of replacement parts kept in stores, and manufacturers' changes to elastomer types internal to replacement components etc.
94	Germany	Article 6	**3.6.5, p.12**	The current life cycle management programs (see subsection 2.6) are being used to afford more accurate assessments of the condition of the SSCs. Is there a general approach to life time extension for all utilities?	The current Canadian approach to lifetime extension is described in detail in Attachment 13.
95	Germany	Article 13	**3.13.3, p.29**	Particular concerns remain to CNSC staff with regard to implementation measures of QA programs for pressure-boundary work for three licensees. What are the specific QA requirements for plant life management regarding aging? Aging aspects are only mentioned generally in subsections 2.6 and 3.14.6.	The CNSC does not have any specific quality assurance (QA) requirements for aging management. However, licensees must follow extensive quality assurance requirements for all their activities as required by their operating licences. Additional information on QA for work on pressure retaining boundaries please refer to Attachment 14.
ARTICLE 14: ASSESSMENT AND VERIFICATION OF SAFETY **Plant Restart, Plant Refurbishment**					
96	Argentina	Article 6	**3.6.5, p.12**	In the report it is stated that the refurbishment efforts at point Lepreau and Gentilly-2 will result in the replacement and improvement of many systems, structures and components (SSCs), and are expected to extend the life of these plants. Which are the main aspects considered to affirm that are expected to extend the life of Point Lepreau and Gentilly-2 NGSs?	The CNSC does not currently have specific regulatory requirements for refurbishment of power reactors in Canada. Therefore, licensees must use current regulatory requirements to effect changes to the systems, structures and components (SSCs) related to the refurbishment effort, whether or not refurbishment would lead to extending the originally intended life of the NPP. For Point Lepreau NPP, NB Power Nuclear (NBPN) developed an 18-item "Licensing Framework" that covers the scope and implementation plans for the activities associated with the refurbishment project. This document was developed following the completion of extensive plant system condition assessments and safety review processes that included, for example, review of plant status against current codes & standards, Wolsong 2/3/4 NPPs, Qinshan NPPs, AECL CANDU 6 designs, and generic CANDU 6 PSA. CNSC staff reviewed the draft Licensing Framework and responded with a regulatory position on all of the 18 items. CNSC staff and NBPN exchanged numerous correspondences and various technical discussions to resolve issues and reach consensus. Currently there is agreement in principle for most of these items between the CNSC and NBPN. With regards to Hydro-Québec (HQ) and its Gentilly-2 NPP, the licensee has developed a licensing framework for G-2, "Cadre réglementaire pour la réfection de G-2", a document similar to the one produced for

	Country	CNS Article	Report Reference	Question	Answer
					Point Lepreau, which is being reviewed by the CNSC, for a target completion date of Spring 2005.
97	Japan	Article 14.2	**3.14.1.3, p.33, L.4; 3.14.1.4, p.33, L.39**	In section 3.14.1.3 and 3.14.1.4, Restart of Pickering-A and Bruce-A were reported. About the licensee's restart effort for system improvements and upgrades, what is the point of regulatory review (such as review items and inspections)? At the restart after a long shutdown, what were the special inspections required in comparison with the usual restart?	The restart of a Unit that has been laid up for an extended period is treated in a manner similar to that of initial commissioning of a Unit following construction. Equipment in the plant has not been operated for a period, and in the case of the recent restarts in Canada, a significant amount of maintenance work is performed prior to the restart. Special conditions were included in the licences to ensure that equipment maintenance was performed and that the CNSC is satisfied by the commissioning tests that are performed as the units are brought back to power production. It is important to note that CNSC approval is normally not required during the restart of a unit following a “”routine” outage. For the restart of Pickering-A, the licensee made a considerable number of commitments far more extensive than the list of examples included in 3.1.14.1.3 of the 3rd Canadian Report. A condition was added to the licence to require the licensee to submit a completion assurance report on key safety and environmental improvements and modifications. Approval of the request to remove the guaranteed shutdown state was to be based on review and verification activities of this completion assurance by CNSC staff. One of the major safety improvements required by the CNSC was the Pickering-A shutdown system enhancement (SDSE), which consisted of adding diverse and independent neutron overpower and high log rate trip parameters. CNSC staff monitored the commissioning activities for Unit 4 and assessed the commissioning test results to ensure that the SDSE had been properly implemented and was effective prior to restart. CNSC staff at Pickering-A reviewed the results of all testing of safety and safety-related systems which was conducted during the restart of Unit 4 and approved each increase of power past the 1%, 5%, 30% and 60% reactor power levels. Bruce-A Units 3 and 4 had been shutdown and in a laid-up state since 1997. As part of the Bruce-A Units 3 and 4 Return to Service, the scope of work to be undertaken by Bruce Power was submitted to the CNSC for their review and comment at the early stages of the project. This document identified the scope of work in terms of analysis and assessments, system and component up-grades, replacement and maintenance and Bruce Power expectation for internal audits on the project. The CNSC reviewed this proposed scope document and identified several issues for enhanced regulatory scrutiny - including field scrutiny during commissioning and testing phases as well as the installation phase. Examples of such issues are comparison against modern codes and standards; Emergency Power Supply up-grades;

	Country	CNS Article	Report Reference	Question	Answer
					pressure tube, steam-generator tube, and feeder inspection programs; and training of Main Control Room staff. Following a review of the design against modern codes and standards and a comprehensive system condition assessment, Bruce Power implemented several safety upgrades such as modifications to structures for improved seismic response; fire prevention and protection upgrades; installation of a new qualified power supply; and construction of a secondary control area in case the main control room becomes unavailable. During field work, CNSC staff monitored Bruce-A project execution routinely and conducted several in-depth audits. When Bruce Power was satisfied that it was nearing completion of the project and would soon be ready to restart the units, it presented its case to the CNSC again. The CNSC staff concurred with Bruce Power's position and agreed to the reactor restart, subject to completion of a number (55) of activities which were still planned. Examples of such activities are Powerhouse Emergency Ventilation system up-grades; new battery bank installation; feeder thickness assessment; and Environmental Qualification up-grades. The CNSC staff amended the Bruce-A Licence to permit the units' restart following their verification that these 55 items were, in fact, completed. During the actual restart of the units, CNSC staff witnessed the approach to first critical as well as several commissioning tests - primarily associated with the reactivity worth of reactor power control devices.
98	France	Article 6	**3.6.4, p.12**	The report mentions that "performance improvement programs were initiated in 1996 at several NPP sites and they continued during the reporting period" and update information is given about some NPP units. However, annex 3.6.1 (p. 61) mention 5 NPP unit which are defueled or in guarantee shutdown state for more than 7 years without any additional information. In the case where these plants are no longer to be used for power generation, is there any reason not to start the preparation of their decommissioning plan? In the case where there are plan for restart operation are there any refurbishing works and associated safety analysis ongoing or planned?	The 5 NPPs referred to in this question are 3 units at Pickering-A which are in a Guaranteed Shutdown State and 2 units at Bruce-A that are in a defueled state. The licensees are considering the restart of these plants, therefore it is not anticipated that they will apply to the CNSC for decommissioning licences in the near future. For Pickering-A NPP, refurbishment and improvement work for Unit 1 is in progress and is expected to be completed in 2005. A decision on the remaining units is a commercial decision for the licensee. Refurbishment and improvement work for Unit 1 will be approximately the same as that for Unit 4 which has already been returned to service. The safety analysis work for Unit 4 also covers the other units. For Bruce-A NPP, Units 3 and 4 have already been returned to service. The restart of Units 1 and 2 is a commercial decision for the licensee. If they are to be restarted, Units 1 and 2 will require more work than Units 3 and 4 before they can be returned to service. The most important items are replacement of the boilers and pressure tubes, since these have reached the end of their service life. A recent up-date of the Safety Analysis Report was undertaken in preparation for the restart of Units 3 and 4 in 2004 and 2003 respectively. Safety Analysis will continue to be conducted as required for the remaining life -

	Country	CNS Article	Report Reference	Question	Answer
					including possible life extension - of Units 3 and 4 and for Units 1 and 2 should the decision be made for these latter two units to be returned to service. As for the issue of decommissioning, preliminary decommissioning plans exist for all NPPs in Canada regardless of their operational status. For Bruce-A NPP, the licensee believes that decommissioning of the remaining laid-up reactor units (that is, Units 1 and 2) is premature. A feasibility study is being conducted on returning these two units to service for a life extension of 25-plus years. Should there be a positive decision to return Units 1 and 2 to service for this extended life, the major work programs would include fuel channel replacement, boiler replacement, and up-grades in the Secondary Control Room, Emergency Power System and Shutdown System Number 2 as well as piping, heat exchanger, valve, power conversion refurbishment and replacements expected for a plant that is 28-years old with the expectation for 25 plus years of life extension.
99	Germany	Article 14.1	**3.14.1.3, p.33**	The assessments for return to service for Pickering A and Bruce A included seismic analyses. Which other external events were considered?	For Bruce A NPP, in addition to conducting a Seismic Margin Assessment as part of Units 3 and 4 Return to Service, a review of the plant design was conducted against the IAEA Safety Standard Series No. NS-R-1 *Safety of Nuclear Power Plants: Design*. In this review, human-induced and natural external events were considered such as road and rail traffic, air traffic, and reliability of off-site power, thunderstorms, tornadoes, and hydrology (that is, lake levels, flooding, and lake temperatures). For Pickering A NPP, the assessment for return to service included only seismic analyses.
ARTICLE 14: ASSESSMENT AND VERIFICATION OF SAFETY **Pressure Retaining Boundaries**					
100	Korea, Republic of	Article 13	**3.13.3**	Last paragraph of 3.13.3 states that CNSC staff has limited some licensees' authorization to perform pressure boundary work and/or required them to subcontract fabrication work to certified companies. 1. What kind of certification does CNSC accept for pressure boundary fabrication work? 2. Who certifies those companies, CNSC or Industrial Code Committee? 3. How many companies are certified to perform pressure boundary fabrication work in Canada?	The CNSC is not directly involved in the certification of subcontractors to perform pressure boundary work. This certification is performed by other authorities. Consequently, the CNSC does not have a listing of those contractors that are qualified. However the number of qualified contractors to perform work on nuclear systems is significantly lower than those qualified to perform work on conventional systems. Additional information can be found in Attachment 14.

	Country	CNS Article	Report Reference	Question	Answer
ARTICLE 14: ASSESSMENT AND VERIFICATION OF SAFETY					
Component Engineering					
101	Hungary	Article 6	**3.6.5, p.12**	What is the condition of non-replaceable or not to be replaced items (components) like in the units, which a lifetime extension expected in?	In support of refurbishment activities, as described in sections 3.14.1.5 & 3.14.1.6 of the report, licensees have demonstrated that their facilities are capable of operating for the requisite time beyond their original design basis. As part of these activities, licensees have performed and will continue to perform detailed condition assessments of major systems, structures and components (SSCs), focusing on those SSCs that would require significant effort and cost to replace. The condition assessments involve identifying all the degradation mechanisms acting on these SSCs and assessing the rate of degradation of these SSCs in order to arrive at a reasonable prediction of their end-of-life. In some cases, such as the fuel channels and feeders, the current condition of these components will likely necessitate their replacement if the plant is to operate for an extended period. For some other SSCs, such as the containment structure and reactor assemblies, although they have aged from their original state, their condition is continuously assessed and has been deemed sufficiently well and the rate of degradation sufficiently low that they can be expected to operate safely for the desired time. For example, the containment structure is affected by thermal cycling, periodic pressurizing, fabricating defects, stress relaxation, corrosion, and embrittlement and its condition is monitored/ maintained through pressure testing, visual inspections, and concrete coating. The reactor assembly is affected by corrosion, erosion, fatigue, creep, and embrittlement and its condition is monitored by visual inspection and leak monitoring. The third group of SSCs includes those that are relatively easily maintained and/or replaced, and are therefore not included in life extension activities as their replacement and/or maintenance can be accomplished when necessary through standard maintenance activities.
102	Korea, Republic of	Article 19		Since 1980s, problems related to sizing or control switch setting of safety-related motor-operated valve in nuclear power plants have been identified and programs have been established for solving these problems. For example, United States issued Generic Letter 89-10(Safety-Related Motor-Operated Valve Testing and Surveillance) and 96-05 (Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves) to	Many examples of these valve-design issues were found by the licensees during activities related to the restart of Pickering-A, Canada's oldest NPP, which was designed in the 1960's. For a wide variety of reasons there were low actuator margins for both motor and air-operated valves. The corrective actions initiated by the licensee were part of a comprehensive valve program based on current accepted industry guidance. Licensees currently have power operated valve calculations to assess the margins, and there are currently no indications of concern. When operating or design information arises which was not known during the completion of the calculations, the calculations are updated and the operators take whatever corrective

	Country	CNS Article	Report Reference	Question	Answer
				solve these problems. Did you experience similar problems related to MOV? Is there any plan to cope with the problems about safety-related motor-operated valve? If yes, please explain the plan briefly.	actions are necessary.
ARTICLE 14: ASSESSMENT AND VERIFICATION OF SAFETY **Severe Accident Management (SAM)**					
103	China	Article 14.1	**4.1, p.53**	When will the regulatory guide for severe accident management (SAM) be issued in Canada? How about the current status of SAM in Canada?	The regulatory guide on Severe Accident Management, G-306 "Severe Accident Management Program", is in its final stages of preparation, and is expected to be issued for use by mid to late 2005. The Canadian nuclear industry is developing a common set of generic SAM guidelines that will subsequently be supplemented by station specific procedures. For additional information please see Attachment 12.
104	China	Article 14.1	**4.1, p.53**	When will the regulatory guide for severe accident management (SAM) be issued in Canada? How about the current status of SAM in Canada?	(Note: This is a repeated question. China was informed. Same answer was given since China did not correct this situation on the IAEA controlled CNS website). The regulatory guide on Severe Accident Management, G-306 "Severe Accident Management Program", is in its final stages of preparation, and is expected to be issued for use by mid to late 2005. The Canadian nuclear industry is developing a common set of generic SAM guidelines that will subsequently be supplemented by station specific procedures. For additional information please see Attachment 12.
105	Finland	Article 18	**4.3**	The Canadian industry has been considering the issue of severe accidents since January 2002, as discussed in section 4.3. It is also mentioned that CNSC is developing a regulatory guide for SAM programs and has requested the licensees to implement SAM programs. Could you please inform what is the current status and contents of the programs of the licensees? Which kind of time schedules is expected for the implementation of the programs at the nuclear power plants?	The Canadian nuclear industry is engaged in a joint effort to develop Severe Accident Management Guidelines (SAMG's). This work is being done in consultation with the Canadian regulator who is similarly engaged in establishing a regulatory guide on SAM. The CANDU-generic SAMG's are scheduled for completion in 2005. Plant specific implementation will follow and are expected to be in place by the end of 2006. Additional information can be found in Attachment 12.
106	Pakistan	Planned Activities	**p.54**	What is the current status and progress of Severe Accident management (SAM) program initiated in 2002? Are any major hardware modifications expected in future in Canadian NPPs to support the resulting SAM guidance for mitigation of the	For the status and progress of the SAM programs please see Attachment 12. The general intent of the SAM programs is not to implement any major hardware modifications, although some instrumentation upgrades may be required at some plants. The SAM programs will make provisions for beyond design basis use of systems and equipment identified as appropriate to mitigate and manage the

		CNS Article	Report Reference	Question	Answer
				consequences of severe accidents?	consequences of a severe accident.
107	United States of America	Article 16.1	**4.3**	Severe accident management is discussed in Section 4.3 as a planned activity. What is the timeline for completing the various strategies, regulatory guidance, and licensee programs?	For the status and timeline of the SAM programs please see Attachment 12. The regulatory guide on SAM is in its final stages of preparation. It is expected to be issued for use by mid to late 2005. The CANDU-generic SAM guidelines, which are being developed by the industry, are scheduled for completion in 2005. Plant specific implementation will follow and are expected to be in place by the end of 2006.
ARTICLE 15 : RADIATION PROTECTION AND ENVIRONMENTAL SURVEILLANCE					
108	Germany	Article 15		a) Are acceptance criteria used for the regulatory review of the radiological consequences of design basis accidents? b) If yes, are these criteria related to releases or related to radiological exposures? c) If dose limits are applied, which are the parameters (e.g. exposure pathways, integration times, distances) considered for the calculation?	a) Yes, acceptance criteria are used for the regulatory review of the radiological consequences of design basis accidents. b) These criteria are related to radiological exposures. c) Dose limits are applied. The parameters considered for the calculation are as follows: 1. for a member of a critical group for which the radiological consequences of the release are most severe, at, or beyond, the site boundary; 2. for the period of 30 days after the analyzed event; and 3. taking into account contribution from external radiation, inhalation and skin absorption. Such criteria are currently subject to revision, as proposed in draft regulatory standard S-310 “Safety Analysis for Nuclear Power Plants” that can be accessed on the CNSC website **(**www.nuclearsafety.gc.ca**).**
109	Belgium	Article 15	**3.15.1**	a) Are there dose targets defined by the regulators in term of collective exposure for a plant? b) The dose targets defined by the licensees are not part of annex 3.15.1. How are these dose targets defined? c) Are they always achieved? d) Are the results available for each plant? e) Is there a national policy is this matter?	a) No, the CNSC does not define dose targets in terms of collective exposure for a plant. Each licensee is responsible for ensuring that all reasonable measures are taken to protect their workers against exposure to radiation as per the requirements of the CNSC Radiation Protection Regulations. b) Each licensee sets internal dose targets based on the work to be performed, the dose historically associated with that work, and the potential for reducing that dose. A current emphasis has been on minimizing the dose associated with tritium, with improvements to ventilation of the work areas. c) The NPPs internal dose targets are not always achieved. The common cause is attributable to unplanned circumstances that occur during the course of a planned station outage. Corrective actions are effected, and lessons learned are added to the OPEX for the next planned work of a similar nature. d) Collective doses are available for each plant. They are usually reported in the plant’s monthly and quarterly radiation protection reports. They are also available for plant outage activities. e) No, there is no national policy on this matter (other than the ALARA requirements in the CNSC Radiation Protection Regulations).

	Country	CNS Article	Report Reference	Question	Answer
110	Japan	Article 15	**3.15.2, p.37, L.16**	In section 3.15.2, Application of the ALARA Principle is mentioned. In addition to the licensees' strategies, how does the CNSC supervise the licensees of the collective doses (man.SV for NPP per year) in applying ALARA principle? Does this is provided in radiation protection regulation?	The CNSC does not include the requirement of collective doses in the CNSC Radiation Protection Regulations in applying ALARA principle. Licensees can demonstrate the adherence to the ALARA principle through the implementation of the following requirements of section 4 of the CNSC Radiation Protection Regulations as part of their respective Radiation Protection Programs: 1. management control of work practices; 2. personnel qualification and training; 3. control of occupational and public exposure to radiation and 4. planning for unusual situations. In addition, CNSC staff regularly evaluates the performance of the implementation of these regulatory requirements using evaluation criteria that were developed based on good radiation protection practices. Nonetheless, licensees have the flexibility to apply any means of control including collective doses targets in the implementation of section 4 of the CNSC Radiation Protection Regulations to assure ALARA.
111	Belgium	Article 15	**3.15.2**	"… ALARA …" It is mentioned that economic factors are taken into consideration for the defined strategies. a) How is it implemented? b) What is the financial value (if used) considered for the man.Sv in Canada?	a) In their Radiation Protection Programs, licensees demonstrate the ALARA principle through the implementation of the following regulatory requirements: management control of work practices, personnel qualification and training, control of occupational and public exposure to radiation, and planning for unusual situations. b) The CNSC does not prescribe any financial value for the application of ALARA. A discussion of the monetary value of the unit collective dose can be found in the IAEA Safety Reports Series No. 21 "Optimization of Radiation Protection in the Control of Occupational Exposure" that provides guidance when such decisions must be made. For more information, please consult the CNSC guide G-129 Rev. 1 "Keeping Radiation Exposures and Doses As Low as Reasonably Achievable (ALARA)" found on the CNSC website (www.nuclearsafety.gc.ca)
112	Korea, Republic of	Article 15	**p.38**	In relation to paragraph 3.15.4, 'Environmental Radiological Surveillance', what are the detailed criteria for environmental radiological surveillance range, selection of monitoring items and sampling points?	The criteria for environmental radiological surveillance range are proximity to nuclear power plants, population centres and ports that berth nuclear-powered vessels and the provision of national radiological human health assessments. Under the Canadian Radioactivity Monitoring Network, Health Canada also undertake monitoring of drinking water for Ra-226 and total U at a few locations. In addition, selected milk samples for gross gamma-emitting radionuclides and Sr-90 are analyzed.
113	Belgium	Article 15	**3.15.4**	Will the mentioned network of 50 detectors be located only in the neighbourhood of the NPPs or will it be distributed on the whole surface of the country? Does Canada	The network of over 50 detectors is primarily focused on nuclear power plants. There are 33 detectors around nuclear power plants, 16 are in population areas covering all Canadian provinces and 1 territory, and finally 4 are located in the naval ports. Therefore the detector network,

	Country	CNS Article	Report Reference	Question	Answer
				foresee surveillance and protection of nature in far and large territorial areas?	although focused around nuclear power plants, does cover the surface of the entire country.
114	Korea, Republic of	Article 15		In relation to 3.15.5, it is described that a new Fixed Point Surveillance Network is planned in addition to the current environmental monitoring program operated under Health Canada. 1. What are major differences between the current environmental monitoring network and the planned Network? 2. What is the working relation between Health Canada and CNSC regarding environmental radiation monitoring around nuclear facilities?	The major difference between the current network and the new network is that the data are transmitted to our data centre from the field, and thus are available continuously. The older network requires sample collection and processing of aerosol filters, TLDs, water and precipitation in our laboratories. The CNSC does not perform its own monitoring around the nuclear facilities. Health Canada is the only federal department that performs environmental radioactivity monitoring, and shares the data/information with other authorities.
115	Hungary	Article 19.8	**3.19.9, p.52**	What is the effect of waste problem on the operation of Canadian units?	Spent fuel is stored at each NPP site, first in pools of water and then in dry storage casks. There is no waste problem that is affecting the operation of the Canadian units. The NPPs are seeking to reduce the amount of radioactive waste produced in an effort to minimize the amount of processing and storage that must be performed.
ARTICLE 16: EMERGENCY PREPAREDNESS					
116	Hungary	Article 16.1	**3.16.2, p.39**	What are the connections like among FNEP and the Provincial Emergency Plans?	Emergency response in Canada is in essence the responsibility of the lowest level of government that can effectively manage the event. In most expected circumstances for an actual emergency at a nuclear power plant, this would be managed by a Provincial Emergency Plan under provincial responsibility. In such cases the federal level would be available as agencies from which provinces could request additional or specific resources. The federal agencies would also be kept fully informed of developments during the emergency response and be responsible for liaison with international jurisdictions (such as USA) and for judging whether the impacts of the Emergency remained within the capacity and authority of provincial emergency management. If the scope and impact of the Nuclear Emergency were sufficiently large, a federal emergency could be declared by the Prime Minister's Office transferring authority for the response to the federal level. However, the federal emergency response agencies, led by Health Canada, would still be relying on provincial and local level resources for both information inputs and actual response as they do not have independent emergency response capabilities. Health Canada is the keeper of the Federal Nuclear Emergency Plan (FNEP). They also lead discussions under the Federal Provincial

	Country	CNS Article	Report Reference	Question	Answer
					Territorial Coordinating Committee on Radiological Nuclear Emergency Management (FPTCC-RNEM). Discussions usually focus on issues, concerns and interests as to how the nuclear emergency network can be improved.
117	Japan	Article 16.2	**3.16.1, p.39, L.17**	"Creation of PSEPC" is reported in section 3.16.1 and "Revision of FNEP" is reported in section 3.16.2. Could you explain the updated nuclear emergency organization and each activity of HC, PSEPC, provinces and nuclear power plants in the case of emergency?	Health Canada is the lead federal department, responsible for radiological/nuclear emergencies. The PSEPC provides the structure for national response, including alerting and notification roles. On-site emergencies are the responsibility of the licensees of nuclear power plants; the off-site responsibility remains with the provincial authorities. If requested by the province and/or if there are international implications, then Health Canada gets involved. Health Canada is supported by PSEPC and other federal departments in managing the consequences. **LICENSEE** Licensees are responsible for any consequences for the use of their facility or radioactive material. In the cases where a release or possibility of a release of radioactive materials from an NPP, the licensee must inform immediately the CNSC and the provincial emergency management agencies. **CNSC** In general, the CNSC does not take primary responsibility in the management of an emergency or serious incident. The primary responsibility for dealing with an incident lies with the licensee of the facility or the radioactive material. Any off-site effects are dealt with by the appropriate provincial authorities. In the event that the provincial authorities become overwhelmed and require immediate assistance, the Federal Nuclear Emergency Plan (FNEP) led by Health Canada would be activated. The CNSC is a member of this plan and a primary supporter by ensuring expert staff are sent to the technical, coordination and public advisory groups at the Government Operations Centre to assist with the response and deal with the emergency situation. **PROVINCES/TERRITORIES** The development and implementation of nuclear emergency management for off-site nuclear emergencies is primarily a provincial/territorial responsibility. Typically, the provincial/territorial emergency plans provide for urgent protective measures, if required. These procedures may include limiting access to the affected zone, providing temporary shelter to the affected population, blocking thyroid uptake of radiation, evacuating buildings or premises in areas near the nuclear power plants, etc. **PSEPC and HC** For the largest incidents, the federal government may become involved.

	Country	CNS Article	Report Reference	Question	Answer
					The prime agencies are Public Safety and Emergency Preparedness Canada (PSEPC), which coordinates civil defence programs, and Health Canada (HC), which may activate the Federal Nuclear Emergency Plan (FNEP). HC is the lead agency for all matters related to activating the FNEP. In general this activation would occur in support of a province or a territory, or in support of a federal department or agency that is leading the federal response to assure public health and safety.
118	France	Article 16.1	**3.6.15, p.43**	The report mentions that, during the blackout of August 14, 2003, the CNSC emergency operation centre experiences difficulties with the power supply making communication difficult. However the report does not mention any plan to prevent this situation to reoccur. Since then, are there any plans to implement appropriate measures to be able to cope with the possible recurrence of loss of power at the CNSC emergency centre?	Immediately after the August 2003 power outage, the CNSC established a temporary alternate-site Emergency Operations Centre with another government agency. This alternate site was equipped with full backup power capabilities. In October 2003, a temporary power generator was installed to provide full backup power to a critical area of the CNSC Headquarters building. In parallel, steps were taken to acquire a permanent power backup generator. The installation of the permanent generator was completed in early August, 2004. It provides full power back-up of critical floors of the CNSC Headquarters building, including the Emergency Operations Centre. In December 2004, the CNSC established a Remote Access Centre, a key component of the Business Continuity Plan. This new capability has been designed to meet the emergency remote access requirements of CNSC employees in situations when physical access to CNSC offices is unavailable. In the very near future, the CNSC will be entering into a memorandum of understanding with another government agency for the establishment of a more permanent alternate-site Emergency Operations Centre.
119	United States of America	Article 16.1		The 2002 reports discussion of emergency exercises (Section 16.4.1) noted the need for on-going improvements in personnel requirements, training, facilities (including communications and informatics), information management, public communication, and notification and activation. How have these improvements progressed during the current review period? Have any additional insights been gained from the most recent set of exercises?	Since the last international/national exercise known as CANATEX/INEX2 which was held in April of 1999, there have been several federal/provincial exercises simulated from nuclear generating stations in Canada and abroad. The latest being a trans-boundary exercise with our American counterparts at the Fermi nuclear power plant located in the State of Michigan. Between November 2002 and February 2003 the CNSC and federal partners organized a series of Nuclear Emergency Management workshops to ensure a solid emergency response network was in place and to develop sound working relationships between the licensee and all levels of government. Since the workshops, there has been continual improvement to strengthen the nuclear emergency management network in Canada. Under the lead of Health Canada, the Federal Provincial Territorial Coordinating Committee on Radiological Nuclear Emergency Management (FPTCC-RNEM) has had discussions and an Action Plan has been produced to focus on amalgamating areas of interest which fall into three overarching themes: policy/infrastructure, communications and training/exercises.

	Country	CNS Article	Report Reference	Question	Answer
					Standards, Policies, Equipment and Infrastructure The initial requirement is to identify gaps, similarities and compatibilities between jurisdictions and to develop standards and policies which will ensure the proper infrastructure and equipment are in place for Canada. The province of Ontario is heavily involved in best practices as a result of developing general emergency management standards. The province moved away from an all hazards approach and now requires that a plan be developed for each specific hazard. As for equipment and infrastructure, the overall objective is to ensure modern and appropriate equipment is available along with adequate training for first responders. The CNSC has developed guidance documentation and will provide assistance in this area. Technical, Operational, Public and Media Communications Once the safety significance of the emergency has been properly assessed, coordination and harmonization are key components of any discussion related to communications, whether internal communications or communicating to the public and media. In continuing efforts to nationalize communications, the province of Quebec with support from other members of the FPTCC-RNEM has undertaken to work in the area of communications, having already worked on perception studies, targeting members of its population and convening focus groups to ensure awareness in all community stakeholders. Training and Exercises Under the FPTCC-RNEM a series of nuclear/radiological emergency exercises will continue to take place to provide key stakeholders an opportunity to enhance their abilities to respond during an emergency. The CNSC and federal/provincial/territorial partners will continue to work closely together to design, coordinate and participate in exercises for nuclear power plants, transportation events and other licensees.
120	Pakistan	Article 19	**p.49**	Have the Canadian NPPs implemented the symptom based Emergency Operating Procedures (EOPs) to cater with events beyond design basis (multiple failures/operator errors), augmenting the preventive part of accident management?	Symptoms based Emergency Operating Procedures have been implemented at Canadian NPPs, being introduced in the mid to late 1980s. Given that they are symptoms based rather than event based they do not explicitly cater to only design basis failures and effectively cover a wide range of scenarios which are outside the design basis (including multiple failures and operator errors). The assignment of a separate role of monitoring and addressing critical safety parameters during an emergency extends coverage to a significant number of scenarios involving operator error (incorrect action and failure to act). Licensees currently utilize event-based Abnormal Incidents Manual (AIM) to respond to accidents such as those related to loss of power or loss of coolant. In addition, licensees monitor critical safety parameter during the application of these AIM procedures and respond to

	Country	CNS Article	Report Reference	Question	Answer
					symptoms that develop outside of expected norms. These latter procedures provide a level of safety function oversight guidance.
ARTICLE 19: OPERATION					
Loss of Electricity Grid Event ("Blackout" of August 14, 2003)					
121	China	Article 19.4	**3.19.4, p.49**	How did Canadian nuclear plants in the province of Ontario maintain the safety function after the loss of electricity grid event on Aug. 14, 2003 ?	The safety functions were maintained at all Canadian plants in Ontario. The exception, as noted in the 3rd Canadian Report, was the impact on Pickering NPP where the Emergency Core Cooling system and the Emergency High Pressure Service Water system were unavailable for several hours until off-site power was restored.
122	France	Article 19.4	**3.19.5, p.49-51**	The report describes precisely (2 full pages) the various effects of the August 14, 2003 loss of electricity grid on the Canadian nuclear facilities. However there is no description of the measure taken since and procedures for responding to such an anticipated operational occurrence. Could Canada provide some indication about the lesson learned and the measures implemented or planned to limit the consequences of such an event?	Plans and schedules, to address most of the issues which complicated the loss of electricity grid event at Pickering NPP, have been developed and the licensee has taken appropriate interim actions in all the major areas. Recently, a local 22.5 MWe turbine generator has been added at the site as an interim arrangement pending final reviews of the longer term solution. Some electrical system issues are still under discussion and emergency service water and fire water improvement actions need further review by the CNSC. The long term corrective action plan of installing auxiliary class 4 power to the NPP will ultimately resolve the major issues.
123	Germany	Article 19.4	**3.19.5, p.49**	The loss of electric grid on August 14, 2003 is described in detail. Which procedures and measures have been established for responding to the loss of electric grid based on the lessons learned?	Plans and schedules, to address most of the issues which complicated the loss of electricity grid event at Pickering NPP, have been developed and the licensee has taken appropriate interim actions in all the major areas. Some electrical system issues are still under discussion and emergency service water and fire water improvement actions need further review by the CNSC. The long term corrective action plan of installing auxiliary class 4 power to the NNP will ultimately resolve the major issues.
124	Belgium	Article 19	**3.19.5.1. b)**	"… Darlington …" Failure of some of the system indicators is the reason for the shutdown of Unit 4. What kind of equipments and what kind of failures were involved?	In response to the event, Unit 4 of Darlington NPP automatically stepped-back due to load rejection. Failure of a Class 2 inverter resulted in de-energizing a Class 2 bus. In turn, this resulted in erratic Shutoff Rod position indication and unavailability of the Control Absorbers out-drives. The operators then decided to shut down the unit.
125	United States of America	Article 16.1	**3.16.5, 3.1**	Several issues related to the August 2003 blackout appeared to merit resolution. Specifically, Section 3.16.5 states that there were difficulties with the power supply at the emergency operations center that made communication difficult. What steps have been taken to improve power reliability or ensure a backup center?	Immediately after the August 2003 power outage, the CNSC established a temporary alternate-site Emergency Operations Centre with another government agency. This alternate site was equipped with full backup power capabilities. In October 2003, a temporary power generator was installed to provide full backup power to a critical area of the CNSC Headquarters building. In parallel, steps were taken to acquire a permanent power backup generator. The installation of the permanent generator was completed in early August, 2004. It provides full power

	Country	CNS Article	Report Reference	Question	Answer
				Also, section 3.19.5.1 mentions that CNSC requested that OPG identify changes that could prevent future recurrence of the blackouts effects. What insights have been gained as a result of this request?	back-up of critical floors of the CNSC Headquarters building, including the Emergency Operations Centre. In December 2004, the CNSC established a Remote Access Centre, a key component of the Business Continuity Plan. This new capability has been designed to meet the emergency remote access requirements of CNSC employees in situations when physical access to CNSC offices is unavailable. In the very near future, the CNSC will be entering into a memorandum of understanding with another government agency for the establishment of a more permanent alternate-site Emergency Operations Centre. OPG identified the need for, and installed additional on-site independent power supply to the equipment. Changes have also been made to the set points for the connections from the NPP to the electricity grid that enhance the likelihood that the Units will continue to operate following a major blackout. Further changes were made to the service water system to improve the availability of water to the key systems. The changes have been publicly reported to the CNSC.
126	Pakistan	Article 19	**p.49-50**	Section 3.19.5.1 describes the effect of loss of electricity grid in Ontario and North Eastern United States (termed as blackout) on Canadian NPPs. In this scenario, the emergency diesels worked as intended and all the affected plants were brought to Guaranteed Shutdown State (GSS). What is the Canadian licensing approach towards "Station Blackout" in which the entire power (off-site and on-site) is lost except station batteries? What is the regulatory requirement for NPPs to cope with such a sequence? Are the NPPs required to submit the deterministic safety analysis/coping analysis of TMLB as part of their Safety Analysis Reports?	Station Blackout is not considered in the deterministic safety analysis presented in the station safety reports. It is included in the probabilistic safety assessments (PSAs). Canadian NPPs have standby generators which will automatically start on loss of off-site power. If all the standby generators fail, then the Emergency Power Supply is started. This is a seismically qualified power supply that can supply water to the steam generators. Complete station blackout is considered to be beyond the design basis for Canadian reactors.
ARTICLE 19: OPERATION **OPEX and Event Analysis**					
127	Belgium	Article 15	**3.15.2 a**	Is there a direct exchange of information between NPP operators? (Concerning the application of the lessons learned from one plant to the other.)	Yes, the CANDU Owners Group (COG) Operating Experience information exchange program provides a forum in which each Canadian NPP and overseas operators of CANDU type NPPs exchange operating experience on a weekly basis. Written copies of recent experience are shared and a weekly teleconference is then conducted for review of the information directly exchanged, to allow for follow up questions and clarification of any terminology, technology or procedures that may not be fully understood by all parties.

	Country	CNS Article	Report Reference	Question	Answer
128	Germany	Article 6	**3.6.4, p.12**	In addition, safety assessments were performed on operating NPPs as a result of specific OPEX and performances. Please explain this point in more detail.	Safety assessments were performed by Canadian NPPs as a consequence of national or international operating experience or events. For demonstrative examples, please see Annex 3.6.2 of the Canadian 3rd Report on Nuclear Safety that lists a number of events that have resulted in assessments and corrective actions at Canadian NPPs.
129	Japan	Article 19.7	**3.19.8, p.51, L.36**	In section 3.19.8, it is mentioned that "These programs include OPEX feedback system amongst the Canadian licensees and COG". Please explain the OPEX feedback system. Please present some specific improvement case dealt with the system, for problems in human or organization aspect.	The Operating Experience (OPEX) program involves licensees sharing amongst themselves information on events to ensure that the lessons learned by one licensee respecting safe operations are learned by other licensees. Each licensee files a report with the CANDU Owner Group (COG), which in turn disseminates the report to other COG members. OPEX reports are also sent to the World Association of Nuclear Operators (WANO), for dissemination to the broader audience of NPP operators. Licensees take the information from the COG or WANO reports, assess the potential impact on their operations, and develop corrective actions, if necessary. The most significant OPEX reports dealing with problems in human or organizational behaviours were the reports on the degraded reactor vessel head at Davis Besse NPP in the USA. The Canadian licensees have also considered the lessons learned from the Mihama steam line break event in Japan.

Attachment 1: Regulatory Requirements for Scheduled Review of the Safety Report

CNSC Regulatory Standard S-99 on "Reporting Requirements for Operating Nuclear Power Plants" requires updates to the facility description and safety report every three years. Relevant text from S-99 is reproduced below (full document is available on the CNSC website at www.nuclearsafety.gc.ca).

6.4.4 Updates to facility descriptions and final safety analysis reports

Under paragraphs 6(a) and 6(b) of the Class I Nuclear Facilities Regulations, an application for a licence to operate a Class I nuclear facility shall contain descriptions of the systems, structures and equipment of the facility, including their design and design operating conditions. Paragraph 6(c) further requires the application to contain a final safety analysis report demonstrating the adequacy of the design of the nuclear facility.

Accordingly, to meet this standard, a licensee shall, within three years of the date of the last submission of the nuclear power plant facility description and final safety analysis report, unless otherwise approved in writing by the Commission or a person authorized by the Commission, file with the designated CNSC contact, a report that consists of an updated facility description and an updated final safety analysis for the nuclear power plant. This report shall include:

(a) a description of the changes made to the site, structures, systems, and components of the nuclear power plant, including any changes to the design and design operating conditions of the structures, systems and components;
(b) safety analyses that have been appropriately reviewed and revised, and that take into account the most up-to-date and relevant information and methods, including the experience gained and lessons learned from the situations, events, problems or other information reported pursuant to this standard; and
(c) the name and address of the sender of the report, the date of completion of the report and the signature of the designated representative of the licensee."

Attachment 2: Evaluating Licensees' Performance and the Use of the CNSC Ratings in the Regulatory Oversight Process

Currently, CNSC staff assesses licensee performance in specific Safety Areas and Programs (see Table A3.14.4.2 of the 3rd Canadian Report), and assigns ratings from A through E (see Table A.3.14.4.1 of the 3rd Canadian Report) to each of the Safety Areas and Programs.

Supplemental information from ongoing regulatory activities is used to update the licensee's performance on an annual basis. Such information includes, but is not limited to:

- results from Type I and Type II inspections;
- results from desk-top reviews;
- information from mandatory scheduled (quarterly and annual) compliance reports;
- performance indicators;
- event reviews;
- information from approvals;
- financial status and economic factors;
- external events / international concerns; and
- how licensee responds to requests from the regulator.

For example, consider the area of Performance Assurance, which consists of Quality Assurance, Human Factors and Training. This is deemed to be an important focus as inadequate licensee performance in Performance Assurance will manifest itself in terms of poor structure of managed processes, poor implementation of managed processes, unclear procedures, poor job conditions, inadequate understanding of tasks and other activities that can be influenced by the assigned task (awareness of task dependencies), increased probability of inappropriate human response during abnormal situations and normal work, inadequate corrective actions, and lack of awareness of operating experience from within the plant and within the nuclear industry. These deficiencies may, in turn, result in an increase in active errors, and in the number of latent conditions in the plant (where persons and/or equipment may not perform their intended function when required to do so under abnormal situations, or where the inappropriate response may exacerbate the situation). The CNSC assesses licensee's performance in the area of Performance Assurance through the information sources listed above to determine the extent to which active errors and latent conditions in the licensed facility are minimized.

Ratings are used as one input to determine what further regulatory actions, if any, might be required. The ratings reported to the Commission in the CNSC annual "industry report" reflect the findings from the CNSC compliance program and the results of assessing the adequacy of the licensee's operating programs and their implementation. CNSC's rating guidance offer advice on the types of CNSC compliance promotion or enforcement responses that could be used to address the various ratings (see Table A3.14.4.3 of the 3rd Canadian Report). For example, a typical response to a poor rating, such as "C- Below Requirements", would be increased regulatory scrutiny. Copies of the annual reports on the performance of the Canadian nuclear industry for the years 2001 through 2003 can be found on the CNSC website at www.nuclearsafety.gc.ca, (under "About Us", and "Annual Report on the Canadian Nuclear Power Industry").

Attachment 3: The Commission – General Information

Source of Authority

The *Nuclear Safety and Control Act* (NSCA) came into force on May 31, 2000, when it replaced the *Atomic Energy Control Act*. It provides the Canadian Nuclear Safety Commission (Commission) with its regulatory authority. Under the NSCA, the Commission has made a number of regulations and bylaws in accordance with a Government of Canada regulatory process. The NSCA and the CNSC regulations can be found on the CNSC website (www.nuclearsafety.gc.ca).

Composition

The NSCA provides for up to 7 permanent Members of the Commission. The NSCA provides that the President is a full-time Member and other Members may be full-time or part-time. Currently, only the President is a full-time Member.

The competency profile for Commission Members requires that they have a significant scientific, engineering and/or business background. They also are typically leaders in their respective field, and their achievements have been recognized by their peers. For example, the current Members of the Commission are a mining specialist, a geologist, two engineers, an epidemiologist and a business person who is also a former provincial energy minister. The core competencies in terms of abilities are their leadership level; the ability to listen, understand and respond in a public hearing context; their empathy for participants; their integrity and ethics; and their sense of equity and fairness. Abridged curriculum vitae for Commission Members can be found on the CNSC website (www.nuclearsafety.gc.ca).

As a "Quasi-judicial" Administrative Tribunal

The Commission Tribunal (usually referred to simply as the Commission) is an independent quasi-judicial administrative tribunal consisting of up to the seven Commission Members appointed by the Governor in Council (Canadian federal government). The term "quasi-judicial" refers to the fact that it is not a judicial court but that it has similar powers to compel evidence and make legally binding decisions which affect, through licensing or certification, the legal rights of a person. It is also subject to the rules or principles of natural justice (which is always the case for a traditional court).

Public Hearing and Intervention

The NSCA requires that before the Commission makes a licensing decision, it must give the applicant/licensee an "opportunity to be heard". In the interest of fairness, the Commission must give persons most affected by the decision the opportunity to present their views to it before making its decision. With respect to certain decisions made by the Commission, the NSCA imposes an obligation to hold a "public hearing". Before making a licensing decision under subsection 24(2) (major nuclear facilities) of the NSCA or where it would be in the public interest to do so, the Commission must hold a public hearing. A public hearing is a hearing structured so as to give affected parties and in most cases interested members of the public a reasonable opportunity to make submissions in relation to the matter to be decided by the Commission. Public hearings are a highly visible component of the work of the Commission.

Attachment 4: The CNSC as an Organization

The CNSC organization is presented in Figure 4.1. It is important to stress here that the Commission and the Secretariat are functionally separate from the rest of the organization. The mandate of each of the CNSC functional entities is described briefly in the following paragraphs.

Office of the President & CEO (7)

The Executive Committee
The Executive Committee comprises the President & CEO, the Vice-Presidents for the Operations Branch and the Corporate Services Branch, the Executive-Directors of the Office of Regulatory Affairs and the Office of International Affairs, the Commission Secretary, and the Senior Counsel / Manager of the Legal Services Unit.

Commission Secretariat (7)
The Secretariat plans the business of the Commission and gives technical and administrative support to the President and to the other Commission Members. This involves related communications with the Minister's Office and all other stakeholders, including government departments, intervenors, licensees, media and the public. The Secretariat is also the official registrar in relation to Commission documentation and manages the hearing process.

Office of International Affairs (28)
The Office of International Affairs (OIA) licenses the export and import of controlled nuclear items. It implements Canada's bilateral nuclear cooperation agreements, international safeguards agreements, domestic nuclear security and international physical protection requirements. The OIA manages a safeguards research and development program, advises on multilateral nuclear non-proliferation issues and coordinates the CNSC's participation in other international activities.

Office of Regulatory Affairs (8)
The Office of Regulatory Affairs is responsible for organization-wide programs, initiatives and actions that enhance the CNSC's regulatory effectiveness, efficiency and overall operation.

Operations Branch (351)
The Operations Branch is responsible for the regulation of development, production and use of nuclear energy in Canada and of production, possession, transport and use of nuclear substances and radiation devices in Canada. Operations Branch is also responsible for emergency preparedness and response at the CNSC.

The organization of this branch of the CNSC provides focus on the regulation of different sectors of the nuclear industry. In the implementation of consistent regulatory and business processes, the Operations Branch comprises five directorates:

Directorate of Power Reactor Regulation (74) – The Directorate of Power Reactor Regulation regulates the development and operation of nuclear power reactors in Canada in accordance with requirements of the *Nuclear Safety and Control Act* and Regulations. This directorate has seven divisions:

1. Bruce Regulatory Program Division
2. Darlington Regulatory Program Division
3. Pickering Regulatory Program Division
4. Point Lepreau / Gentilly-2 Regulatory Program Division

5. Inspection Division
6. Program Development and Integration Division
7. Advanced CANDU Reactor Project Division

Directorate of Nuclear Cycle and Facilities Regulation (61) – The Directorate of Nuclear Cycle and Facilities Regulation regulates the development and operation of uranium mining and processing facilities, nuclear substance processing facilities, waste management facilities, low power reactors, research and test facilities, accelerators and Class II facilities. This Directorate has five divisions:

1. Environmental Protection and Audit Division
2. Processing Facilities and Technical Support Division
3. Research Facilities Division
4. Uranium Mines and Lands Evaluation Division
5. Wastes and Geosciences Division

Directorate of Nuclear Substance Regulation ((87) – The Directorate of Nuclear Substance Regulation regulates the production, possession, transport and use of nuclear substances and radiation devices. It also manages the emergency response capacity of the organization. This Directorate has six divisions:

1. Operations Inspection Division
2. Technical and Emergency Programs Division
3. Nuclear Substance and Radiation Devices Licensing Division
4. Class II Facilities and Dosimetry Services Licensing Division
5. Packaging and Transport Licensing Division
6. Radiation Protection Division

Directorate of Assessment and Analysis (102) – The Directorate of Assessment and Analysis undertakes specialist safety and security assessments in support of the regulation of the power reactors, uranium mining and processing facilities, nuclear substance processing facilities, waste management facilities, low power reactors, research and test facilities, accelerators and Class II facilities and the transport and use of nuclear substances and radiation devices. This Directorate has eight divisions:

1. Engineering Assessment Division
2. Human Performance Division
3. Organization and Management Systems Division
4. Personnel Certification Division
5. Physics and Fuel Division
6. Plant Thermalhydraulics Division
7. Nuclear Security Division
8. Systems Engineering Division

Directorate of Operational Strategies (19) – The Directorate of Operational Strategies is responsible for leading the development of regulatory processes, programs and documents to afford a basis for consistent and effective regulatory practices in the branch. This Directorate has two divisions:

1. Regulatory Program Improvement Division
2. Regulatory Standards and Research Division

<u>Corporate Services Branch</u> (127)
The Corporate Services is responsible for policies and programs related to the management of the CNSC's finances and administration, human resources, information technology, strategic planning, communications and information management. The Corporate Services Branch comprises five directorates:

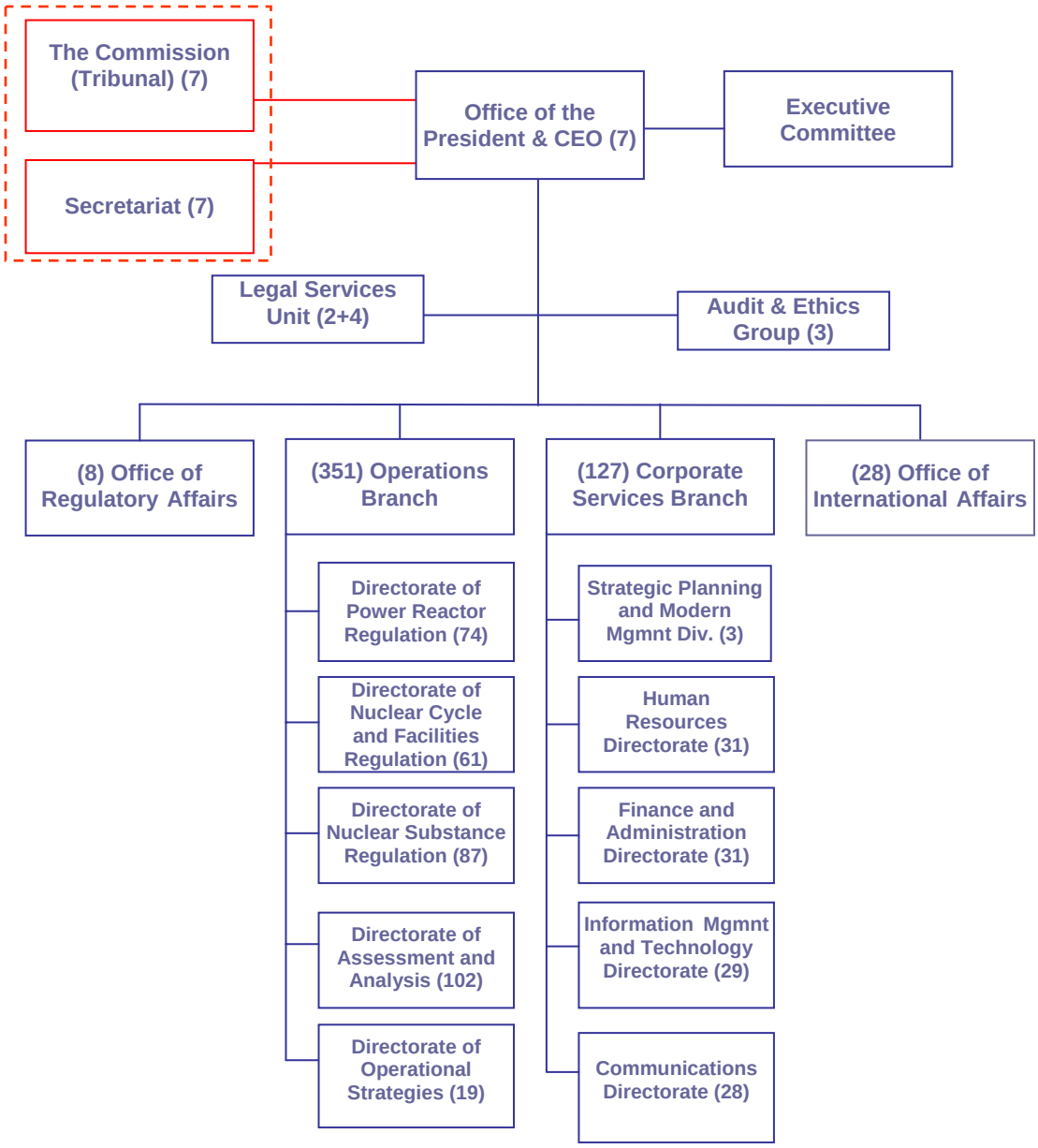
Communications Directorate (28)
Finance and Administration Directorate (31)
Human Resources Directorate (31)
Information Management and Technology Directorate (29)
Strategic Planning and Modern Management Division (3)

Audit and Ethics Group (3)
The Audit and Ethics Group is responsible for examining corporate management accountability and program performance. The group carries out internal audits and evaluations, and makes recommendations for continuous improvement.

Legal Services (2) (plus 4 legal counsels who are not employees of the CNSC)
The Legal Services Unit, which is staffed by Department of Justice lawyers, provides legal advice to the Commission and staff.

Figure 4.1: The CNSC Organization

(Note: numbers in brackets indicates the number of positions in the organizational unit)



Attachment 5: Quality Management of the CNSC Activities

The CNSC has adopted Canada's national business excellence model developed by the National Quality Institute (www.nqi.ca). The business excellence model reinforces continuous improvement and is similar in nature and stature to the more commonly referenced Malcolm Baldrige Award and the European Foundation for Quality Management business excellence model.

The CNSC Management Model incorporates sound management practices in the areas of Leadership, Planning, Process Management, Citizen Focus, Staff Focus, Other Stakeholder Focus, and Operational Results. The CNSC approach meets the management practices and performance expectations explicitly set out by an accountability framework issued by the Treasury Board of Canada Secretariat (www.cio-dpi.gc.ca/si-as/maf-crg/maf-crg_e.asp). The introduction of the Management Model has helped the CNSC take a more holistic approach to aligning and managing its many improvement initiatives.

Our most recent Annual Departmental Performance Report that can be accessed on the CNSC website (www.nuclearsafety.gc.ca) indicates the progress made to date (as of March 2004) following a more localized implementation of the many of the elements within the Management Model. Our expectations are that a fully integrated alignment with the Management Model will take another 3 to 5 years.

The CNSC has a management system manual (June 2004). The manual describes a four-level hierarchical system for management system documentation—the manual itself is the top-level document. The system is organized in accordance with the mission and mandate assigned to the CNSC by the *Nuclear Safety and Control Act* (NSCA), as well as other policies, directives, and international commitments of the federal government. Details, such as processes, roles, and responsibilities, are based on a "Program Logic Model / Results Chain" that links those areas to the mission of the CNSC. At this point in time there are no references to Quality Management standards in our management system manual.

As an example of implementing the CNSC Management Model, the CNSC has initiated in spring of 2004 the Power Reactor Regulatory Improvement Program (PRRIP). This program aims at improving the delivery of power reactor regulation program and the coordination of work amongst staffs of various CNSC divisions of several directorates. The PRRIP also aims at achieving uniformity of regulatory approach across NPPs, shifting responsibilities to ensure that proper and adequate expertise is applied to the varying responsibilities, and reducing overlap and duplication. The program also recognizes and maximizes the use of strengths of everyone involved in power reactor regulation. In summary, the PRRIP is designed to improve efficiency and overall effectiveness of the power reactor regulation, while utilizing existing resource levels. Work is continuing in the key improvement areas identified in the PRRIP (Planning and Reporting; Process Management – Compliance; Process Management – Licensing; Risk-informed Approach; and Information Management and Communication). Improvement initiatives are expected to continue in the power reactor program over the next 2-3 years.

A report issued in early 2005 by the Office of the Auditor General (OAG) of Canada states that "Overall, the Canadian Nuclear Safety Commission has made satisfactory progress in response to our recommendations from our December 2000 audit of power reactor regulation". The findings of the OAG report are consistent with the CNSC's pursuit of continuous improvement, and validate the efforts of the CNSC over the past four years in improving its regulatory framework. Full text of the 2005 OAG report can be found on the OAG website (http://www.oag-bvg.gc.ca).

Attachment 6: Approach to Developing Licensing Basis for Future Power Reactors in Canada

In assessing the options for the development of a Licensing Base Document (LBD) for future nuclear power plants (NPPs) in Canada, the following general objectives were set:

- enhance safety in comparison to existing NPPs;
- harmonize licensing requirements with international practices;
- apply experience gained with CANDU operating plants;
- use a technology-neutral approach to the extent possible; and
- consider a risk perspective to the extent practical and prudent.

The overall framework for developing the LBD is based on the IAEA TECDOC-1362 "*Guidance for the Evaluation of Innovative Nuclear Reactors and Fuel Cycles"*, and the IAEA Safety Standard Series No. NS-R-1, "*Safety of Nuclear Power Plants: Design".* Modifications would be effected to incorporate CANDU specific requirements.

Current development of the LBD is focusing on requirements for the design of new power reactors. It calls for the use of a systematic and risk-informed approach to defence-in-depth, including identification of initiating events, strategies to prevent initiating events from occurring and from progressing to accidents, and strategies to mitigate the consequences of events and accidents should they occur. The risk perspective, supported by a comprehensive plant-specific PSA, is essential in balancing strategies of accident prevention and mitigation; that is, higher frequency scenarios rely more on prevention, whereas lower frequency scenarios rely more on mitigation.

For the purpose of developing the LBD, the CNSC is considering three Safety Goals: Large Release Frequency, Severe Core Damage Frequency, and Small Release Frequency

Large Release Frequency refers to the frequency of an off-site release that would result in the need for long-term, or even permanent, evacuation of the surrounding population as a result of extensive ground contamination. This requirement is more restrictive than that needed to meet the fatality goals. A numerical value of once every million years for such events is widely accepted in the international nuclear community.

Severe Core Damage Frequency is a measure designed to limit reliance on the containment system. The frequency of accidents that could lead to severe damage is very low, i.e., less than once every hundred thousand years and also is widely accepted in the international nuclear community.

Small Release Frequency, considered to be a CANDU-specific requirement, covers some accident scenarios that may result in limited core damage, leading to small but significant releases. These accidents require emergency measures such as sheltering or short term evacuation of an area around the plant.

Although the development of LBD has not yet been completed, it became clear that certain key issues require special attention. They are:

- re-classification of event categories;
- definitions of levels of the defence-in-depth and their application;
- adoption of Safety Goals;
- consideration of severe accidents at the plant design stage;
- replacing the unavailability concept by reliability;
- requirements for shutdown systems;

- requirements for containment;
- requirements for sharing of systems and instrumentation; and
- introduction of technical specifications (tech-specs) to define operational limits and conditions.

It is anticipated that the developed LBD will be technology-neutral at the safety fundamentals level to allow its use for the licensing of any new power reactors in Canada. However, at the detailed level, it is expected to contain many technology-specific requirements which pertain to licensing a specific type of reactor in Canada.

Attachment 7: Criteria Used for Recommending a Licence Period

The criteria used by the CNSC staff for recommending a licence period are contained in section 3.1 of a Commission Member Document (CMD), CMD-02 12 on *New Staff Approach to Recommending Licence Periods*. The criteria are reproduced below.

Staff must prepare a recommendation for the Commission on the licence period that is appropriate for the activity to be licensed and the licensee under consideration. The criteria below provide staff with a systematic basis for recommending licence periods that will reduce unnecessary regulatory burden while maintaining a rigorous level of control.

- The recommended duration of the licence should be commensurate with the licensed activity.

- A longer licence period can be recommended when the hazards associated with the licensed activity are well characterized and their impacts well predicted, and they are within the scope considered in the environmental safety case.

- A longer licence period can be recommended when licensees have in place a management system, such as a quality assurance program, to provide assurance that their safety-related activities are effective and maintained.

- A longer licence period can be recommended when effective compliance programs are in place on the part of both the applicant/licensee and the CNSC.

- A longer licence period can be recommended when the licensee has shown a consistent and good history of operating experience and compliance in carrying out the licensed activity. There should be reference to the history of performance in terms of the standard terminology defined in CMD 02-M5. (Note: These definitions have been reproduced as Table A 3.14.4.1 on page 88 of the 3rd Canadian Report.)

- The licence period must be consistent with the requirements of the Cost-Recovery Fees Regulations. (For those applicants who must pay the full fee for the term of the licence at application, the new licence periods will be applied only after the new Cost Recovery Fees Regulations are in place.)

- The licence period should take account of the planning cycle of the facility, and the licensee's plans for any significant change in the licensed activity.

Attachment 8: Risk-informed Performance-based Regulatory Oversight at the CNSC

The CNSC has endorsed the following definitions of risk and risk management:

"**Risk** is the chance of injury or loss, defined as a measure of the probability, and severity of an adverse effect (consequences), to health, property, the environment or other things of value; mathematically, it is the frequency (or probability of occurrence) of an event multiplied by its magnitude (or severity)."

"**Risk management** is the process of:

- identifying risks (taking into account scientific evidence socio-economic and policy/ political considerations),
- assessing their implications (frequency, consequences and cost-benefit),
- deciding on a course of action (evaluating and choosing options),
- assigning responsibility, authority and resources
- evaluating and monitoring the results (effectiveness of measures taken), and
- communicating effectively with the stakeholders."

Regulating in a risk-informed manner thus implies the use of risk information as an input to making decisions, prioritizing regulatory actions, and allocating resources.

The CNSC is currently moving towards a risk-informed performance-based regulatory oversight approach. In this approach, risk insights, engineering analysis and judgment, operating experience and performance results are used to:

- develop measurable and objective criteria for monitoring licensed facility performance,
- establish objective safety and regulatory thresholds, and
- focus on the results as the primary basis for regulatory oversight actions.

The CNSC will have a project plan in place by March 2005 to develop risk informed regulation for power reactors. It has therefore set up a working group whose objective is to develop risk assessment guides explaining methodologies for inclusion of risk prioritization and resource allocation into planning, reporting, and regulatory process management. Specifically, these guides will address risk identification, risk implications, decision-making on a regulatory course of action, assigning priorities, responsibility, authority, and resources, evaluating and monitoring results; and effective communication.

Attachment 9: Use of Periodic Safety Reviews (PSRs) in Canada

Although Periodic Safety Reviews (PSRs) are not a regulatory requirement, the CNSC safety areas (see Table A3.14.4.2 of the 3rd Canadian Report) could be considered equivalent to the intent of the safety factors found in the IAEA NS-G-2.10 on PSR. In fact, as stated at the IAEA workshop on experience with PSRs in October 2004, Canada currently considers its safety review and re-licensing processes equivalent to the PSR process. A CNSC Project team has been established to review this opinion and evaluate the significance of any potential gaps identified. If any gaps are identified the CNSC will develop an action plan to address the gaps including working with the licensees regarding their implementation. It is likely that any move to adopt PSRs would result in a realignment of overall Canadian licensing requirements rather than introducing PSRs as additional regulatory requirements. The project has taken longer than expected since international experience is being gathered on how certain safety factors are implemented in other countries to better understand their scope. In addition, the intent is to ensure that any changes that are made are effective and efficient and that any additional burden to the regulator or the licensee is justified. The CNSC project team anticipates finishing the review sometime in 2005. One gap that was already identified is that modern standards are not systematically implemented into our regulatory framework. Currently, the CNSC does not use PSR in the licence renewal process.

From the perspective of the licensees, public confidence in the safety of Canadian NPPs comes from the more frequent and publicly open and transparent licensing process. In comparison to the practices of other countries, where PSRs are used, the licensing process results in licence periods that are longer than those granted in Canada (double or longer). The licence period should be connected to the effort needed to perform a PSR, and if such a requirement was to become part of the licensing framework in Canada, the licensees would be seeking a commensurate increase in the licence period as a benefit for the cost of the effort. The current licensing and compliance processes used in Canada result in similar continuous review and affirmation of safety, while providing greater opportunity for public involvement in the licensing review.

If PSR is selected as a future option, the most logical period for a PSR would be 10 years to ensure that there is sufficient time for defining the scope, PSR work, and regulatory review of the work including implementation of corrective actions. The licensing and compliance frameworks currently used in Canada must then be subject to review and perhaps a complete overhauling. This is why a decision related to the use of PSRs must consider factors such as the frequency of public access to the licensing process, the effectiveness and efficiency of the proposed changes, and the additional burden that may be imposed on the regulator and the licensees.

Attachment 10: Organization and Management Review Method, Safety Culture Characteristics, Measurement of Safety Performance

Organization and Management Review Method

The Organization and Management Review Method is explained in detail in a comprehensive research report (AECB RSP-0060) that the CNSC can make available upon request.

Briefly, the Organization and Management Review Method that the CNSC employs to measure safety culture uses basic scientific data collection principles, measurement "tools" and analysis techniques. These tools and techniques can be found in the scientific literature. Specifically, the CNSC uses 5 measurement tools to assess performance. The tools include a functional analysis, Behavioural Anchored Rating Scales, Semi-structured Interviews, Behavioural Checklists and a standardized paper-and-pencil survey. It is important to note that the CNSC does not audit the facility in the traditional audit sense during these Organization and Management evaluations.

Based on data collected at various nuclear organizations as well as a review of the literature relevant to safety culture, a set of 17 organizational behaviours were identified which impact facility safety performance. These are: Attention to safety, Coordination of work, Decision-making, External Communications, Formalization, Goal/Priority setting, Interdepartmental and Intradepartmental communications, Organizational culture, Organizational knowledge, Organizational performance evaluation, Performance quality, Personnel selection, Problem identification and resolution, Resource allocation, Roles and responsibilities, Time urgency, and Training. All of these behaviours were determined to be "observable" and clearly "identifiable" characteristics of the organization that, given the appropriate tools, could be measured in a systematic manner using both quantitative and qualitative techniques. These behaviours have been identified as important for the measurement of the impact of organizational and management factors on safety performance. They can be directly linked with the safety culture characteristics and performance objectives.

Safety Culture Characteristics

The basic assumptions regarding safety culture are often taken for granted among the organization's members who share the organization's culture. The assessment of these values and attitudes that comprise the basic assumptions must be based upon characteristics that have been identified to be important for the existence of a positive safety culture within a nuclear facility. The safety culture characteristics were developed by an expert group brought together by the IAEA and can be found in INSAG 15. The characteristics represent those elements that would characterize a facility that has a healthy or positive safety culture. The safety culture characteristics include, for example:

- Safety is a clearly recognized value in the organization
- Accountability for safety in the organization is clear
- Safety is integrated into all activities in the organization
- A safety leadership process exists in the organization
- Safety culture is learning driven in the organization.

Measurement of Safety performance

Each safety culture characteristic has specific and measurable performance objectives. The objectives for each characteristic must be met in order for the organization to achieve the characteristic. Currently, the performance objectives are stated in a qualitative way, but the results of organization and management reviews are reported using both quantitative and qualitative measures. The performance objectives and sample performance criteria were developed based on research, and expert opinion, as well as recent work done by

international organizations (e.g. IAEA). As an example for the safety culture characteristic "safety is a clearly recognized value in the organization", a performance objective is "documentation that describes the importance and role of safety in the operation of the organization exists." A sample criterion would be "safety-related documentation is prominently displayed, referenced, and understood by personnel within the organization." These criteria are relevant for organizational behaviours associated with a specific safety culture characteristic. Individual plants can develop their own criteria to demonstrate how achievement of the objectives might be assessed.

Attachment 11: Regulatory Requirements for Reporting Problems Identified by Research or Analysis

CNSC Regulatory Standard S-99 on "Reporting Requirements for Operating Nuclear Power Plants" requires the licensee to report within 21 days on any problems or potential problems that are recognized through research findings or new or revised analysis and that represent a change in the safety analyses previously presented to the CNSC. Relevant text from S-99 is reproduced below (full document is available on the CNSC website www.nuclearsafety.gc.ca).

6.3.2.3 Reports of problems identified by research findings or revised analyses

To meet this standard, a licensee shall, within 21 days of becoming aware, through research findings or new or revised safety analyses, of a problem or potential problem that represents a hazard or potential hazard to the health and safety of persons, security or the environment, or that is different in nature, greater in probability, or greater in magnitude than was previously represented to the Commission in licensing documents, file a report with the designated CNSC contact. The problems, or potential problems, that the licensee shall report to the CNSC under this standard include the following occurrences:

(a) when a final safety analysis report for a nuclear power plant contains an assumption, input, analytical method or safety analysis result that is, or that may be, invalid;
(b) when a limit defined in the nuclear power plant licensing documents, or in appendices to these documents, is or may be inadequate to assure safety;
(c) when an analysis, from which a limit in a licensing document was derived, may be invalid or uncertain such that the margin of safety may be less than predicted;
(d) when the defined specifications of a special safety system or of a safety-related system of a nuclear power plant are or may be invalid;
(e) when a nuclear power plant licensing document contains an error that, if accepted, relied or acted upon as being valid, could give rise to increased risks to the health and safety of persons, security or the environment; and
(f) when the measures that are in place for the purpose of protecting the environment from the operating impacts of a nuclear power plant are, or may be, inadequate."

Attachment 12: Status and Timelines of Severe Accident Management Programs by the Regulator and the Industry

The Canadian licensees, under the CANDU Owners Group (COG) sponsorship, are developing a common set of generic Severe Accident Management Guidelines (SAMG's) that will be subsequently supplemented by station specific procedures. CANDU SAMG's build on the Westinghouse Owners Group approach with the necessary adjustments implemented to account for differences in design and operation practices.

The primary objectives of CANDU SAMG's are defined as:

- termination of fission product releases from the plant
- maintaining or returning the containment to a controlled, stable state
- returning the reactor core to a controlled, stable state.

To achieve these objectives, SAMG's will provide guidance to:

- diagnose plant conditions
- prioritize response
- assess equipment availability
- assist in equipment recovery
- evaluate impacts of recovery actions
- identify long term concerns.

The major tasks and timetable for the SAMG's project are shown as follows:

- Project initiation and preparation of request for proposal	2002
- Joint Project Agreement signed and award of business	May 2003
- Project Execution Plan and QA Program	June 2003
- SAM Format and preliminary Severe Accident Control Room Guides (SACRG) and Severe Accident Exit Guideline's (SAEGs), First Draft TBD Vol. 1, DFC and Severe Challenge Status Tree (SCST)	Dec 2003
- Remaining Severe Accident Guidelines	Aug 2004
- Calculation Aids and Final SAEGs	Nov 2004
- Generic SAM Documentation	Late 2005
- Plant Specific SAMG	Dec 2006

The regulatory guide on Severe Accident Management, G-306 "Severe Accident Management Program", is in its final stages of preparation, and is expected to be issued for use by mid or late 2005. It can be accessed on the CNSC website (www.nuclearsafety.gc.ca).

Attachment 13: Plant Life Management (PLM) in Canada

1. NPP Design-life and Life Extension

Canadian NPPs are not licensed based on a predetermined design lifetime. There are no provisions in the *Nuclear Safety and Control Act* (NSCA) or the CNSC regulations that address the design lifetime or lifetime extension of NPPs. Current plant life management (PLM) programs (see item 2 of this Attachment) are used to assess the condition of "life-limiting" systems, structures and components (SSCs) that will require significant time and cost to replace when they reach a degradation level that may begin to impinge on the safety margins. As a result, prediction of the so-called "lifetime" of Canadian NPPs is continuously refined and updated.

Power Reactor Operating Licences can be granted for whatever period the Commission deems appropriate once the Commission has been satisfied that other requirements have been met. Licensees must demonstrate in their licence renewal applications that the current conditions of the facility support continued safe operation over the next licensing period. This frequent licence renewal process could lead to many design upgrades and replacement of major components during the lifetime of NPPs. In certain cases, such as the proposed refurbishment of Gentilly-2 and Point Lepreau NPPs, licensees evaluate the feasibility of the economical, as well as safe, continued long-term operation (i.e. life extension) well beyond the original design life of the plant. These cases of refurbishment will be subject to the same licensing requirements for safe operation during the granted licence period even after the refurbishment has been completed.

2. Plant Life Management (PLM) Programs

At the end of the 1980's, CNSC recognized that although NPP licensees had programs in place related to ageing, they had not yet adequately been integrated into a comprehensive and systematic ageing management strategy. As a result, in 1990, CNSC Staff raised a Generic Action Item, GAI 90G03 (see page 78 of the 3rd Canadian Report) entitled "Assurance of Continuing Nuclear Station Safety", which required licensees to demonstrate that:

- potentially detrimental changes in the plant condition are being identified and addressed before challenging the defence-in-depth philosophy;
- ageing related programs are being effectively integrated to result in a disciplined overall review of safety;
- steady state and dynamic analyses are, and will remain, valid;
- a review of component degradation mechanisms is being conducted;
- reliability assessments remain valid in light of operating experience; and
- planned maintenance programs are adequate to ensure the safe operation of the plant.

The scope of work and of the associated ageing management programs covered SSCs important to safety, including such systems as: special safety and safety-related systems; SSCs whose failure could prevent a safety-related or a special safety system from fulfilling its function or cause a safety system actuation; SSCs used in emergency operating procedures; and SSCs relied upon for protection from fire and seismic events.

In response to GAI 90G03, licensees' submissions listed and described a number of ageing related surveillance and maintenance activities that they were carrying out to ensure continuing nuclear safety. However, licensees did not demonstrate that they have a systematic and integrated approach to ageing management. CNSC staff, therefore,

recommended that the licensees use the IAEA Safety Report Series N0 15 on "Implementation and Review of a Nuclear Power Plant Ageing Management Program" as an appropriate framework for such a program.

Licensees have since developed or modified existing programs that cover ageing management of SSCs critical to nuclear safety. In 2003, letters were sent to each power reactor licensee informing them of CNSC staff's decision to close the GAI on the basis of the submissions provided and to monitor licensee program performance through the CNSC's ongoing compliance program.

3. Future Plans for a Regulatory Standard

CNSC staff is in the process of developing a regulatory standard that will outline the regulatory requirements for NPP licensees' ageing management programs. CNSC staff is contemplating to use this regulatory standard as a regulatory basis for compliance inspection of ageing management programs.

Attachment 14: Quality Control and Quality Assurance of Pressure Retaining Boundaries

The operating licence conditions for CANDU NPPs reference the American Society of Mechanical Engineering (ASME) code and the Canadian Standards Association [CSA] pressure-boundary standards. Conventional standard CSA B51 (which is referenced in all federal and provincial pressure boundary legislation in Canada) entitled 'Boiler, Pressure Vessel and Pressure Piping Code [for public safety]' includes existing provisions for a 'quality control (QC) program' in clause 5.3. These 'QC' provisions are being vigorously enforced and expanded to apply to quality assurance (QA) for repairs, replacements and modifications for non-nuclear and nuclear systems. This is an extension of the requirements for the quality assurance programs described in the 1st and 2nd Canadian Reports.

All licensees in Canada are required (as a licence condition) either to:

1. meet these QC and QA requirements in order to do their own repairs, replacements and modifications; or
2. hire subcontractors who have the requisite certifications to do repairs, replacements and modifications.

In order to obtain the appropriate certification, subcontractors must develop and implement a quality assurance (for nuclear work) or quality control (for non-nuclear work) program that meets the ASME and CSA requirements. These programs are audited by an inspection agency authorized by the CNSC and/or the provincial pressure boundary regulator. Once the subcontractor's QA or QC program and implementation of the program is deemed acceptable by the auditor, they are granted a certificate of authorization to perform pressure boundary work. Even when the work is done by a subcontractor, it must be done under the licensee's supervision and must follow the licensee's approved QA program and the subcontractor's certified repair, replacement and modification procedures.

The CNSC is not directly involved in the certification of subcontractors to perform pressure boundary work. This certification is performed by other authorities. Therefore the CNSC does not have a listing of those contractors that are qualified. However the number qualified contractors to perform work on nuclear systems is significantly lower than those qualified to perform work on conventional systems.

Attachment 15: List of Program Descriptions Required to Support a Nuclear Power Reactor Operating Licence Renewal Application

The application should include a summary of programs with references, as appropriate, to supporting documentation. Each program does not have to be described separately if it forms a sub-program to a larger program. However, it should be clear in the application where the information on each program listed here is to be found. Which requirement(s) from the new Regulations that each program is meant to address is given in italics after the program title. Requirements from the *General Nuclear Safety and Control Regulations* are abbreviated as *G-x(y)*, where *x* is the section and *y* the subsection of the Regulations. Similarly, requirements from the *Class I Nuclear Facilities Regulations* are abbreviated as *C-x(y)*. Those programs that are not explicitly required by the Regulations but which CNSC staff is requesting information on under section *G-3(1)(n)* are indicated with an asterisk (*).

General Information, including:
- applicant's full name and business address *G-3(1)(a)*
- facility and activity to be licensed *G-3(1)(b)*
- names of persons who have authority to act for the licensee in their dealings with the Commission *G-15-(a)*
- names and position titles of the persons who are responsible for the management and control of the licensed activity *G-15(b)*
- land ownership and control documentation *C-3*
- financial guarantees *G-3(1)(l)*

Community Relations Program *C-3(j)*

Site Description Documentation and Site Plan *C-3(a), C-3(b)*

Safety Report and Safety Analysis Program *G-3(1)(c), G-3(1)(d), G-1(i), G-1(j), C-6(a), C-6(b), C-6(c), C-6(h)*

This should include reference to the current version of the safety report, reference to additional safety analysis and assessments that are not included in the current version of the safety report

Design Documentation (by reference only) *C-6(a), C-6(b)*

Maintenance Program *C-6(d)*

Periodic and In-Service Inspection Programs *C-6(d*

Systems Testing Program *C-6(d)*

This should include reference to the supporting reliability analysis for the Special Safety Systems and the Safety Support Systems

Technical Surveillance and Reporting Program *C-6(d)*

Nuclear Plant Life Assurance Program *

Environmental Qualification Program *

Fire Protection Program *

Operating Policies and Principles *C-6(d)*

Corrective Action and Operating Experience Programs *C-6(d)*

Quality Assurance Program *C-3(d)*

Radiation Protection Program *G-3(1)(e), G-3(1)(f), C-3(f)*

Action Levels pertaining to Section 6 of the Radiation Protection Regulations *G-3(1)(f)*

Nuclear Substance Control Program *C-6(e)*

This should include the name, maximum quantity and form of any nuclear substance that is to be encompassed by this licence. Reference should be made to any other CNSC licences that control other nuclear substances *G-3(3)(c).*

Human Factors Program*

Chemistry Control Program *C-6(d)*

Configuration Management and Change Control Program *C-6(d)*

Occupational Health and Safety Program (non-radiological) *C-3(e), C-3(f), C-6(e)*

This should include reference any provincial requirements

Organization, Staffing and Training *G-3(1)(k), C-6(m), C-6(n)*

This should include the structure of the organization and the results that have been achieved in implementing the program for recruiting, training and qualifying workers in respect of the operation and maintenance of the nuclear facility. At this time only provide the information for workers who require CNSC certification C-6(n).

Emergency Preparedness Program *C-6(k)*

This should include reference to On-Site and Off-Site plans for both radiological and non-radiological (fire, chemical, personal injury, etc.) incidents

Environmental Protection Program *C-3(g), C-6(h), C-6(i)*

Effluent and Environmental Monitoring Program *C*-3(h), C-6(i), C-6(j)

for both radiological and non-radiological materials

Waste Management Program *G-3(1)(j), C-3(e), C-6(i), C-6(j)*

for both radiological and non-radiological materials

Security Program *G-3(1)(e), G-3(1)(g), G-3(1)(h), C-3(i), C-6(l)*

Safeguards Program *C-6(f)*

Decommissioning Plan *C-3(k)*

A statement identifying the changes to the information that was previously submitted *G-5(b)*

The proposed commissioning program for systems and equipment that will be used at the nuclear facility *C-6(g)*

Reporting and Record Keeping *G-28 to G-32 and C-14(1) to (5)*

Station Improvement Plans*

This should include summaries of the following:

- Corporate Improvement Initiatives
- Facilities Improvements
- Safety significant Engineering Change Notices

The summaries should mention improvements completed during the current licence term, ones that are underway and ones planned for the future.