

3rd Review Meeting – Convention on Nuclear Safety
First Anniversary Report
Status of Actions on Canada
April 2006

1. Introduction

At the 3rd review meeting of the Convention on Nuclear Safety, held in Vienna, April 2005, Canada presented its report to an audience of more than 34 participants representing 18 countries. Canada also responded to comments and questions from numerous countries, such as Finland, Korea, Hungary, Japan, USA, Pakistan, Germany and China, pertaining to such topics as CNSC independence, the risk-informed regulatory approach, plant restarts and refurbishments, license re-issuance and periodic safety review (PSR). The following sections list the good practices and the status of the follow-up actions, to be reported at the 4th review meeting.

2. Good Practices

Good regulatory and industry practices that were identified by the peer review of Canada's report include:

- the regulatory process is open and transparent to the public;
- the industry regularly shares operating experience so that lessons are quickly learnt and integrated into operations;
- there is ongoing, systematic regulatory oversight of licensee safety performance by the regulator in several safety areas;
- the regulator systematically assesses licensees' safety culture, quality management and compliance with the legislative and regulatory framework; and
- the regulator implements modern management systems for quality management as part of its initiatives to improve effectiveness and efficiency.

3. Follow-up Actions and Status

Several actions to improve safety were accepted by Canada. These actions and the status of each are described briefly below.

3.1 Development of the regulatory approach for refurbishment and life extension of NPPs

All power reactor licensees in Canada are currently either actively pursuing refurbishment projects or preparing preliminary plans for them. In August 2005, the CNSC prepared a position paper on the Regulatory Approach to Life Extension of Nuclear Power Plants (NPPs) and then presented it to stakeholders, such as the Canadian Nuclear Association, the power reactor licensees, and non-governmental organizations. The position paper clarifies the regulatory approach that was developed in consultation with power reactor licensees, and is in line with

previous successful refurbishment projects and their regulatory oversight. In addition, a Regulatory Guide on Life Extension (G-360) has been drafted and is expected to be issued for public consultation in May 2006.

3.2 Modernization of the regulatory framework for licensing new reactor projects

There are indications, including public planning documents for the province of Ontario, that new nuclear power plants may be built in Canada to meet future energy needs.

The CNSC issued an information document, "Licensing Process for New Nuclear Power Plants in Canada" (INFO-0756) in 2006 and held a public information session. The document clarifies the current licensing process, in the context of the Nuclear Safety and Control Act and its associated Regulations. The CNSC plans to draft a number of supporting technical regulatory documents such as requirements for siting, design, construction and operation. This work draws upon international experience and best practices, including the International Atomic Energy Agency's (IAEA) nuclear safety standards, and "pre-licensing" reviews of new nuclear power plants. It represents an evolution of existing practices and modernization of the Canadian regulatory framework.

3.3 Maintaining safety competence in the nuclear industry and regulatory body

The CNSC maintains an active interest in issues relating to staffing and training at the licensed power reactor sites and regularly assesses these areas against established requirements and expectations. At the CNSC itself, "learning management system" profiles were established for all divisions in 2004 and individual profiles for staff members were set up with accompanying learning plans. In addition to established training programs, the CNSC has initiated an extensive recruitment campaign to attract new staff members to maintain current expertise. The recruitment campaign is also intended to address anticipated retirements and increases in workload due to such projects as reactor refurbishment and potential applications for construction of new power reactors in Canada.

In 2005/06, power reactor licensees continued to replenish their workforces through significant hiring programs that have attracted hundreds of workers including both experienced workers and new graduates from Canadian universities, some of which offer nuclear engineering programs. In particular, the University of Ontario Institute of Technology has shaped a nuclear engineering program to specifically meet industry needs. Industry members and the CNSC participate in formulating the curriculum by involvement in an advisory board to the university. Master of Nuclear Engineering programs are available at a number of universities via the University Network for Excellence in Nuclear Engineering and the first graduates were generated in 2005. Similar engagement in colleges is helping to secure skilled labour and operator staffing needs for the future. The licensees are also active in programs like campus outreach and robotics competitions to promote the industry and foster apprenticeship programming.

3.4 Completing the quality management program implementation in regulatory body

In 2005, the CNSC formally committed to the establishment of a corporate-wide Quality Management System (QMS) that is being developed in accordance with the requirements and guidance in the IAEA Safety Standard GS-R-1, draft standard DS-113 and accompanying safety guides. Furthermore, the CNSC established a Quality Council headed up by the Chief Quality Officer, a position held by the Executive Vice President of Operations. A new division for Internal Quality Management was also established.

The QMS will capitalize on, and integrate, the numerous improvement initiatives currently underway within the CNSC to facilitate the development, implementation and continuous improvement of its business processes and practices. In addition, the QMS will include clear performance measurements and the benchmarking of CNSC's practices and performance against its international peers.

The self-assessment, that is currently being conducted for the International Regulatory Review Team (IRRT) mission (see Section 3.11), reflects the CNSC's commitment to implement the QMS in a timely manner. It will also help align its business process and practices with the IAEA guidelines.

3.5 Improving the rating system used to evaluate licensees' performance

CNSC staff efforts continue at improving/redefining the rating system, which was introduced in 2002 to produce defensible grades for the various safety areas. Progress has been made toward achieving objectivity, consistency for the different licensed sites, consistency from one rating period to the next, and consideration of all applicable data. Additional detailed guidance has been provided to CNSC staff related to application of the existing system when rating power reactor licensees.

3.6 Finalizing the Power Reactor Regulation Improvement Project (PRRIP)

The overall outcome of PRRIP is to enhance the existing power reactor regulatory program to formally incorporate a risk-informed, performance-based approach that meets or exceeds international benchmarks such as the IAEA GS-R-1 standard. PRRIP's emphasis is on planning, monitoring and reporting, compliance and licensing processes, information management and communications as well as risk-informed, performance-based regulatory approach.

Project plans which include key objectives and milestones are in place for each of these focus areas. Work has started in all projects and CNSC staff expects that during 2006 and 2007 most of the deliverables under the PRRIP projects will be completed and implemented. PRRIP will also incorporate a corrective action plan based on the results of the IRRT process.

3.7 Evaluating the use of periodic safety review in Canada

Canada's report to the third review meeting noted that as part of the license renewal process for NPPs, the CNSC and the licensees already practice a form of periodic safety review similar to an

IAEA periodic safety review (PSR). During 2004/05 in response to the suggested action from the review meeting, CNSC staff evaluated the implications of formally adapting the IAEA PSR in the regulatory process. CNSC staff noted that certain aspects of the IAEA PSR methodology should be considered in the enhancement of the regulatory oversight of NPPs.

The possible adoption of aspects of PSR is a sub-project under PRRIP (see Section 3.6). The current efforts, which include licensee consultation, involve the application of PSR to establish regulatory requirements for extending the life of operating NPPs.

3.8 Enhancement of a risk-informed performance-based regulatory approach

The regulatory framework and decision making process for power reactors in Canada have always been risk-informed, but the method used to consider risk insights was not formalized. In 2005, a working group was established under PRRIP to develop a systematic, risk-informed decision-making process for eventual implementation in regulatory developments and decisions regarding power reactors. The group developed a process, in consultation with CNSC staff and management, CNSC licensees, and subject matter experts.

A trial use of the process will start in May 2006. Feedback following the trial use will result in modifications, leading to eventual use of the process in power reactor regulation. It is expected that its full implementation will make the CNSC regulatory approach risk-informed and performance-based.

3.9 Continuing the program to improve safety margin for large loss of coolant accidents (LLOCA)

As reported at the 3rd review meeting, analysis of large loss of coolant accidents (LLOCA) in Canada has been affected by periodic discoveries that have increased the postulated consequences of a LLOCA predicted for licensed facilities. The inherently conservative “limit of operating envelope” analysis methodology exaggerates the consequences, and leaves little demonstrable margin to the safety acceptance criteria. Therefore, significant discoveries can only be offset in the short term by constraints on plant operation to restore the lost safety margin. An industry team under the CANDU Owners Group was formed to address this issue.

There are two basic approaches being examined to resolve the concerns: namely plant design changes and additional safety analysis with new tools and methodologies. In the first case, a notable design change considered is the use of a new fuel design that would reduce the positive void reactivity coefficient and improve safety margins at the Bruce “B” NPP. In the second case, the CNSC continues to monitor the development of new tools and methodologies, and is currently finalizing a new regulatory document for safety analysis for NPPs (S-310). This regulatory document will establish the requirements and acceptance criteria for future LLOCA analysis.

3.10 Continuing the project on Safe Operating Envelope (SOE)

The CNSC monitors on an ongoing basis that NPPs meet established operating policies and principles. The CNSC is also planning to evaluate the adequacy of the proposed SOE principles and guidelines that form the basis for establishing operating limits and conditions (OLC).

The power reactor licensees continue the work on preparation and implementation of OLC documents to ensure compliance with the SOE principles and guidelines. This work, which is in various stages of completion, involves gap analyses for systems in the NPPs. The most advanced is the Pickering NPP which has recently completed SOE gap analyses for all units and on all safety significant systems, and has revised the OLC documents.

3.11 Consideration of hosting an International Regulatory Review Team (IRRT) mission

Following the 3rd Review Meeting, the CNSC established a project to host an IRRT mission. A letter was sent in November 2005 to the IAEA officially requesting such a mission. Under the project, aspects such as “General Requirements” and “Management System” will be evaluated on a corporate-wide basis, while aspects related to “Regulatory Activities” will focus on NPPs.

The project is being planned and executed in accordance with relevant IAEA documents and will follow the IAEA’s modular approach called Integrated Regulatory Review Services. The IAEA preparatory mission is planned for late September 2006, while the IAEA peer review is planned for November 2007. The final report is expected by April or May of 2008.

4. Conclusion

Canada acknowledges the good practices and actions to improve safety arising from its national report to the 3rd review meeting on the Convention for Nuclear Safety. Work to address each of the actions is underway.