



**Canadian Nuclear
Safety Commission**

**Commission canadienne
de sûreté nucléaire**

**CANADIAN NUCLEAR SAFETY COMMISSION'S RISK BASED APPROACH
TO REGULATING FUEL FACILITIES IN CANADA**

**A Technical Paper to be presented at the
OECD/NEA/WGFCS Workshop on**

**“Fuel Cycle Safety Past, Present and Future”
Wilmington, North Carolina, USA
October 16-18, 2007**

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The Canadian Nuclear Safety Commission (CNSC) is the regulatory body in Canada that was created by an Act of the Canadian Parliament to regulate the use of nuclear energy and materials to protect health, safety, security and the environment and to respect Canada's international commitments on the peaceful use of nuclear energy.

The Processing and Research Facilities Division (PRFD) of the Directorate of Nuclear Cycle and Facilities Regulation (DNCFR) is responsible for the licensing and compliance oversight of fuel facilities operating in Canada. The Directorate provides for the oversight of more than 89 regulated facilities across the country. These facilities include fuel cycle facilities, uranium mines, research reactors and facilities, nuclear material processing facilities, waste facilities, etc... To maximize the efficiency of regulating these facilities with finite resources, Directorate staff established criteria that were applied to the development of a risk based regulatory plan that has been used for the past five planning cycles.

The paper will discuss the development of the criteria, ranking system and methodology used to generate the current regulatory plan that is being used by the Directorate.

Introduction

The Canadian Nuclear Safety Commission is an independent federal agency responsible for the regulation of all aspects of nuclear energy in Canada. With the passage of the *Atomic Energy and Control Act* in 1946, the Atomic Energy Control Board (AECB) was created. In May 2000, the *Act* was updated and replaced by the *Canadian Nuclear Safety and Control Act* (CNSA), for the purposes of modernizing Canada's nuclear regulatory regime. At that time, the AECB was replaced by the Canadian Nuclear Safety Commission (CNSC), reflecting the changing regulatory environment that had taken place in Canada since the origin Act was passed.

The CNSC mandate is to regulate the development, production and use of nuclear energy, nuclear substances, prescribed equipment, and prescribed information in Canada in order to:

- Prevent unreasonable risks to the environment and to the health and safety of persons;
- Prevent unreasonable risk to national security; and
- Achieve conformity with measures of control and international obligations to which Canada has agreed.

In Canada there are approximately 2,500 operations comprising of approximately 4,000 licences. The types of facilities licensed by the CNSC include:

- Nuclear power plants
- Uranium mines and mills
- Uranium fuel processing and fabrication facilities
- Nuclear substance processing
- Industrial nuclear substance users
- Research and test facilities
- Importer/exporters of nuclear-related dual –use equipment
- Waste management facilities

The CNSC is divided into two independent parts. The paper will focus on only the part of the organization that is comprised of the regulatory staff that implements decisions made by the Commission, a quasi judicial tribunal. There are presently seven Directorates that form the Operations Branch of the CNSC, three of which regulate the nuclear facility types listed above. The other four Directorates provide important technical assessment and analysis that support the licensing, compliance and international obligations of the CNSC.

The Directorate of Nuclear Cycle and Facilities Regulation, (DNCFR) is one of three Directorates within the CNSC that is responsible for the licensing and compliance oversight of nuclear facilities in Canada. In particular, DNCFR assumes this role for over 75 facilities across Canada that include mines/mills, uranium processing, research, waste management, and nuclear material processing facilities.

As a result of the changing environment and additional expectations being thrust upon a limited number of resources, the DNCFR management team instructed staff to pursue the development of a risk based approach to compliance activities related to the facilities regulated by the directorate.

Concept of Risk Based Approach

The uranium processing facilities regulated by DNCFR are categorized as Class IB nuclear facilities under the *Class I Nuclear Facilities Regulations* of the NSCA that were issued in support of the *Canadian Nuclear Safety and Control Act* promulgated May 1, 2000. For the purposes of regulatory oversight, the majority of nuclear facilities that fell under the 1B nuclear facility category were further grouped and subsequently assigned to a specific Division. The directorate from time to time has re-organized the regulatory oversight with the objective of delivering an effective and efficient compliance program.

It should be noted that the CNSC embarked on this integrated risk management approach for all nuclear facilities that were being regulated by the three directorates. The overall objective was that all facilities would be ranked relative to the risk they posed. The regulatory effort from a licensing and compliance perspective would then be based on the ranking. Finally when the process had been completed, the risk ranking could be integrated across all of the licensing directorates with the goal of a comprehensive risk ranking of all CNSC licences and the level of risk associated with each type of licensed activity performed.

In 2002, staff initiated the first workshop to begin the process of establishing a risk based approach to compliance activities performed by DNCFR. Technical Support Staff within the CNSC was included in the workshop to insure that the assessment was complete and that all of the appropriate safety areas that could impact the level of risk that a facility posed were considered.

The specialty areas represented during the exercise were:

- radiation safety
- environmental protection
- engineering systems
- quality assurance
- emergency preparedness
- waste management
- decommissioning
- safeguards

The only aspect not ranked in this manner was public interest risk posed by facilities which was left up to the management team of DNCFR to be ranked. An external facilitator with a background in risk management was used to lead the working group through the exercise. This approach was determined to be a very practical and effective approach to completing the risk ranking exercise.

The methodology employed during the risk ranking exercise was consistent with the Canadian Standards Association's risk management standard. 1

Objectives Associated with the Regulatory Program

The objectives of the risk ranking project needed to be aligned closely with the CNSC mission which is to: *"regulate the use of nuclear energy and materials to protect health, safety, security and the environment..."* The fundamental objectives and other key objectives were identified along with the regulatory means that exist in the programs the CNSC uses.

Priority	Fundamental Objectives	Target
1	Protect human lives	Public/Workers
1	Protect the environment	Endangered Species at risk Non-human populations Ecosystem Land and Resource use
1	Protect national security	Public/Nation
1	Meet International Obligations	Government

Priority	Other Objectives	Target
2	Minimize adverse perception	Public
2	Maximize credibility	Public
2	Improve efficiency/effectiveness of the regulatory program	Minister
2	Increase openness and transparency	Public
2	Optimize program costs	CNSC-CEO and Public

The means by which these objectives can be achieved by the CNSC is through the use of the following regulatory tools:

- Licensing (Assessments, approvals)
- Compliance Inspections
- Compliance Promotion and Enforcement
- Third Party reviews paid by Licensees
- Third Party Contracts (Specialty Agencies contracted by the CNSC)
- Licensee's Self assessment
- Increase Licence Terms
- Promotion to public – Outreach

The Process

For the facilities regulated by DNCFR, the relative risk that each facility posed was determined by a process that involved six distinct steps.

Step One

Initially all facilities underwent a qualitative determination of their associated hazards and potential consequences to workers, the environment and the public which was performed by the compliance officer for the specific facility.

Step Two

A technical workshop was conducted where the facility specific and technical experts came together and categorized/ranked the technical risk areas associated with all the facilities being assessed.

Step Three

With respect to all technical areas used in the risk ranking exercise, the risk criteria and performance criteria was developed.

Step Four

The criteria developed in Step Three was further broken down into a ranking from high, medium, to low risk by all participants of the workshop.

Step Five

A further iteration of the risk ranking was done some time later to further break down the risk ranking into three additional levels such as High 1, High 2 and High 3.

Step Six

The final step was a validation by the facility experts of the risk rankings developed for each of the technical risk areas.

Technical Risk Areas

For the risk ranking exercise, five technical risk areas were identified for the facilities regulated by DNCFR. The risk areas were:

- 1) Operational Organization
- 2) Facility Design and Condition
- 3) Emergency Preparedness
- 4) On-Site Personnel Protection; and
- 5) Environmental Protection

For each of these areas, there were a number of aspects/programs that were taken into consideration as part of the exercise. Several examples of the aspects are listed for each of the risk areas that were considered.

1) Operational Organization

- Organizational complexity and administrative management structure
- Facility staff qualifications, training requirements, and support services
- Operational performance; and
- Quality Management Systems

2) Facility Design and Condition

- Recent safety analysis report
- Safe operating envelope (operating policies and principles)
- Design change projects; and
- Maintenance systems and programs

3) Emergency Preparedness

- Emergency plan and procedures
- Off site needs and support
- Emergency planning and response organizations

4) On-Site Personnel Protection

- Radiation protection programs
- Non-radiological health & safety
- Reporting and record keeping

5) Environmental Protection

- Environmental Management Systems
- Radiological and Hazardous Chemical Monitoring
- Waste Management Programs

The process of conducting the risk assessment exercise identified other factors for consideration namely:

- Security
- Safeguards
- Legal
- Public
- International Obligations
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Compliance Program

The risk criterion was developed for each technical area by the participants who were divided into five working groups, a specific group for each of the technical areas. The risk factors and performance measures were discussed. Once this had been completed, the group as a whole was presented with the criterion for each area and validation took place.

Finally, the facilities were ranked overall from highest risk to lowest. With a risk ranking that involved nine categories, a numeric value could be calculated for the purposes of providing an overall ranking of facilities within DNCFR. During the process, all facilities were ranked for each individual safety area rather than by individual facility to determine the final risk ranking of the facilities within DNCFR.

In addition, the participants in the risk ranking exercise proceeded to develop the compliance expectations that would form the basis of the regulatory plan for each facility. It should be noted that each facility had a resulting unique risk profile.

There are a number of compliance activities performed by the CNSC that when summarized result in the overall compliance program for a nuclear facility. Some of the key activities are:

- Routine inspections (Type II)
- Audits and Program Evaluations (Type I)
- Annual Reports
- Incident Reports
- Licence Specific Reports

Once the exercise was completed, a compliance program for any of the facilities could be prepared. Since licensing terms vary in length (typical 3-7 years), the compliance expectations for the specific term can be easily developed. There remains flexibility in the plan since the goal is to complete all identified compliance activities prior to commencement of the assessment of licence renewal applications.

The availability of specialists to participate or conduct program specific evaluations can be a significant constraint when executing a compliance program. Since there are other licensing groups within the CNSC, the specialists are shared limiting their availability at times throughout the year. To address the CNSC goal of efficient and effective regulation, each project officer who has been identified as the single point of contact per facility (SPOC) formulates a Facility Assessment and Compliance Team (FACT).

The FACT is involved in preparing the annual regulatory plan and exchange information amongst the members regarding the status of the facility. In addition to the regulatory plan, FACT may be involved in review of the Annual Report, incidents at the facility, evaluation of proposed changes and new initiatives.

Conclusion

The risk assessment performed by DNCFR has been a useful exercise that has assisted in the development of compliance programs for uranium processing facilities. Such an approach insures that resources from the technical support divisions and compliance groups are focused on the most significant safety areas for all nuclear facilities licensed by the Directorate.

The documented approach provides CNSC staff with a justification for the allocation of resources for the purposes of verifying regulatory compliance resulting in compliance programs that insure that the mandate and mission of the CNSC are fulfilled.

Reference

¹ CAN/CSA-Q850/97- Risk Management: Guideline for Decision