We will never compromise safety

The Canadian Nuclear Safety Commission in 2008–09

88,000,000	megawatt hours of electricity produced by CNSC-regulated nuclear power plants
2,000,000	Canadian homes using nuclear power generated by CNSC-regulated nuclear power plants
1,000,000	medical procedures, using Technetium-99m, delivered in CNSC-licensed medical facilities
3,300	licences
2,000	inspections
2,000	licensing decisions made by Designated Officers
800	employees
260	intervenors at public hearings
150	nuclear inspectors
22	bilateral nuclear non-proliferation arrangements
20	operating nuclear power reactors
7	permanent Commission Tribunal members
6	completed Environmental Assessments
2	applications received for new uranium mines

1 safe and secure Canadian nuclear sector

Safety First

As Canada's independent nuclear regulator, the Canadian Nuclear Safety Commission (CNSC) oversees Canada's nuclear sector, ensuring its facilities and activities are among the safest and most secure in the world.

The CNSC's strict licensing requirements, along with a robust inspection and compliance regime, promote the safe, secure operation of Canadian nuclear facilities while protecting the health of Canadians and their environment. The CNSC also cooperates with domestic and international partners to promote and maintain the peaceful use of nuclear energy and materials around the world.

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The Canadian Nuclear Safety Commission Across Canada

The Canadian Nuclear Safety Commission (CNSC) maintains headquarters in Ottawa, Ontario, in addition to regional offices throughout the country. The CNSC also has permanent site offices at each of Canada's five nuclear generating stations and at Chalk River Laboratories. At these and other sites, CNSC staff inspect operations and assess if licensees are complying with regulations and the conditions of their operating licences.

Letter to the Minister

The Honourable Lisa Raitt
Minister of Natural Resources Canada
Ottawa, Ontario

Madam:

I have the honour of presenting you the Annual Report of the Canadian Nuclear Safety Commission for the fiscal year ending March 31, 2009. The report has been prepared and is submitted in accordance with Section 72 of the *Nuclear Safety and Control Act.*

Michael Binder

President and Chief Executive Officer
Canadian Nuclear Safety Commission

Message From the President

It is with great pleasure that I present the Canadian Nuclear Safety Commission (CNSC) 2008–09 Annual Report. I am proud of the evolution and accomplishments of this organization in my first full year as CNSC President.

While recent global economic trends have slowed growth in the worldwide demand for energy over the short term, projections indicate that long-term energy needs will increase substantially here in Canada and globally. In the 2008 Speech From the Throne, the Government of Canada publicly recognized the importance of nuclear energy as a reliable and proven technology for helping meet the increasing need for power. The speech also committed that the government would "ensure that Canada's regulatory framework is ready to respond should the provinces choose to advance new nuclear projects."

While continuing to meet our day-to-day regulatory responsibilities, the CNSC has been preparing for the possibility of new reactor technologies and for the new demands we will inevitably face as a regulatory agency. To position ourselves appropriately, we have modernized our regulatory framework and have increased our engagement with a range of government partners. Our management team has also established clear direction and priorities: commitment to ongoing improvement, clarity of requirements, capacity for action, and communications. This has allowed us to better explain to Canadians our role and responsibilities with respect to nuclear power, medical and industrial uses of nuclear substances, and nuclear security.

This year's report will give readers a good sense of the scope of the nuclear sector and of the regulatory activities we undertake to ensure Canadians' safety. Our mission is clear: the CNSC protects the health, safety and security of Canadians as well as the environment, and respects Canada's international commitments on the peaceful use of nuclear energy.

We have realized many significant accomplishments over a busy fiscal year and these are outlined in this report. We held 20 public hearings and meetings where we listened to Canadians from across the country. The Commission Tribunal made 40 licensing decisions concerning Canada's nuclear facilities, including 13 decisions related to Environmental Assessments. Also, as part of our day-to-day work in carrying out regulatory oversight of the more than 3,000 nuclear licences in Canada, we conducted 2,000 inspections and assessed many licence applications, renewals and amendments.

In response to the extended shutdown of the National Research Universal (NRU) reactor in December 2007, which resulted in concerns about the supply of radioactive isotopes used for medical diagnostics and treatment, the CNSC and AECL jointly

commissioned an external review (the Talisman Report) of the events leading up to the shutdown to learn lessons that would prevent a similar occurrence in the future. As a result, the CNSC created the Harmonized Plan to bring these and other corporate-wide improvement initiatives under one umbrella. I am pleased to confirm that the CNSC completed all Talisman Report recommendations related to the NRU during this fiscal year.

Also this year, we reviewed several new nuclear power plant designs to verify their acceptability against Canadian safety criteria. We completed Phase I of the review for AECL's ACR-1000 and initiated reviews of Westinghouse's AP1000 and Areva's US-EPR. These reviews will provide vendors with the CNSC's regulatory expectations for new nuclear power plants.

Our vast regulatory scope—extending from nuclear power reactors, uranium mines and mills, fuel fabrication facilities and waste management to nuclear substances, radiation devices and many other facilities and activities—made recruiting and retaining skilled employees an important priority. Overall, we met our recruitment objectives, attracting highly qualified, talented people in key technical areas.

On the international front, we continued to participate fully in the activities of the International Atomic Energy Agency and the Nuclear Energy Agency. These fora provide opportunities to share best practices in nuclear safety and strengthen Canada's commitments to non-proliferation and the peaceful use of nuclear materials.

In 2008–09, three external members were appointed to the CNSC Audit Committee. The Committee's role is to ensure that, as President, I have independent, objective advice, guidance and assurance on the adequacy of the CNSC's control and accountability processes. The Committee reinforces the independence of internal audits, and its oversight responsibilities extend to key areas and processes that include values and ethics, risk management, management control, and accountability reporting. This group promises to act as a valuable resource for our organization, and I look forward to its oversight and advice.

Finally and most importantly, as CNSC President, I can assure Canadians that the use of nuclear materials and nuclear facilities in Canada is safe and secure.

With respect,

Michael Binder

Commission Tribunal Members

Michael Binder
President and Chief Executive Officer, Canadian Nuclear Safety Commission

Ottawa, Ontario
Named as a permanent member on January 15, 2008

Dr. Christopher R. Barnes
Professor Emeritus, School of Earth and Ocean Sciences, University of Victoria

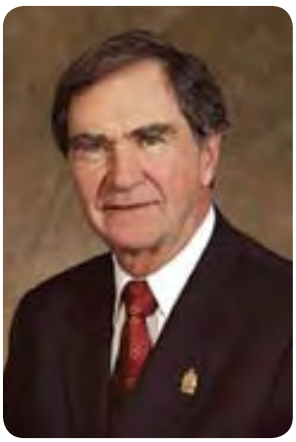
Victoria, British Columbia
Named as a permanent member on January 23, 1996

Dr. Ronald J. Barriault
Physician, Restigouche Regional Health Authority

Charlo, New Brunswick
Named as a permanent member on December 3, 2007

Alan R. Graham

Rexton, New Brunswick
Named as a permanent member on January 1, 1999



André Harvey

Québec City, Québec
Named as a permanent member on June 2, 2006

Dr. Louis LaPierre
Professor Emeritus in Biology, Université de Moncton

Moncton, New Brunswick
Named as a temporary member on September 4, 2008

Dr. J. Moyra J. McDill
Professor, Department of Mechanical and Aerospace Engineering, Carleton University

Ottawa, Ontario
Named as a permanent member on May 30, 2002

Dan Tolgyesi
President, Québec Mining Association

Québec City, Québec
Named as a permanent member on May 30, 2008

Executive Management Team

Michael Binder
President and
Chief Executive Officer

Ramzi Jammal
Executive Vice-President,
Regulatory Operations
and Chief Regulatory
Operations Officer

Terry Jamieson
Vice-President,
Technical Support

Patricia McDowell
Vice-President,
Regulatory Affairs

Gordon White
Vice-President,
Corporate Services and
Chief Financial Officer

Jacques Lavoie
Senior General
Counsel and Director
of Legal Services

Marc Leblanc
Commission Secretary

The CNSC Will Not Compromise Safety

As Canada's nuclear regulator, the Canadian Nuclear Safety Commission stringently monitors and controls the use of nuclear energy and materials to protect Canadians, their health and the environment.

CNSC site inspector, left, discusses work plan with power reactor staff at the Darlington Nuclear Generating Station.

Nuclear power currently accounts for more than 15 percent of electricity generated worldwide. As populations grow and energy needs increase, so will demand for reliable power over the long term.

Two global realities suggest a compelling need for countries to produce power in ways that do not rely on fossil fuels. First, worldwide electricity generation—most of which is produced in coal and natural gas-powered plants—accounts for 27 percent of human-generated carbon dioxide emissions. These emissions contribute to climate change. Second, as developing economies grow, they must increasingly meet their populations' energy demands by importing power from abroad. This threatens the energy security of such countries, as fossil fuel prices are volatile.

Nuclear power plants generate electricity without the combustion of fossil fuel. Therefore, many see the expansion of the global nuclear energy industry as part of the solution to meeting rising demands for power, without harming the environment or increasing dependence on dwindling fossil-fuel resources.

Against this backdrop, Canada's nuclear industry continues to develop this country's capacity to produce nuclear energy and related products. It has also reiterated its commitment to the safe and secure development of nuclear resources.

Canadians demand a reliable, safe nuclear sector that protects people and the environment. The CNSC's role as Canada's nuclear regulator is to carefully monitor the development and maintenance of nuclear energy, in keeping with these expectations. As this country's and the world's nuclear industries move forward to supply nuclear power, nuclear medicine, and other related products, the CNSC will not compromise safety and is committed to protecting Canadians.

CANADA IS A KEY PLAYER IN THE GLOBAL NUCLEAR SECTOR

Exceptional track record

Canada's nuclear sector has an exceptional track record of safely supplying markets at home and abroad. One such market involves worldwide demand for uranium, driven largely by the fuel requirements of the world's fleet of 439 nuclear power plants. As more reactors are built to meet global energy requirements, demand for uranium will increase accordingly.

Renewed commitment

In the November 2008 Speech From the Throne, the Government of Canada reinforced an existing commitment to secure Canada's energy future, noting that "nuclear energy is a proven technology, capable of reliable, large-scale output." The speech also committed that the Government would "ensure that Canada's regulatory framework is ready to respond should the provinces choose to advance new nuclear projects."

Clear objectives

The Government of Canada is committed to dramatically reducing Canada's greenhouse gas emissions and air pollution. In its *Turning the Corner* action plan, the Government said it would "...set an objective that 90 percent of Canada's electricity needs be provided by non-emitting sources such as hydro, nuclear, clean coal or wind power by 2020."

Future demand

Renewed interest in the nuclear sector is expected to lead to plans for both investing in new nuclear power facilities and refurbishing existing nuclear power plants as they reach the end of their operating lives. At the CNSC, we know that any increase in demand will require us to watch meticulously over the entire nuclear fuel cycle—from uranium mining and milling, uranium refining and fuel production, nuclear power generation, and nuclear medicine to the safe long-term management of nuclear waste.

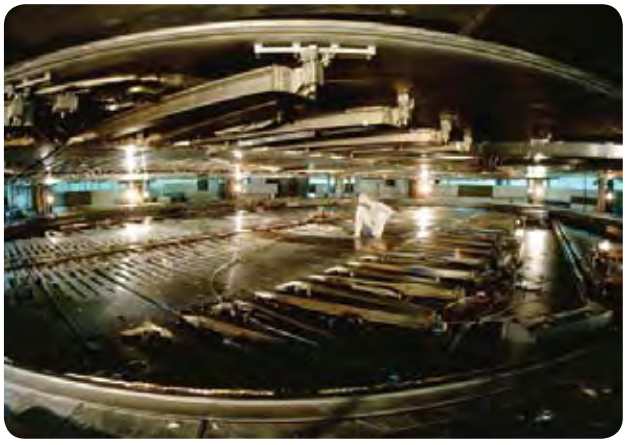
Commitment to safety

The CNSC helps ensure that people employed by or living near nuclear power plants, mines and mills, and nuclear waste management facilities are not exposed to dangerous levels of radiation and other potential hazards. Canada has an impressive, internationally recognized track record for nuclear safety and reliability, to which the CNSC's regulatory oversight has contributed.

The CNSC Regulates the Entire Canadian Nuclear Sector

Over decades, Canada has built a sophisticated nuclear sector that touches many aspects of Canadians' lives. Nuclear energy and related products heat our homes, fuel our businesses and help us overcome illnesses.

Uranium mines and mills (page 32)
Canada produces 25 percent of the world's supply of uranium, the raw material used for nuclear fuel. As all Canada uranium mines are currently located in the Athabasca Basin of northern Saskatchewan, the CNSC maintains an office in Saskatchewan with full-time staff who oversee regulatory compliance and safety. CNSC-regulated uranium mines are among the safest mines of any kind in Canada. Milling separates the uranium from surrounding rock and produces "yellowcake," a powdered form of uranium which is ready for processing.



Nuclear processing and research facilities (page 38)
Before uranium can be used in nuclear power plants, it must be refined into a usable form at processing facilities. Uranium is formed into dime-sized pellets and arranged into fuel bundles, each about the size of a fire log. Fuel bundles are used in nuclear power plants for producing electricity and for various medical and industrial uses. Uranium processing plants are carefully regulated and licensed by the CNSC to protect Canadians and the environment. At research facilities, engineers and scientists experiment with and develop new ways of using nuclear energy, related products and nuclear medicine, to benefit Canadians.

Nuclear power plants (page 44)
Nuclear reactors in secure power plants generate electricity by harnessing heat energy produced by the nuclear fission of uranium fuel. Canada's five nuclear power plants produce more than 15 percent of the country's electricity. The CNSC has the job of ensuring the safety of those living and working around nuclear power plants, and part of that mandate is to keep CNSC staff on site at all plants. The golden rules of reactor safety are to ensure the reactor is controlled, the fuel cooled and the radioactivity contained at all times.

Waste management (page 54)
Nuclear waste—including spent nuclear fuel bundles, contaminated clothing, tools and radioisotopes—is managed rigorously to ensure the safety of citizens and the environment. High-level waste includes spent nuclear fuel bundles and is stored in water-filled pools or dry storage canisters. Low- and medium-level waste, such as contaminated clothing, tools, radioisotopes, and uranium mine and mill tailings, are stored in secure, regulated, licensed facilities. The CNSC oversees the management of all nuclear waste in Canada.

Medical, academic and industrial uses (page 60)
Nuclear medicine uses radioactive substances called isotopes for diagnosing and treating illnesses, and Canada produces half of the world's supply of these medical tools. Radioactive substances are also used in industry in geological surveys, mineral exploration, and quality control measures in manufacturing, such as sterilization and checking for flaws in welds and machinery parts. In agriculture, radioactive substances are used to develop disease-resistant species. The CNSC regulates all medical and industrial uses of nuclear substances and radiation devices.

International obligations and undertakings (page 66)
Canada meets many important international obligations with respect to its nuclear sector and takes a leading role in discussions about global nuclear safety and security. The CNSC implements Canada's international obligations under the *Treaty on the Non-Proliferation of Nuclear Weapons* to provide assurance on the peaceful use of nuclear energy and related products in Canada. The CNSC also maintains bilateral relations with foreign regulators and contributes to multilateral organizations such as the International Atomic Energy Agency and the Nuclear Energy Agency.

Overview of the CNSC

CNSC site inspectors at the Bruce Nuclear Generating Station.

The Canadian Nuclear Safety Commission protects the health, safety and security of Canadians as well as the environment, and respects Canada's international commitments on the peaceful use of nuclear energy.

FASTFACTS

11

CNSC site and regional offices are located throughout Canada.

150

The CNSC has about 150 nuclear inspectors.

800

Continuing to grow in 2008–09, the CNSC now has about 800 employees.

2000

The CNSC was established in 2000 as a successor to the Atomic Energy Control Board.

In 1946, Canada's Parliament passed the *Atomic Energy Control Act* (AECA), creating the Atomic Energy Control Board and giving it the power to regulate and license the development and use of atomic energy.

The *Nuclear Safety and Control Act* (NSCA) came into effect in May 2000 and established the CNSC as the Atomic Energy Control Board's successor.

The CNSC is a quasi-judicial independent body that has jurisdictional authority over nuclear-related activities in Canada.

VISION

To be the best nuclear regulator in the world.

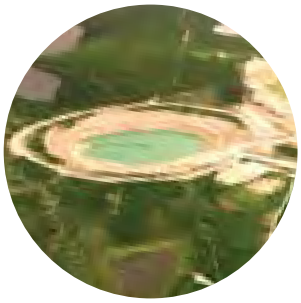
MISSION

To regulate the use of nuclear energy and materials so that the health, safety and security of Canadians and the environment are protected, and to respect Canada's international commitments on the peaceful use of nuclear energy.

MANDATE

Under the NSCA, the CNSC's mandate involves four major areas:

- regulation of the development, production and use of nuclear energy in Canada to protect health, safety, security and the environment
- regulation of the production, possession, use and transport of nuclear substances, and the production, possession and use of prescribed equipment and prescribed information
- implementation of measures respecting international control of the development, production, transport and use of nuclear energy and substances, including measures respecting the non-proliferation of nuclear weapons and nuclear explosive devices
- dissemination of objective scientific, technical and regulatory information about CNSC activities and the effects of those activities on the environment and the health and safety of persons, and of the development, production, possession, transport and use of nuclear substances

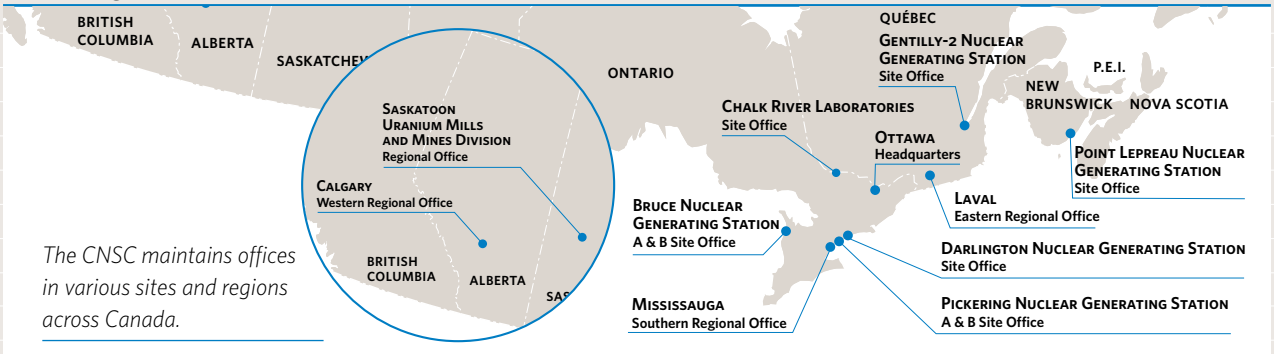


The CNSC is also responsible for complying with the Government of Canada's December 2007 Directive to the CNSC regarding the health of Canadians. This Directive requires the CNSC to consider the health of Canadians—who depend on nuclear substances produced by nuclear reactors for medical purposes—when it regulates the production, possession and use of nuclear substances, in order to prevent unreasonable risk to the health of persons.

The CNSC also administers the *Nuclear Liability Act* and, as a Responsible Authority under the *Canadian Environmental Assessment Act* (CEAA), oversees Environmental Assessments (EAs) for nuclear projects in accordance with this legislation.

Furthermore, the CNSC is Canada's authority with respect to nuclear safeguards as set out in the agreement between the Government of Canada and the International Atomic Energy Agency (IAEA) for the application of safeguards in connection with the *Treaty on the Non-proliferation of Nuclear Weapons*.

Site and regional offices



The CNSC maintains offices in various sites and regions across Canada.

OPEN AND TRANSPARENT COMMISSION TRIBUNAL

The CNSC's Commission Tribunal has up to seven permanent members appointed by the Governor in Council and is supported by more than 800 employees. The President of the CNSC is a permanent full-time member and the other members may be appointed to serve on a full-time or part-time basis. The Governor in Council can appoint temporary members as required.

The Commission Tribunal makes independent, fair and transparent decisions.

Commission Tribunal members are chosen based on their credentials and are independent of all political, governmental, special interest group or industry influences.

The Commission Tribunal makes independent, fair and transparent decisions on the licensing of nuclear-related activities, makes legally binding regulations and sets regulatory policy direction on matters relating to health, safety, nuclear security and the environment. With respect to licensing major nuclear facilities, the Tribunal considers proposals from applicants, recommendations from CNSC personnel and the views of stakeholders before it makes its decisions.

To promote openness and transparency, the Commission Tribunal conducts business to the greatest extent possible in public hearings and meetings and, where appropriate, in the communities affected by its decisions. Tribunal hearings are conducted publicly approximately 10 times per year and decisions are released within 30 business days of the close of hearings.

Industry representatives provide a technical briefing to the Commission Tribunal on the current status of and future progress in the management of radioactive waste in Canada.

WHO WE ARE

The CNSC fulfills its mandate thanks to its dedicated and skilled employees.

To be the best nuclear regulator in the world, the CNSC requires the best staff, so one of its key priorities is to build the capacity to meet and exceed all aspects of its mandate and to become an employer of choice.

This priority requires the CNSC to focus on strengthening its knowledge and understanding of workforce issues, particularly given the changing demographics of the workforce, increasing rates of retirement and the challenges of succession planning. As Canada's workforce ages, the Canadian nuclear industry is poised to expand. When this expansion and new technologies come online to support it, competition for high-calibre employees will escalate.

Over the past year, the CNSC hired 120 new employees, meeting its 2008–09 recruitment objectives. This indicates great success as the organization works to build and retain a workforce with the appropriate mix of scientific, technical and other professional knowledge, skills and experience.

The CNSC grew by 12.97 percent in 2007–08 and 17.3 percent in 2008–09 to support ongoing growth and renewal in the nuclear industry.

The CNSC will continue targeted recruitment efforts and focus on retention strategies to ensure its staff is qualified to meet the demands of growth and change.

CNSC inspectors

The NSCA empowers the CNSC to designate inspectors. These people have specific authorities and powers for ensuring that licensees and other regulated bodies (such as transport carriers) comply with the NSCA, its regulations (and other regulations incorporated by reference, such as the *Transportation of Dangerous Goods Regulations)*, licence terms and conditions, and decisions and orders made under the NSCA. Inspector compliance verification and enforcement are an essential part of the CNSC's regulatory programs.

DOING MORE WITH THE PEOPLE WE HAVE

The CNSC believes learning is a lifelong process and is committed to employee training. In turn, this will create more efficient and effective operations, allow the CNSC to achieve its mission, and promote the ongoing development of a professional, competent, versatile and motivated workforce.

Highlights of employee development initiatives in 2008–09 include:

- development of a new Inspector and Qualification Training Program
- delivery of more than 92 technical and non-technical training sessions
- selection of participants to attend the World Nuclear University Summer Institute
- creation of Individual Learning Plans for all CNSC staff
- implementation of a new employee orientation program
- development of new modules for the mandatory CNSC management training program

Building on these achievements, the CNSC will continue to focus on more training and knowledge management in the coming year to support employee development and retention.

WHAT WE DO

The NSCA gives the CNSC the power to license, make regulations and establish technical requirements for nuclear-related activities in Canada. These are the hallmarks of a modern nuclear regulatory regime.

The NSCA states that all people wishing to carry out nuclear-related activities in Canada must first obtain a licence from the CNSC. Furthermore, the NSCA authorizes the CNSC to attach any conditions to licences that it deems necessary to meet the NSCA's requirements.

The CNSC regulates:

- nuclear power plants
- uranium mines and mills
- uranium processing and fuel fabrication facilities
- nuclear research and test facilities and non-power plants
- nuclear materials, substances and processing facilities
- radioactive waste and waste management facilities
- hospitals and cancer treatment centres

The NSCA empowers the CNSC to make regulations for a range of activities related to the design, construction, operation, decommissioning and abandonment of nuclear facilities and nuclear substances. The CNSC also makes regulations for a range of technical and operational activities related to nuclear facilities and substances.

Regulations can establish the technical requirements related to developing and using nuclear energy and nuclear substances, and can incorporate standards established by other organizations and authorities when doing so.

The CNSC's regulatory framework includes regulatory documents and guides. These clarify the CNSC's regulatory requirements and provide guidance on how licensees may meet the requirements set out in regulations and in their licence conditions. Regulatory documents may be incorporated by reference in regulations or licence conditions and thereby become legally enforceable.

The CNSC conducts independent research to support its decisions. It also engages independent experts and participates in international initiatives to advance knowledge, safety and regulatory regimes around specific issues such as new nuclear reactor designs, aging facilities and the effects of radiation on people and the environment.

The CNSC has leveraged its research resources primarily to gain a better understanding of important near-term issues. While this type of research must continue, the CNSC will seek to increase its investment in

independent research and the evaluation of innovative and advanced nuclear science and technology that may soon be the subject of applications before the Commission Tribunal.

HOW WE DO IT

The CNSC has established and is implementing a strong management system that seeks continuous improvement within the organization. It is process based, as shown in Figure 1.

Using a risk-informed regulatory approach

The CNSC uses a "risk-informed regulatory approach" to licensing and compliance. This involves assessing the risk associated with facilities and activities in the nuclear sector according to a potential event's probability and consequences.

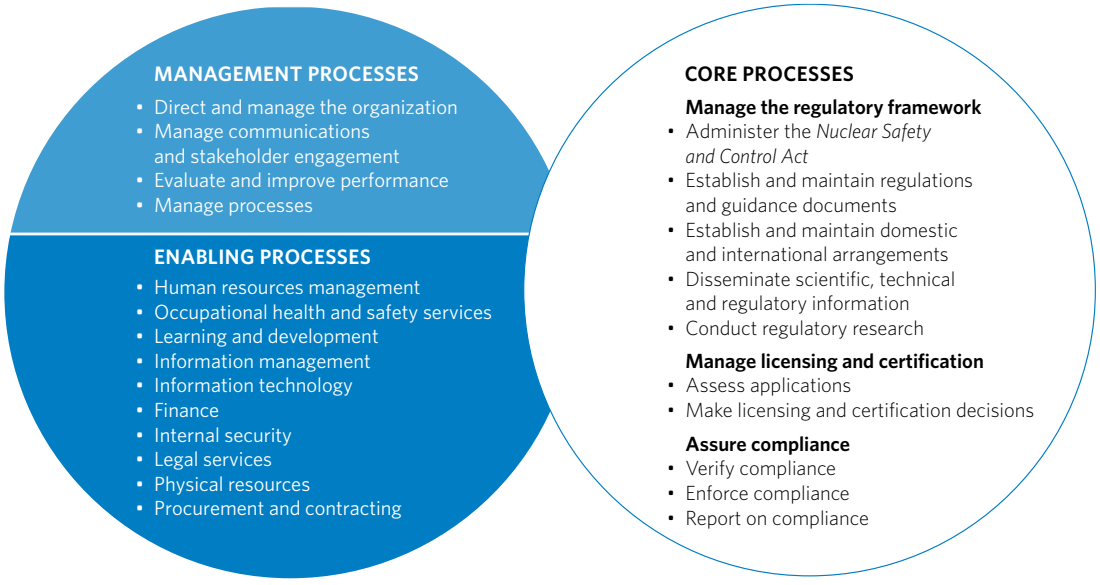
Factors that affect a facility or activity's risk ranking include the risk associated with the type and complexity of the facility or activity, and the performance and compliance history of a licensee or operator.

Building from a minimum baseline of regulatory oversight, additional regulation in licensing and compliance is applied to particular facilities or activities based on their risk rankings. This approach allows the CNSC to use its resources where they are most needed to ensure its compliance program is as effective as possible. To strengthen this risk-based assessment, the CNSC has also implemented a "lifecycle approach" to regulating nuclear activities and facilities. This approach recognizes that every stage in the lifecycle of a nuclear facility or activity must be uniquely handled to ensure appropriate regulatory control and security.

The CNSC tailors its inspections to a facility's level of risk.

For facilities or activities where accidents or malfunctions could have severe consequences, the CNSC requires licensees to produce designs and operating procedures that include multiple layers of defence against such incidents. Combined with higher levels of CNSC monitoring and control, this dramatically reduces risk. For facilities or activities where high-consequence events are not possible or are extremely unlikely, the level and frequency of CNSC regulatory oversight is correspondingly less. The risk ranking for all licensed activities determines the type and frequency of CNSC inspections to be performed each year.

Figure 1: The CNSC's management processes



The CNSC's management approach ensures that work is performed in a consistent, reliable manner.

An inspector checks the state of components inside the vacuum building at the Pickering A Nuclear Generating Station.

The CNSC's compliance program includes Type I and Type II inspections along with a variety of desktop reviews.

Type I inspections are complex and comprehensive onsite reviews that assess and verify licensee compliance in safety areas and programs.

Type II inspections are point-in-time, snapshot verifications of licensee activities, focusing on outputs or performance of licensee programs, processes and practices. Findings from Type II inspections play a key role in identifying where a Type I inspection may be required to assess the overall safety area or program.

Desktop reviews are assessments of documentation submitted by licensees to confirm compliance with regulatory requirements.

Scrutinizing nuclear facilities for safety

The design of nuclear facilities is another important aspect of reducing risk. Facility and equipment designs use defence-in-depth and barriers, which include multiple independent safety systems to protect critical areas such as nuclear fuel components. Each facility also creates specific safety programs, which provide additional lines of defence. That way, if one or more safety systems fail, others are in place to keep the facility safe, limit potential emissions and provide enough time to correct the original problem. This important characteristic is standard for any modern nuclear facility. The CNSC scrutinizes these safety programs for appropriateness and robustness.

Constantly striving to improve safety records

In line with its risk-management approach, the CNSC increases its regulatory oversight of licensees with poorer safety records, applying greater scrutiny and stricter reporting requirements. A high level of scrutiny is also applied to aging facilities.

The CNSC promotes safety awareness among licensees and encourages them to pay close attention to early warning signs and signals, however faint, within their organizations or with respect to facilities that create potential risk hazards.

Key safety areas assessed by the CNSC:

- operating performance
- performance assurance
- design and analysis
- equipment fitness for service
- emergency preparedness
- environmental protection
- radiation protection
- site security
- safeguards

QUALIFIED PERSONNEL ARE:

trained

knowledgeable

capable

authorized

A strong safety culture is the foundation of safe operations at every nuclear facility. Managers and workers must take safety seriously and the CNSC has developed tools to ensure that a culture of safety is maintained at all times.

Certifying key safety-related nuclear energy workers

Nuclear energy workers in key positions ensure the safety of licensed nuclear operations and as such, are certified under the NSCA to ensure they are sufficiently qualified to carry out the duties of their position.

While every CNSC licensee is required by the regulations to train and authorize their workers to competently carry out their duties, CNSC certification adds an extra level of assurance that these key positions are adequately qualified. The certification process confirms that the CNSC has inspected and verified that the licensee's training and examination programs and processes meet regulatory requirements.

At nuclear power plants, positions requiring CNSC certification are health physicists, control room operators and shift supervisors. Where industrial radiography is performed, the exposure device operators require CNSC certification. CNSC certificates are issued only when the CNSC is satisfied that the candidate has the knowledge and skills required to safely carry out the duties of their position. The CNSC undertook work to amend the *Class II Nuclear Facilities and Prescribed Equipment Regulations* to ensure that Radiation Safety Officers for Class II licences are adequately qualified and trained to perform their duties. The amendment is expected to be approved in the upcoming fiscal year.

All Canadian nuclear power plant licensees have on-site armed response teams to guard against intruders.

Preparing for emergencies

Emergency preparedness is essential to being a responsible nuclear regulator, and the CNSC requires all major nuclear facilities to have comprehensive emergency preparedness programs. The organization works with nuclear operators, municipal, provincial and federal government agencies, first responders and international organizations to be ready to respond to any nuclear emergency—always.

The CNSC also plays a key support and oversight role in preparing for, or during, any emergency that could result in radiation exposure to workers or the public that exceed regulatory dose limits. It also ensures each licensee has proven measures and strategies in place to minimize the impact of any potential event on public health and the environment.

The CNSC's role during a nuclear emergency is to:

- monitor the response of the licensee
- evaluate response actions
- provide technical advice and take regulatory action when required
- provide field response to assist local authorities as needed
- inform the government and the public on its assessment of the situation

The CNSC also has a Duty Officer who receives reports on actual or potential incidents and to respond to those seeking emergency information and assistance. The Duty Officer is available 24 hours a day and is the first point of contact in the event of an emergency.

The CNSC, its federal partners and licensees hold emergency exercises to prepare for potential nuclear emergencies.

Accident reporting

The International Nuclear and Radiological Event Scale is a tool for promptly and consistently communicating to the public about the safety significance of reported nuclear and radiological incidents and accidents. The scale can be applied to any event associated with nuclear facilities, as well as to the transport, storage and use of radioactive material and radiation sources.

The CNSC reports any significant events via a global Web-based nuclear events system. Reports include all significant events in nuclear power plants, research reactors and nuclear fuel cycle facilities, and occurrences involving radiation sources or the transport of radioactive material.

In 2008–09, there were no significant nuclear events reported for Canada.

CERTIFICATION

In 2008-09, the CNSC issued new certificates to:

60

nuclear power plant personnel

170

exposure device personnel

2

nuclear reactor personnel

62

The CNSC also renewed 62 certifications for nuclear power plant personnel.

Highlight 1
EXPLAINING RADIATION DOSES

Radiation from Canada's nuclear sector is strictly controlled by the CNSC, which sets and enforces exposure limits to protect people and the environment.

Canada's nuclear facilities have a strong track record of keeping radiation doses far below these limits. This performance, verified by CNSC staff, gives Canadians the best possible indication that Canadian nuclear facilities are operating safely.

ABOUT RADIATION

Ionizing radiation is a natural part of the world. Humans are exposed to small amounts of radiation from natural sources such as uranium and other radioactive elements found in rocks and soil, cosmic radiation from the sun, from the foods we eat and the air we breathe.

The sum of this natural radiation is called background radiation. Natural background radiation accounts for more than 50 percent of the radiation that an average Canadian receives in a lifetime—approximately 2.4 millisieverts (mSv)[1] per year (a millisievert is a unit of radiation dose). The remaining exposure comes from artificial sources such as medical applications (46 percent) and from other activities such as the operation of nuclear facilities (1 percent).

Figure 2 provides a visual representation of components that contribute to typical Canadian annual radiation doses to adult members of the public, including both natural and artificial sources.

1 Canada and many other countries use Système Internationale (SI) units to measure radiation exposure, which include millisieverts. Millisieverts (mSv) measure the biological effects of ionizing radiation absorbed.

Natural background radiation accounts for more than half of the radiation received by Canadians throughout their lives.

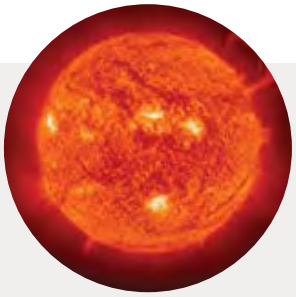
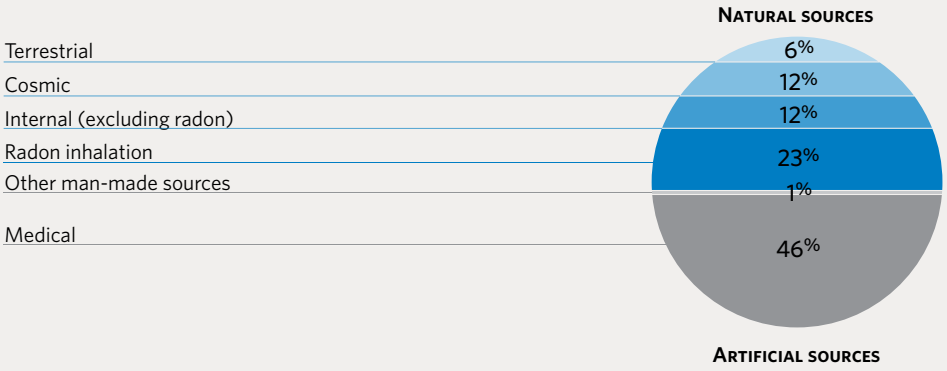


Figure 2: Sources of doses to adult members of the Canadian public



Man-made sources of radiation (except for medical sources) account for just one percent of Canadians' exposure to radiation.

THE ALARA PRINCIPLE

The CNSC requires licensees to follow the As Low As Reasonably Achievable (ALARA) principle. This principle, endorsed by the International Commission on Radiological Protection, calls upon licensees to use practical, cost-effective design, construction and operations to reduce unnecessary radiation doses to workers and the public—even if current performance and doses are already well below regulatory limits.

The CNSC ensures that operators of licensed nuclear facilities have the appropriate programs in place to monitor and control radiation doses to workers and the public. CNSC staff perform ongoing verification activities to make certain that the industry is operating in a safe manner.

SAFE DOSES FOR WORKERS AND THE PUBLIC

Regulatory limits for safe radiation doses, to workers in nuclear facilities or for the general public, are set at levels well below those that could pose health risks.

Canadian radiation dose limits are based on international standards. The regulatory dose limit for a member of the public in Canada is 1 mSv per year, while the dose limit for a nuclear energy worker is 50 mSv per year and 100 mSv over a five-year period.

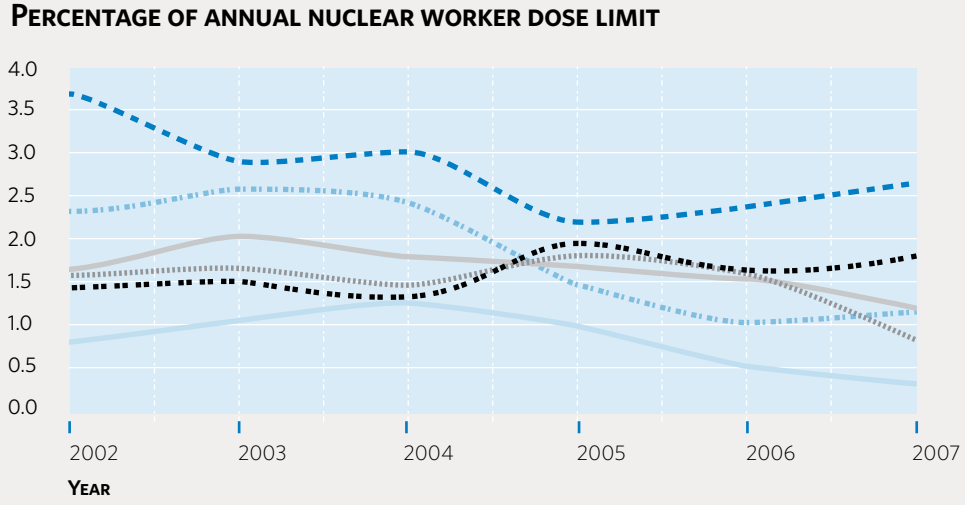
Worker and public radiation dose levels are important indicators of the overall safety of the nuclear industry.

HIGHLIGHT 1 CONTINUED

EXPLAINING RADIATION DOSES

Figure 3 shows the average annual worker doses in various types of nuclear industries as a percentage of the nuclear energy worker annual dose limit of 50 mSv. It can be seen that operators of licensed nuclear facilities maintained radiation dose levels for workers well below the regulatory limits, from 2001 to 2007.

Figure 3: Canadian nuclear energy worker radiation dose levels as a percentage of annual nuclear worker dose limit of 50 mSv



From 2002 to 2007, radiation doses to nuclear industry workers were under four percent of regulatory dose limits.

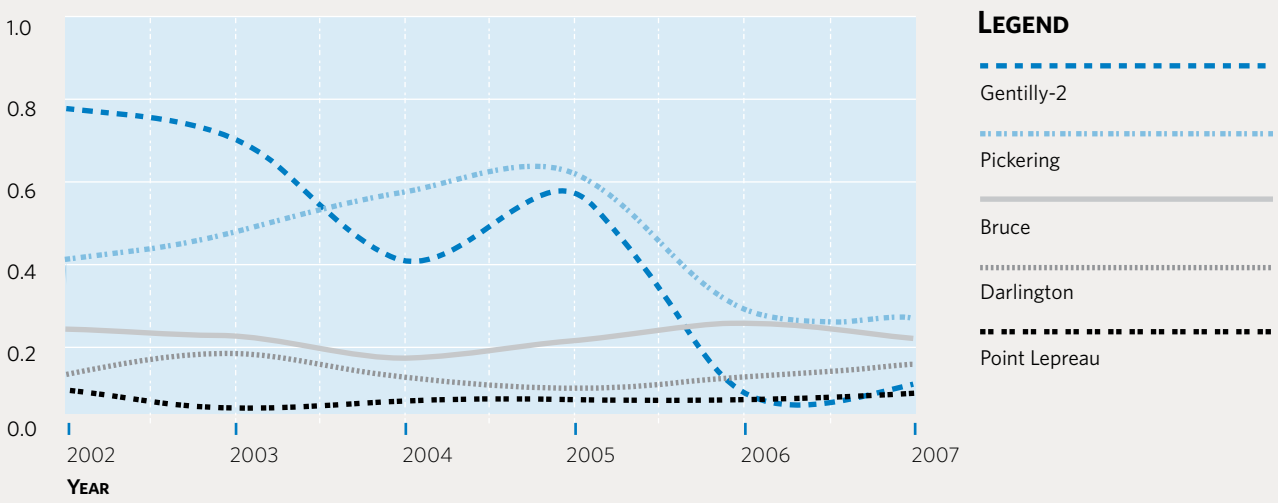
Nuclear facilities release radioactive material (in gas and liquid form) into the environment that could result in radiation doses to members of the public. Releases to the environment that contribute to public radiation doses must be within regulatory limits and ALARA. These doses are calculated using environmental monitoring and computer modeling.

Figure 4 shows average annual public doses from Canada's five nuclear power plants as a percentage of the annual public dose limit of 1 mSv. As the figure shows, from 2002 to 2007, radiation dose levels for members of the public were well below the regulatory limits.

EXPERT PROTECTION

Risks associated with the nuclear industry are varied and complex, which is why the CNSC has some the world's best scientific and engineering experts on staff.

Figure 4: Public doses around Canadian nuclear power plants as a percentage of annual public dose limit of 1 mSv



From 2002 to 2007, radiation doses to members of the public living around nuclear power plants were under one percent of regulatory dose limits.

These experts assess if nuclear materials and activities are safe or pose a risk to Canadians and they work with other specialists around the world to develop ways to eliminate, reduce or manage risks. The CNSC also provides clear and timely safety and operational information to the public on its Web site at nuclearsafety.gc.ca

THOROUGH RESEARCH

In 2008–09, the CNSC performed the following work to better understand the effects of radiation on people and the environment:

- continued amalgamation of many health studies that have been performed throughout the years because of the historical and current presence of the nuclear industry in the community of Port Hope, Ontario, to respond to concerns raised by some residents about possible health effects in the community
- updated work on the health effects of Canadian uranium miners exposed to radon and its decay products, to provide objective scientific information on the health effects of occupational exposure to radon and to improve our confidence in current dose limits and radiation protection program requirements
- took a lead role in understanding the health effects of tritium, in work over the past year to update nuclear power plant workers' data, to help incorporate it into *Mortality (1957–1994) of the Corrected Canadian Nuclear Power Industry Workers Study, with Specific Attention to Tritium Exposure*

2008–09: A Year of Growth and Accomplishments

The CNSC marked many significant achievements throughout 2008–09, as it strengthened its operations, clarified its requirements, increased its capacity and improved communication with stakeholders.

Because of a renewed focus on nuclear power, medical and industrial uses of nuclear energy, and nuclear security—and the possibility that Canada's nuclear sector will grow substantially as a result—the CNSC has had to adapt its operations extensively. More than ever before, the organization must carry out its regulatory and licensing activities in a simple, clear and timely fashion. Above all, the CNSC must ensure compliance to protect the health, safety and security of people, the nation and the environment, and ensure that Canada's international obligations are met.

The need for adaptability required the CNSC to strengthen its operations in 2008–09 and communicate more effectively with various stakeholders, including making sure licensees understand the requirements that the CNSC places on them. The organization clearly focused on four key priority areas in 2008–09 and continues to reinforce them with staff and stakeholders: commitment to ongoing improvements, clarity of requirements, capacity for action, and communication. The following highlights illustrate the CNSC's recent accomplishments under each of these priorities.

COMMITMENT TO ONGOING IMPROVEMENTS

- The CNSC developed a Harmonized Plan of improvement initiatives. This plan responds to lessons learned from the Chalk River National Research Universal (NRU) reactor shutdown in December 2007 and other relevant audit findings, and harmonizes improvement initiatives under a single umbrella.
- During medical isotope shortages in November and December 2008, the CNSC worked with interdepartmental partners and led discussions with international regulators on isotope supply.

CLARITY OF REQUIREMENTS

- The CNSC improved the regulatory framework to clarify regulatory requirements, particularly for EAs and the siting and design of new nuclear power plants (NPPs) and uranium mines. New regulatory documents related to the siting and design of new NPPs were published, and staff review guides for the review of licence applications and EAs have been prepared to ensure consistent reviews for all applications.

- Nine CNSC regulatory documents were published (three for consultation and six in final format). A full list of regulatory documents can be found at nuclearsafety.gc.ca
- The *Nuclear Substance and Radiation Devices Regulations* and the *Class II Nuclear Facilities and Prescribed Equipment Regulations* were amended to correct regulatory deficiencies and to adopt the latest relevant international standards.
- The CNSC engaged government partners through the Major Projects Management Office to clarify requirements and improve efficiency in regulating new nuclear projects for:
  - » Bruce Power's New Nuclear Power Plant project in Tiverton, Ontario
  - » Bruce Power's New Nuclear Power Plant project in Nanticoke, Ontario
  - » Ontario Power Generation's Darlington New Nuclear Power Plant project in Bowmanville, Ontario
  - » Ontario Power Generation's proposed Deep Geologic Repository in Tiverton, Ontario
- The CNSC continued to implement an improved protocol to enable AECL and all Canadians to know clearly and in advance what the CNSC will require to extend the Chalk River NRU reactor's operating licence in 2011.

The CNSC's Commission Tribunal held 20 public hearings and meetings in 2008–09, with 260 intervenors.

- Pre-project vendor design reviews were provided to verify whether, at a high level, the acceptability of an NPP design would respect Canadian safety principles and criteria. In 2008–09, Phase I (Review Process and Focus Areas) for the ACR-1000 design review was completed (see highlight on page 52). The CNSC also began to review Westinghouse AP1000 and AREVA US-EPR designs, which could be considered for new build projects in Canada.

CAPACITY FOR ACTION

- The CNSC instituted Phase I of its conversion to the Revenue Spending Authority, a more sustainable funding regime to facilitate CNSC growth in response to growth in the nuclear sector.
- Successful recruitment efforts to new employees in a competitive industry were continued, with a staff growth rate of 17.3 percent.
- The CNSC undertook research and support to help acquire and maintain critical knowledge on existing and emerging science and advanced technology.
- An approximate additional 6,000m^2 of office space was leased to accommodate the increase in new staff associated with anticipated growth in the nuclear industry.

COMMUNICATIONS

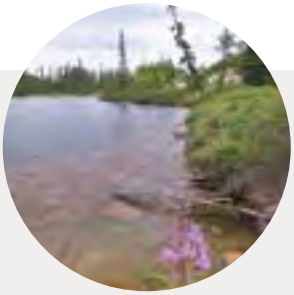
- The CNSC revamped its Web site, nuclearsafety.gc.ca, to provide licensees and the public more convenient access to a greater range of information.
- The Commission Tribunal held 20 public hearings and meetings where 260 intervenors participated. Several hearings were held in directly affected communities. Further to these public hearings the Commission made 40 decisions, including 13 related to EAs and 2 CNSC orders concerning Canada's nuclear facilities.
- The CNSC collaborated with Indian and Northern Affairs Canada to facilitate training for CNSC operational staff on the legal duty to consult with Aboriginal peoples. Aboriginal consultation plans were drafted for new NPPs proposed for Bruce Power in Tiverton, Ontario, and Nanticoke, Ontario, and for Ontario Power Generation's Darlington site in Bowmanville, Ontario.
- Outreach initiatives were held in communities such as Port Hope, Bowmanville, Pickering, Kincardine, Point Lepreau, Bécancour and in various Saskatchewan communities. These activities touched on issues such as NPP performance, radiation protection requirements, uranium exploration and mining, and EAs.

Highlight 2

THE CNSC PROTECTS THE ENVIRONMENT

A CNSC inspector takes measurements to verify environmental remediation measures at a decommissioned mine site.

Protecting the environment is an important part of the CNSC's work. The *Nuclear Safety and Control Act* (NSCA) provides for the continued health and safety of people and the environment associated with the development, production and use of nuclear energy.



The CNSC actively gathers public input throughout the Environmental Assessment process.

The *Canadian Environmental Assessment Act* (CEAA) provides additional focus on environmental stewardship and ensures that the public can participate fully in decisions that may affect the environment.

ENVIRONMENTAL ASSESSMENTS

The CNSC oversees Environmental Assessments (EAs) to ensure that all regulated nuclear projects are environmentally safe. There are two main types of EAs, both of which can be elevated to a review panel:

- screening-level EAs, usually conducted for small projects with few project-environment interactions
- comprehensive studies, usually conducted for larger, more complex projects with the potential for significant adverse effects or that are likely to draw public interest or concern

To fulfill specific CNSC requirements for each project, licensees undertake technical studies to evaluate the potential impacts of their projects and to find ways to reduce or avoid any adverse environmental effects under normal and abnormal operating conditions.

EAs examine factors such as air and water quality, noise, aquatic and terrestrial life, human health, social and economic impacts, use of land and resources, and Aboriginal interests. Public participation is an important part of the EA process. Where feasible, CNSC often holds public meetings in communities where a nuclear project is proposed, to provide information on the EA, gather public input and provide community members with direct access to technical experts.

Once the proponent or prospective licensee sends technical studies and an Environmental Impact Statement to the CNSC, CNSC experts review and analyze the technical documents and prepare an EA report. For screening EAs, the CNSC invites the public to review the EA report and provide their comments, which are addressed and included in a table in the final report.

The final EA report is presented to the Commission Tribunal, the responsible authority under the CEAA. The Tribunal makes its EA decision based on evidence in the report. If the Tribunal deems that the project, including proposed mitigation measures, is not likely to cause significant adverse environmental effects, then a project may proceed to the licensing phase.

HIGHLIGHT 2 CONTINUED

THE CNSC PROTECTS THE ENVIRONMENT

For large projects with a high level of public interest, the Commission Tribunal may hold a public hearing to consider an EA report. When this happens, the public may be able to participate in the hearing, either through written submissions or by making a presentation to the Tribunal.

Improved screening process for Environmental Assessments

In 2008, the CNSC identified ways to streamline and further improve its EA and licensing process for screening-level EAs. The CNSC posted a draft document entitled *Process Improvement Initiatives for Screening Environmental Assessments at the CNSC* on its Web site for public review and comment. The feedback was considered before a revised draft was presented to the Commission Tribunal, which endorsed the improved process in August 2008.

The new process was formally presented in the document entitled *Environmental Assessment Screening Process at CNSC* (INFO-0774) and came into effect on January 1, 2009. This document provides a set of clearly defined processes and criteria to achieve a more effective and efficient screening-level EA and licensing process at the CNSC.

The improved process takes into account the complexity and level of risk of a project while remaining open and transparent and promoting the best use of time and resources for CNSC staff, the Commission Tribunal, proponents and other stakeholders.

JOINT REVIEW PANELS

The CNSC has been working with the Canadian Environmental Assessment Agency to coordinate the EA process for new major projects that may be assessed by a Joint Review Panel (JRP).

A JRP is a review panel established jointly between the Minister of the Environment and another jurisdiction (in this case, the Commission Tribunal) that has powers, duties or functions that relate to the assessment of a project's environmental effects. JRPs allow both the NSCA and the CEAA to be considered at the same time. This improves regulatory efficiency and allows for integrated reviews of both EA and licensing information to help the public, other stakeholders and panel members fully understand a project's implications.

CNSC licensees reforest the area of a decommissioned mine.

A CNSC inspector takes water quality measurements at a tailings management area of a decommissioned mine site in Elliot Lake, Ontario, to ensure that effluent criteria meet release standards set out under CNSC licences.

The panel is established as a single body to perform the EA and make recommendations to Cabinet on its findings. It has the authority to grant a licence under the NSCA for the first licence application of a project. The panel process also provides many opportunities for the public and Aboriginal communities to participate and exchange views.

JRPs for new nuclear projects

To date, three major nuclear projects have been referred to a JRP process:

- Bruce Power's New Nuclear Power Plant project near Tiverton, Ontario
- Ontario Power Generation's proposed Deep Geologic Repository near Tiverton, Ontario
- Ontario Power Generation's Darlington New Nuclear Power Plant project near Bowmanville, Ontario

As the lead regulator for these projects, the CNSC works with other federal departments and agencies to conduct reviews and to ensure that any potential impacts on the health of Canadians and their environment are assessed and mitigated appropriately.

TRITIUM PROJECT

In response to public concerns about the use and disposal of tritium, the Commission Tribunal requested a study on the biological effects of tritium on human health and the environment. The study will also review technologies that are available to control tritium when it is used in industry.

Working with Canadian and international health, soil, vegetation, atmospheric and technology specialists, the CNSC's technical specialists made significant progress on this study during the fiscal year. The study is targeted for completion by the end of

HIGHLIGHT 2 CONTINUED
THE CNSC PROTECTS THE ENVIRONMENT

this fiscal year. The work will be made available on the CNSC's Web site, and the final report will form the basis of new recommendations for the regulation of tritium.

Understanding tritium
Tritium, one of the components measured in an overall radiation dose, is a naturally occurring radioactive isotope of hydrogen and has a half-life of 12.33 years. Tritium is produced in the outer atmosphere (and also as a byproduct of nuclear reactor operations) and is found in trace quantities in the air and groundwater throughout the world.

As tritium decays, it releases radiation that is too weak to penetrate human skin. The CNSC monitors tritium release levels in the air and water (which could be inhaled or ingested) to ensure that operators of licensed nuclear facilities understand tritium levels and do not exceed annual radiation dose limits.

The CNSC is investing in better understanding tritium effects on health (largely from ingestion and inhalation). For more information, see *Tritium Studies — Standards and Guidelines for Tritium in Drinking Water* (INFO-0766) at nuclearsafety.gc.ca

URANIUM DISCHARGES

Environment Canada, with the CNSC's technical support, had previously found that uranium and uranium compounds in effluent from Canadian uranium mines and mills were entering the environment in quantities or concentrations or under conditions that have or may have an immediate or long-term effect on the environment.

It was determined that the CNSC's regulatory oversight and public licensing process provided the best approach to identify and implement appropriate risk-management activities. Three facilities that required attention were identified: the Rabbit Lake operation, the Key Lake operation, and the Cluff Lake operation. The uranium issues at each of these facilities are unique and therefore were addressed separately.

At the Rabbit Lake uranium mine and mill, the CNSC required improvements to the effluent treatment to reduce uranium. A review of the performance of the upgraded treatment system for its first year of operation demonstrated an 86-percent reduction in concentration of uranium in the effluent and an 85-percent reduction in total discharge of uranium to the environment.

For the Key Lake facility, CNSC staff assessed the effectiveness of the reverse osmosis plant at removing uranium from groundwater. The assessment demonstrated that the plant has been operating with an average removal efficiency of 97 percent, preventing the release of more than 2,500 kg of uranium to the environment.

The Cluff Lake operation was not subject to immediate uranium risk-management measures because it has ceased operation, is no longer releasing effluent to the environment and is undergoing decommissioning. The CNSC continues to monitor environmental performance at this site. Uranium concentrations within what was the initial effluent-receiving water body continue to decline as predicted.

CNSC licence conditions require licensees to monitor soil, air and water around nuclear facilities.

Risk-management activities with respect to uranium releases continue to be a priority at the CNSC. They are part of what the CNSC continues to insist on with respect to its own activities and those of CNSC licensees.

OTHER ENVIRONMENTAL IMPROVEMENTS

The CNSC worked on many fronts to reduce the environmental impact of nuclear facilities and activities:

- conducted a CNSC-funded research project through the University of Ottawa, starting in the summer of 2008 and continuing through 2009, to study the levels of tritium and organically bound tritium in soils and plants near the Darlington Nuclear Generating Station, Gentilly-2, Shield Source Inc. and SRB Technologies Inc.
- followed up on issues raised in EAs, such as one pertaining to the Pickering Nuclear Generating Station
- undertook several research projects to increase the CNSC's capacity for precise evaluation of environmental effects
- improved documentation to help demonstrate that certain low-risk projects can be safely monitored with lower frequency
- prescribed an updated, risk-informed, performance-based program for radiation and environmental protection compliance program for all licensees (starting with power reactors) with specific measures and performance indicators
- created ongoing compliance reports to reflect each licensee's specific performance
- initiated a program at Cameco's Beaverlodge mining complex in Saskatchewan, identifying environmental risk sources and levels, in response to the Commission Tribunal's request that the licensee develop a mitigation plan to reduce its local environmental effects
- took regulatory action to address environmental concerns at Cameco's Welcome Waste Management Facility in Port Hope and Port Granby Waste Management Facility in Clarington, Ontario, imposing several actions and timelines on the licensee, who met the first requirements during this fiscal year
- promoted and required licensee adherence to the Environmental Management System based on international standards

Uranium Mines and Mills

Nuclear fuel for today and tomorrow

Uranium is a common, naturally occurring element found throughout the earth's crust, soils and oceans. Where uranium deposits are concentrated enough to support mining operations, they are designated as uranium resources.

An underground Cameco miner remotely controls a truck to transport ore.

FASTFACTS

Canada has four operating uranium mines, which are all in Saskatchewan.

8%

Canada has an estimated 8 percent of the world's known uranium resources.

21%

Ore grades of Canadian mines average as high as 21 percent.

20

The CNSC regulates more than 20 decommissioned tailings management sites associated with closed uranium facilities.

Canada has an estimated 8 percent of the world's known uranium resources and is a top producer, with an estimated 25-percent share of the global market.

As shown in Table 1 Canada's mines have ore grades averaging as high as 21.2 percent, which is more than 10 times higher than ore grades of other uranium mines worldwide.

Mined uranium ore is milled into a powder consisting of uranium oxide concentrate called yellowcake, which is further processed before it is used as fuel in nuclear power reactors.

Table 1: Canadian uranium-producing mine reserves and production capacities for 2007

Mine and Status	Reserves (tons of uranium)	Production capacity (tons of uranium per year)	Average uranium ore grade (%)
McArthur River/Key Lake	168,000	7,200	21.2
McClean Lake	12,655	3,077	1.4
Rabbit Lake	6,925	4,615	1.0
Cigar Lake (Committed for 2010)	89,000	6,924 (projected)	17.8
Midwest (Planned for 2010)	13,460	2,300 (projected)	3.7

Canada is a leading producer of high-quality uranium.

THE CNSC'S ROLE

The CNSC regulates and licenses all uranium mines and mills in Canada for the protection of Canadians and the environment. All operating uranium mines in Canada are currently located in the Athabasca Basin area of northern Saskatchewan. The CNSC maintains an office in Saskatchewan with full-time staff who ensure the compliance of uranium mine and mill licensees.

In addition to general licensing and compliance standards and activities required throughout the lifecycle of any nuclear facility, the CNSC requires uranium mines to follow specific obligations outlined in the CNSC's *Uranium Mines and Mills Regulations*.

Before making licensing decisions on uranium mines, the Commission Tribunal seeks advice from CNSC experts in areas such as geology, radiation protection, chemistry, environmental science, human factors, seismic engineering, fire protection, waste management and emergency response.

In 2008–09, all mines and mills were inspected and some received up to eight visits by CNSC inspectors.

EXISTING MINES AND MILLS

Operating licences for uranium mines and mills are issued for specific time periods, usually from two to five years. Renewals of existing licences and all proposals for new mining and milling activities require Commission Tribunal approval.

During 2008–09, the licences for Cameco's three mines or mill complexes were renewed for five years, expiring on October 31, 2013.

As noted in last year's CNSC Annual Report, Cameco proposed an expansion of its Key Lake facility to increase its annual production of uranium oxide from 18 million to 22 million pounds. The regulatory process for this expansion remains on hold until improvements are made to the mill's effluent treatment systems. (Improvements will reduce the level of contaminated effluent.) The CNSC considers expansion programs when existing operations are able to demonstrate that their emissions are adequately controlled. The research and plant improvements continued with some good successes in 2008–09, and those will be reported back to the Commission Tribunal and stakeholders in the coming year.

Uranium mines and mills

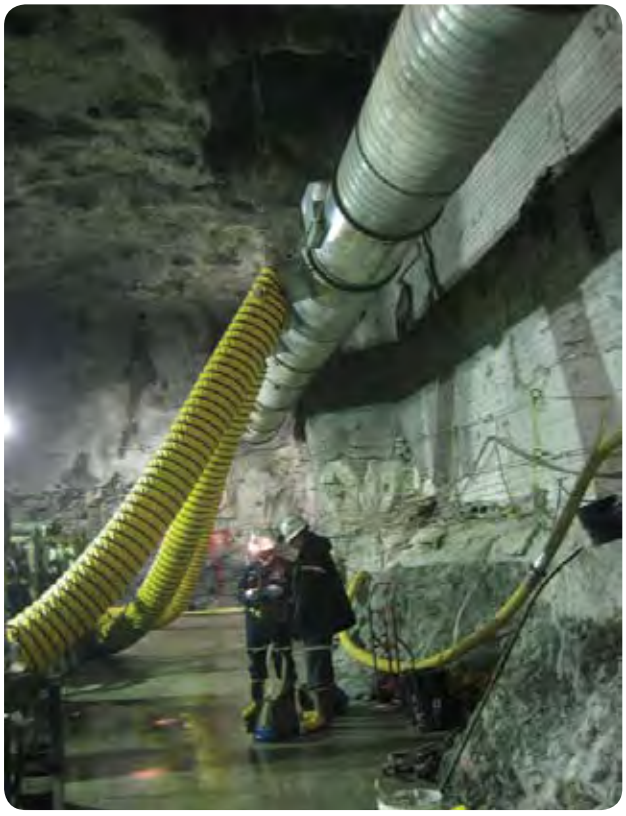
The CNSC oversees the regulation of all uranium mines and mills across Canada.

Despite effluent treatment issues at the Key Lake site, other provisions and enhanced monitoring are in place to ensure the environment is being protected and that effluent limits continue to be respected.

The CNSC continued to monitor other existing uranium mines to ensure compliance with regulatory and licence requirements. The organization also ensured that findings were accurately reported to the Commission Tribunal as well as to stakeholders, local Aboriginal communities and other interested parties.

The CNSC worked with Environment Canada to report on releases of uranium into the environment at a number of Canadian uranium mines. Based on the report's findings, a number of actions were taken. For example, the Commission Tribunal added a licence condition for Cameco's Rabbit Lake facility that has resulted in reduced uranium releases to the environment at the operation by 85 percent.

The CNSC continues to monitor Cameco's implementation of its action plans for the Cigar Lake uranium mining facility, which was flooded in October 2006. The partially dewatered main shaft was re-flooded in Summer 2008, extending the mine rehabilitation.



Water is pumped out of an underground uranium mine.

Onsite monitoring included CNSC inspections at McClean Lake, Rabbit Lake, McArthur River, Key Lake and Cigar Lake facilities, and inspections at the decommissioned uranium mine facilities at Cluff Lake and Beaverlodge.

NEW MINES

The past several years have seen significant uranium exploration in Canada from coast to coast, resulting in greater public interest about the safety of uranium mining. The Provinces of British Columbia and Nova Scotia have imposed multi-year moratoriums that temporarily prevent uranium exploration and mining. While the CNSC does not regulate exploration activities, its expert advice on the safety of uranium mining is often sought during public information outreach sessions, such as those held in New Brunswick during 2008–09.

The CNSC has received two applications from mining companies expressing interest in establishing new mining operations: in northeastern Québec (Matoush), and to the far north in Nunavut (Kiggavik).

Strateco—Matoush

The CNSC received an initial application and project description for the Matoush project in November 2008. The CNSC met with Strateco Resources to discuss the EA process under the James Bay and Northern Québec Agreement and to discuss the application submitted by Strateco for the Matoush project's underground exploration program.

The CNSC also prepared a letter asking Strateco to demonstrate how their submission addresses the regulations that apply to preparing the site, constructing the exploration ramp and conducting an underground exploration program.

The CNSC provided comments on the draft EA Guidelines to the COMEV (the tripartite committee under the James Bay and Northern Québec Agreement that prepares EA Guidelines). The CNSC also met with the Cree Regional Authority to provide an information session on the CNSC's mandate and regulations.

AREVA Resources Canada—Kiggavik

In January 2009, the CNSC received a submission from AREVA Resources Canada about an application for the Kiggavik project. The CNSC performed a review of the application, sent its assessment back to AREVA, and provided input to help the Nunavut Impact Review Board screen the project proposal.

Cameco's Rabbit Lake facility in northern Saskatchewan includes a uranium mill complex (in foreground) and a workers' camp residence (top).

DECOMMISSIONED MINES

The CNSC regulates more than 20 decommissioned tailings management sites associated with closed uranium mining facilities.

Tailings consist of ground rock and process effluents that were generated in mills normally associated with mines. Mechanical and chemical processes extracted the uranium from the mine ore and produce waste known as tailings. The unrecoverable and uneconomical metals, minerals, chemicals, organics and process water were discharged, normally as slurry, to a final storage area, commonly known as a tailings management facility or tailings storage facility.

Canada's tailings management sites, commonly referred to as legacy mines, are the result of uranium mining activities that took place in various parts of the country from the early 1930s to the 1990s. These sites no longer operate, and the owners are responsible for monitoring them and for any work that may be required to protect public health and safety, and the environment. They are currently overseen by the CNSC through the organization's waste facility licences or are in the process of obtaining a CNSC licence.

Various environmental monitoring programs and environmental or ecological risk assessments for specific sites have also been undertaken. These will continue at decommissioned sites and the remaining waste facilities to confirm that they are complying with regulations and their licences.

INDUSTRY PERFORMANCE

The uranium mining industry in Canada employs about 5,000 people and is a leading employer of Aboriginal people, making it a major economic contributor in Canada. The sector is also responsible for approximately 5,800 spin-off jobs. Given the extent of employment in these highly industrial operations, occupational health and safety of the uranium mining sector is an important indicator of the industry's performance.

Lost time incidents

Lost time incidents (or LTIs, also called lost time accidents or injuries) occur when workers become injured and lose time from work. Provincial workers' compensation boards compile LTI statistics for major industries as a conventional health and safety measure.

Uranium mines in Saskatchewan are categorized as underground, hard rock mines. Table 2 shows a sample of industries in Saskatchewan and the percentage of workers in each who were injured with time loss from 2004 to 2007. As the table reveals, no uranium mining category exceeded the average percentage of industries shown.

Table 2: Inter-industry comparison of LTIs in Saskatchewan from 2004 to 2007

Industry description	% of workers injured with time loss			
	2004	2005	2006	2007
Open pit mining (includes McClean Lake)	0.84	0.94	0.68	1.08
Underground soft rock mining	1.58	1.32	1.22	1.39
Underground hard rock mining*	2.02	2.15	3.17	2.79
Construction trades	8.67	9.28	7.53	7.19
Automotive service shops towing	4.39	4.71	3.87	3.72
Operation of oil wells	1.11	0.89	0.82	1.21
Servicing of oil wells	5.43	5.53	4.44	3.74
Conventional logging	8.54	21.66	21.83	32.03
Mechanical logging	3.18	4.24	3.29	2.19
Refineries/upgraders	1.18	1.14	1.15	0.78
Machine shops	12.80	14.32	12.87	11.15
Government of Saskatchewan	3.73	3.54	3.75	3.02
Average >	4.46	5.81	5.39	5.86

Uranium mining is well below average for lost time incidents.

Source: Saskatchewan Workers' Compensation Board – Statistical Supplement

*In the classification of mines in Saskatchewan, the uranium mines are grouped as hard rock mines. This grouping also includes an underground gold mine, the Seabee Mine. In looking at data from the Saskatchewan Mining Industry Accident Summaries, LTIs at this gold mine are four to five times the frequency of those at uranium mines. The inclusion of this gold mine in the hard rock mining classification increases the percentage of workers injured with time loss for this category. Therefore, the uranium mines alone would compare even more positively to other industries indicated in the inter-industry comparison table.

The inter-industry comparison of LTIs shows open pit mining, which includes the McClean Lake operation at less than 1 percent of workers injured with time loss. Underground hard rock mining, which includes the Rabbit Lake and McArthur River underground mines, shows approximately 2 percent of workers injured with lost time. These figures compare favourably to figures for construction trades, conventional logging, refineries, machine shops, and the Government of Saskatchewan—indicating the strength of the occupational health and safety programs for Saskatchewan uranium mines versus those of other industries.

The Canadian uranium mining industry is a leading employer of Aboriginal people.

REPORTABLE EVENTS

Licensees are required to notify the CNSC of significant events or situations that are outside the normal operations described in their licensing documents or because of public interest. While characterized as *significant* in regulatory terms, such events rarely, if ever, result in significant effects on the health and safety of people or the environment. Significant events are reported via Significant Development Reports (SDRs).

To assess the overall regulatory performance of Saskatchewan uranium mines, the CNSC undertook an analysis of reportable events over the last five years, with the following highlights:

- Three of the inactive mine sites (Cluff Lake, Midwest and Beaverlodge) had no reportable events in the last year. During the full-site decommissioning work at Cluff Lake, there were nine reportable incidents over the previous four years.

Two CNSC inspectors from the CNSC's Saskatoon office, along with a Cameco radiation protection technician, perform radiation protection sampling in an underground uranium mine.

- All sites showed a 25- to 75-percent decrease in reportable events over the last two years. For 2008, there were 29 reportable events for the five operating sites, 10 of which were from Key Lake and 5 from Rabbit Lake. For comparison, there were 68 reportable events in 2007, 15 of which were from Key Lake and 29 from Rabbit Lake.
- In total, for the five active sites (McClean Lake, McArthur River, Key Lake, Rabbit Lake and Cigar Lake), there have been 11 SDRs over five years, with Key Lake contributing 5 of those 11. For 2008, however, there were only two SDRs for the five active sites. None of these SDRs had an impact to the health and safety of workers or the environment.

Canada's uranium mining industry employs about 5,000 people.

Nuclear Processing and Research Facilities

An important part of Canada's nuclear sector

The CNSC regulates several facilities that process nuclear substances or use them for research. These include uranium processing facilities, fuel fabrication facilities, and non-power reactors used for scientific purposes or to create medical radioisotopes.

The TRIUMF facility at the University of British Columbia is one of the world's leading subatomic physics laboratories, where advanced research is performed in nuclear medicine, materials science and information technology.

FASTFACTS

UO_2

UO_2 is used to manufacture fuel for CANDU reactors.

10

Canada has 10 research reactors with operating licences.

2

Two major research facilities in Canada use high-power particle accelerators.

4

Canada has four major isotope processing facilities.

Canada's nuclear sector includes many nuclear facilities that perform different types of processing and research. At uranium processing facilities, uranium ore concentrate—commonly referred to as yellowcake—is refined and processed to create fuel bundles for nuclear power plants. Nuclear research reactors and accelerators are used for research into innovative medical and industrial uses of nuclear technology (including research into the power reactors of the future), as well as for training, materials testing, and producing radioisotopes for medical purposes. Licensees who operate these facilities include universities, private corporations and government agencies.

THE CNSC'S ROLE

The CNSC licenses nuclear substance processing and research facilities following the *Class I Nuclear Facilities Regulations* and other regulations under the NSCA. The CNSC's expert staff regularly visit licensed facilities to ensure compliance with regulations and ensure that facilities are operated safely and securely.

PROCESSING URANIUM FOR REACTOR FUEL FABRICATION

Uranium processing for fuel fabrication in Canada happens in many stages at several facilities in Ontario. Cameco Corporation's uranium refinery in Blind River receives uranium ore concentrate from uranium mills and purifies it using a process called solvent extraction to produce high-purity uranium trioxide (UO_3) powder. This powder is shipped to Cameco's Conversion Facility in Port Hope to convert it to uranium dioxide (UO_2), which is used to manufacture CANDU reactor fuel and uranium hexafluoride (UF_6). The UF_6 is exported for further processing into fuel for other types of reactors.

Cameco ships the UO_2 powder to two fuel manufacturing facilities that produce fuel bundles for CANDU reactors. One of them, Cameco Fuel Manufacturing Inc., is also located in Port Hope. The other facility is owned and operated by GE-Hitachi Nuclear Energy Canada Inc. GE-Hitachi's fuel manufacturing operations are performed at two plants: one that makes fuel pellets in Toronto, and the other that makes fuel bundles in Toronto.

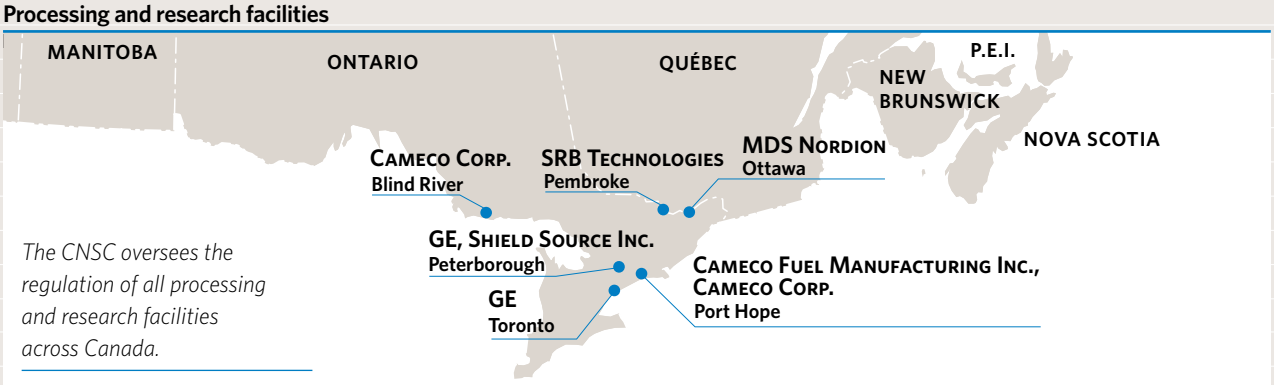
Due to a long history of uranium-processing and fuel-fabrication concerns in the Port Hope community, the CNSC continues to inspect and ensure regulatory compliance in areas such as environmental protection, radiation protection, fire safety, and operational safety and security. The CNSC provides particularly careful regulatory oversight of these facilities.

At the Commission Tribunal meeting in Ajax, Ontario, on December 11, 2008, Cameco presented an information update on contamination beneath its UF_6 plant at the Port Hope uranium conversion facility. Cameco provided information about the contamination and stated that the flow of contaminated groundwater had been contained and the conditions that led to the contamination had been resolved. The CNSC continues to closely monitor Cameco's site-wide environmental investigation.

In conjunction with the Port Hope Area Initiative, Cameco's proposed Vision 2010 project will aim to improve the existing environmental contamination in and around the industrial complex that makes up the uranium processing facilities. These issues are described in further detail on page 58 of this report.

In addition, the CNSC continues to interact with the Port Hope community through stakeholder meetings, public information sessions, direct correspondence with the general public and through the media.

Processing and research facilities



The CNSC oversees the regulation of all processing and research facilities across Canada.

MAINTAINING SECURE RESEARCH FACILITIES

There are various types of nuclear facilities across Canada, used for scientific research and radioisotope production for medical and industrial uses. Of particular importance are non-power reactors and particle accelerators.

Most Canadian nuclear research facilities emit small or negligible effluents to the environment. The protection of workers and the public immediately around the facilities is the main focus of the CNSC's regulatory and safety programs, and nuclear research facilities are subjected to rigorous inspection and licensing requirements.

The CNSC applies a flexible and specific approach to these facilities that ensures safety is never compromised, but that also recognizes and accommodates the uniqueness of the research environment. As an example, the CNSC has provided regulatory guidance for various proposals received from facilities that wish to use alternative methods to produce Molybdenum-99, the most common nuclear medicine product in the world.

RESEARCH REACTORS

Non-power reactors are commonly called research reactors. There are currently 10 research reactors in Canada that are operating or in a shutdown state. Four of them, the National Research Universal (NRU), the Zero Energy Deuterium (ZED-2) and the two MAPLE reactors, are at AECL's Chalk River Laboratories, and the remaining six are at universities (University of Alberta, Edmonton; Royal Military College of Canada, Kingston; École Polytechnique, Montréal; Saskatchewan Research Council, Saskatoon; Dalhousie University, Halifax; and McMaster University, Hamilton).

These reactors continue to play essential functions serving the scientific and academic communities and providing technological solutions and isotopes for medical and other applications. In comparison, there are about 280 such civilian reactors operating in 56 countries around the world. Russia has the most research reactors (62), followed by the United States (54), Japan (18), France (15) and Germany (14).

Other research reactors that are shut down or decommissioned are still subject to regulatory oversight by the CNSC.

In addition to maintaining high standards for ensuring the safety of Canadian research reactors, the CNSC continues to be active in achieving full compliance with the IAEA's *Code of Conduct on the Safety of Research Reactors,* the international voluntary standard.

Accelerators

A particle accelerator is a special type of nuclear facility for creating, using and studying high-energy, sub-atomic particles. Two major research facilities in Canada use high-power particle accelerators: TRIUMF, a multi-university research centre in Vancouver, BC; and Canadian Light Source Inc. at the University of Saskatoon, Saskatchewan. TRIUMF produces a wide variety of isotopes and is used for astronomical and material studies, and Canadian Light Source provides ultra-bright and pure lights for material studies and medical applications.

Nuclear substance processing

Canada is a significant contributor to the world supply of nuclear substances for industrial and medical purposes. Major facilities of this type currently operating include:

- MDS Nordion, a division of MDS (Canada) Inc., located in Ottawa, Ontario, processes nuclear isotopes for health and life sciences and manufactures sealed sources for industrial applications. A sealed source is a radioactive substance that is sealed in a container and may be used in medical, academic and industrial applications.
- Shield Source Inc., located in Peterborough, Ontario, and SRB Technologies (Canada) Inc., located in Pembroke, Ontario, process tritium gas to produce a wide range of self-illuminating safety signs and also to manufacture radiation devices. Both facilities receive tritium gas—harvested as a waste by-product from Canadian power reactors—that is inserted into phosphorous-lined glass tubes. These devices are used as exit signs in public buildings or airplanes and glow in the dark so exits can be seen during electrical outages.

INDUSTRY PERFORMANCE

Lost time incidents

Lost time incidents (LTIs) occur when workers become injured and lose time from work. Provincial workers compensation boards compile LTI statistics for major industries as a conventional health and safety measure. Table 3 summarizes the results of LTIs for Canada's nuclear processing and research facilities from 2004 to 2008.

TR cyclotrons are negative ion cyclotrons designed for rapid, reliable and high-yielding production of some radioisotopes for the biomedical community.

Table 3: Lost time incidents for Canadian nuclear processing and research facilities

	2004	2005	2006	2007	2008
Chalk River Laboratories	4	1	3	1	4
Cameco Corp, Blind River	0	1	1	0	0
Cameco Corp, Port Hope	5	0	0	1	0
Cameco Fuel Manufacturing Inc. (formerly Zircatec Precision Industries Inc.)	0	0	0	1	0
Canadian Light Source	n/a*	n/a	n/a	n/a	n/a
Royal Military College of Canada (Slowpoke facility)	n/a	n/a	n/a	n/a	n/a
École Polytechnique de Montréal (Slowpoke facility)	n/a	n/a	n/a	n/a	n/a
General Electric, Peterborough	0	0	0	0	0
General Electric, Toronto	0	0	0	2	0
McMaster University (High-power research reactor)	0	2	0	1	1
MDS Nordion	n/a	1	0	1	1
Saskatchewan Research Council (Slowpoke facility)	n/a	n/a	n/a	n/a	n/a
Shield Source Inc.	n/a	0	0	0	0
SRB Technologies (Canada) Inc.	2	1	1	0	0
TRIUMF	3	3	2	2	2
University Of Alberta (Slowpoke facility)	n/a	n/a	n/a	n/a	n/a
Dalhousie University (Slowpoke facility)	n/a	n/a	n/a	n/a	n/a

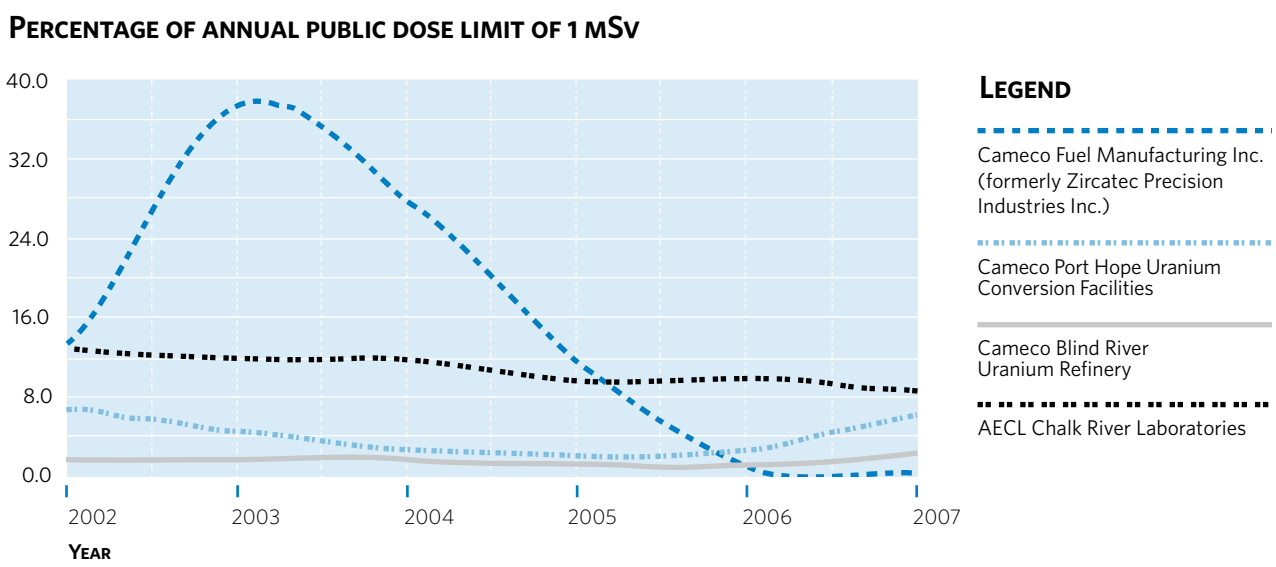
Note: n/a indicates that data was unavailable at the time of the report.

Canada's nuclear processing and research facilities experienced few LTIs from 2004 to 2008.

Radiation protection

Figure 5 on the following page shows the average public doses for four Canadian major nuclear processing and research facilities as a percentage of the annual public dose limit of 1 mSv. From 2002 to 2007, radiation dose levels for members of the public were well below regulatory limits.

Figure 5: Radiation doses to members of the public from 2002 to 2007 from four major processing and research facilities



Note: The decreasing doses at Cameco Fuel Manufacturing (Zircatec) were mainly due to the construction of a berm near the storage building in 2005–06 and to less production and activity compared to the previous years.

Radiation doses for members of the public were well below regulatory limits between 2002 and 2007.

Chalk River Laboratories

Chalk River Laboratories, owned and operated by Atomic Energy of Canada Limited (AECL), is the most complex nuclear site in the country. Activities and facilities encompass non-power reactors, isotope production, fuel fabrication and research, tritium processing, waste management and waste treatment, decommissioning projects, new facilities projects, Class II nuclear facilities and numerous laboratories handling nuclear substances. The site's NRU reactor has been a major part of Canadian nuclear research and is one of the largest and most versatile research reactors in the world.

The NRU reactor has three purposes:

- It supplies industrial and medical radioisotopes used for diagnosing and treating life-threatening diseases.
- It is a major Canadian facility for neutron physics research.
- It provides engineering research and development support for CANDU power reactors.

The NRU leads the world in the production of life-saving medical isotopes that benefit millions of people around the world each year. The CNSC has onsite staff who monitor the Chalk River Laboratories facilities, including the NRU reactor, to ensure that they operate safely and in compliance with regulatory requirements.

NRU: Lessons learned about isotope production

In late 2007, a licensing concern related to the NRU reactor in Chalk River resulted in an extended shutdown. This caused public concern that there would be shortages of radioactive isotopes needed for medical diagnosis and treatment in Canada and around the world.

The Government of Canada took a number of actions to address the situation. In 2007–08, the CNSC and AECL commissioned an independent consulting firm to examine their respective performances, identify the underlying causes of the extended outage, and make recommendations for improvements in both organizations to prevent a repeat occurrence or similar situation. Talisman's report, including the CNSC's management responses, was posted on the CNSC Web site on July 28, 2008, where information about the NRU situation is updated on a regular basis.

This lessons-learned report outlined 15 summary and 66 detailed recommendations (41 applicable to the CNSC), which both the CNSC and AECL fully accepted. The CNSC immediately initiated corrective actions.

As of March 31, 2009, all NRU-specific actions had been closed, along with 28 broader action items. Other progress includes the signing of a new protocol for communication between the CNSC and AECL, a problem-resolution process, and the development

and implementation of a system to track NRU regulatory commitments. Thirteen other action items have been incorporated as part of the CNSC's Harmonized Plan for Improvement Initiatives. Work on the Harmonized Plan is progressing and focusing primarily on clarifying and strengthening the CNSC's broader licensing, inspection and enforcement processes.

The NRU reactor in the media

In December 2008, there were media reports of two separate leaks at the NRU reactor. AECL is required to continuously monitor for leaks from the NRU reactor's cooling system and to take prompt action if a leak is detected. In this case, AECL delayed restarting the reactor until the leak was investigated. Any water resulting from the leak was placed in storage tanks before being sent to the Waste Treatment Centre at Chalk River Laboratories. As required, AECL officially notified the CNSC by submitting a preliminary report within 24 hours of the event.

The CNSC took steps to ensure the public remained confident in the nuclear regulatory regime, including making updates to its Web site. AECL and CNSC staff provided information about these leaks at the February 19, 2009 CNSC public meeting. The CNSC President also appeared before the Standing Committee of the House of Commons on Natural Resources to reiterate that Canadian nuclear facilities are safe—otherwise the CNSC would not license them to operate—and that the CNSC regulatory framework makes safety the number one priority.

At no time were the public or the environment at risk from the two leaks.

Reportable events

Licensees are required to notify the CNSC of significant events or situations that are outside the normal operations described in their licensing documents or because of public interest. While characterized as *significant* in regulatory terms, such events rarely, if ever, result in significant effects on the health and safety of people or the environment. Significant events are reported via Significant Development Reports (SDRs).

Table 4 shows the number of events that AECL reported to the CNSC for the Chalk River Laboratories site from 2004 to 2008. The number of SDRs presented to the Commission Tribunal is also listed. There were no events with consequences to public health or the environment.

Table 4: Chalk River Laboratories reportable events

	2004	2005	2006	2007	2008
Reportable events*	49	69	151*	202	186
Significant Development Reports	2	3	1	1	2

*Reporting requirements for Chalk River Laboratories were changed under its October 2006 licence renewal, explaining the increase in the number of events reported since then.

None of the events that AECL reported to the CNSC, from 2004 to 2008, had consequences for public health or the environment.

Public interest triggered the two SDRs listed in 2008:

- **SDR No. 2008-5, CMD 08-M35: May 2008**
  AECL announcement to discontinue development of the MAPLE reactors
- **CMD 09-M7: February 2009**
  Update regarding media reports dealing with heavy water leak on December 5, 2008, and ongoing reflector leaks at the NRU research reactor

The December 2008 heavy water leak event was sent as a Significant Development Report to the Commission Tribunal.

The NRU reactor has been a major part of Canadian nuclear research. For updates on the CSNC's regulatory oversight, visit nuclearsafety.gc.ca

Nuclear Power Plants

Regulated for safety

The CNSC regulates all nuclear power plants in Canada throughout their lifecycle and encourages licensees to not only meet applicable standards, but to exceed them, to make them as safe as possible for Canadians and the environment.

The Darlington Nuclear Generating Station, located in Bowmanville, Ontario, began operating in 1988.

FASTFACTS

15%

Nuclear power plants generate about 15 percent of Canada's electricity.

20

Canada currently has 20 operating nuclear power reactors.

16

The CNSC conducted 16 Type I inspections at Canadian nuclear power plants in 2008–09.

300

More than 300 different inspections were performed by CNSC inspectors at Canadian nuclear power plants in 2008–09.

Nuclear power plants (NPPs), also called nuclear generating stations, have been operating in Canada since the early 1970s. NPPs generate approximately 15 percent of electricity in Canada, 51 percent in Ontario, 30 percent in New Brunswick and 3 percent in Québec.

THE CNSC'S ROLE

The CNSC regulates the entire lifecycle of NPPs and every aspect of their operation. The licensing process for NPPs follows the stages laid out in the *Class I Nuclear Facilities Regulations* and the *General Nuclear Safety and Control Regulations*: site preparation, construction, operating, decommissioning, and abandonment.

At each licensing stage, the CNSC determines if the licence applicant is qualified and has made adequate provisions to protect the environment, the health and safety of persons, and national security. For new facilities or for major projects such as refurbishments, Environmental Assessments (EAs) are carried out to determine foreseeable risks and to identify measures to lessen those risks. Applicants must also meet the requirements for Canada's international obligations for the peaceful use of nuclear energy.

The CNSC does more than require licensees to meet applicable standards. It also encourages them to exceed standards so that stations will be as safe as possible for Canadians.

CNSC staff reviews all applications for operating licences, including renewals and amendments, to assess licensees' qualifications to safely operate a nuclear generating station. Applications and CNSC staff recommendations are then presented to the Commission Tribunal. If satisfied that the proponent is qualified and will make adequate provisions to protect the health, safety and security of Canadians and the environment, the Commission Tribunal may issue a licence appropriate for the facility. CNSC operating licences are issued for closed terms and are renewed on the basis of how well the licensee complies with the terms of the licence.

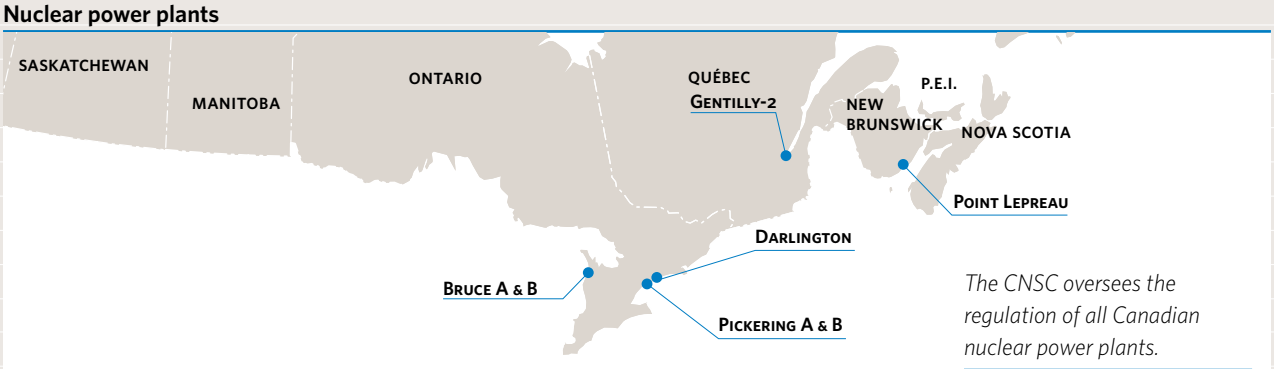
Currently, Canada has NPPs on five sites, with 22 reactors (two of which are permanently shut down). These include reactors in full commercial operation, reactors undergoing refurbishment and those in extended shutdown. Should the provinces choose to advance new nuclear projects (new builds), additional reactors may result.

ENSURING SAFETY TODAY —EXISTING REACTORS

The CNSC provides regulatory oversight for reactors in full commercial operation. Specifically, CNSC staff assesses the performance of NPPs against CNSC regulations and particular operating licence conditions. The CNSC also oversees how licensees implement programs in the following areas: operating performance, performance assurance, design and analysis, equipment fitness for service, emergency preparedness, environmental protection, radiation protection, site security, and safeguards. CNSC staff review events, investigate situations in which licensees have not complied with regulations, and monitor how licensees implement corrective actions when addressing deficiencies.

The CNSC maintains regulatory oversight through its licensing and compliance programs administered by CNSC headquarters employees and by onsite inspectors. The CNSC has full-time staff at each NPP who regularly verify that licensees are complying with regulatory requirements and the specific conditions of their licences. In addition, other CNSC employees with specialized technical expertise regularly visit each NPP to verify more specifically that licensees are complying.

Nuclear power plants



The CNSC oversees the regulation of all Canadian nuclear power plants.

The Bruce Power site is located in Tiverton, Ontario.

In 2008–09, the CNSC NPP compliance activities included 16 Type I inspections (audits), 312 Type II inspections (snapshot inspections that are less comprehensive than Type I inspections), and 220 documentation reviews. Results were communicated to licensees, and any issue of non-compliance received appropriate CNSC attention and follow-up. These actions ensured that licensees corrected the situation and that the health and safety of Canadians was not compromised.

Refurbishments

After about 25 to 30 years of operation, an NPP's life may be extended for another 25 to 30 years if it is refurbished. This type of project represents a continued long-term commitment to the facility and may involve replacing or refurbishing major plant components, substantially modifying the plant, or both. Refurbished NPPs need to meet modern standards as much as possible, with a focus on safety improvements.

Refurbishments undergo a rigorous assessment process. The licensee may be required to conduct an EA to identify the effects that a refurbishment would have on the environment and propose measures to counter any such effects. Licensees are also required to carry out an Integrated Safety Review (ISR) in accordance with the guidelines issued by the International Atomic Energy Agency (IAEA) for Periodic Safety Reviews.

An ISR identifies elements essential for safety and evaluates the plant's current state, operations and performance. It considers a company's operating experience in Canada and around the world, examines research and development activities as well as technology advances, and identifies reasonable and practical modifications to the plant's systems, structures, components and project management.

Following these assessments and reviews, licensees will propose plans for their plant's refurbishments. CNSC staff will consider the submissions and make recommendations to the Commission Tribunal about whether to amend operating licences to include refurbishments.

The following refurbishment activities took place during 2008–09:

Ontario

Bruce A

- CNSC staff reviewed Bruce Power's ISR for Bruce A (Units 1 and 2).
- Bruce A (Units 1 and 2) refurbishment was underway.
- Bruce Power is currently reviewing plans to refurbish Bruce A (Units 3 and 4).

Darlington

- Ontario Power Generation (OPG) has informed the CNSC that it is targeting the end of July 2009 to resubmit a draft ISR proposal. OPG expects to spend about two years preparing the ISR before submitting it for CNSC review.

Pickering B (Units 5 to 8)

- OPG submitted all reports to support its ISR, and the CNSC completed its reviews. OPG plans to submit the final ISR report and Global Assessment in fall 2009 for CNSC review and acceptance.
- The Commission Tribunal accepted the results of the EA Screening of the Pickering Nuclear Generating Station B Refurbishment and Continued Operations Project following a public hearing that ended on December 10, 2008.

Québec

Gentilly-2

- The CNSC has received notice from Hydro-Québec of its plans to refurbish the Gentilly-2 nuclear generating station in order to extend the station's operation to 2035.
- Refurbishment is expected to begin sometime in 2011 if approved by the Commission Tribunal.

New Brunswick

Point Lepreau

- New Brunswick Power Nuclear was authorized by the Commission Tribunal to refurbish the Point Lepreau reactor to extend its operation to 2030. It is expected to return to service in 2009, subject to Commission Tribunal approval.

Decommissioned power reactors

The Douglas Point, Gentilly-1 and Nuclear Power Demonstration power reactors are shut down, partially decommissioned and in the storage-with-surveillance phase. As these facilities contain radioactive materials, including radioactive waste from decommissioning activities, they are licensed as waste management facilities. More information on other waste management facilities can be found in the Waste Management section on page 54.

INDUSTRY PERFORMANCE

Nuclear power plant ratings and performance summary

Every year, the CNSC publishes a report on the safety performance of Canada's operating NPPs. The *CNSC Staff Integrated Safety Assessment of Canadian Nuclear Power Plants* (formerly entitled the *Annual CNSC Staff Report on the Safety Performance of the Canadian Nuclear Power Industry* and abbreviated to the "NPP Report") evaluates how well licensees are meeting regulatory requirements and CNSC expectations as they implement of their programs.

The evaluations in the NPP Report are based on information gathered through CNSC monitoring, inspections, event reviews, general surveillance, document assessments and performance indicators.

The 2008 NPP Report has undergone some changes to clarify it and to make the underlying assessment more process based. This year and going forward, the CNSC is adopting a risk-informed decision-making approach to determine NPP safety ratings. This new approach combines all findings over the year and introduces an integrated plant rating. This will allow the CNSC to better identify and monitor NPPs' performance trends over time.

Rating categories for this year's report have been renamed (see Table 5). The NPP Report previously used a five-level letter grading system with ratings of A, B, C, D and E. Starting with this year's report, there are four levels and ratings: Fully Satisfactory (FS), Satisfactory (SA), Below Expectations (BE) and Unacceptable (UA).

Table 5: New and previous ratings for the CNSC's NPP Report

NEW RATING	PREVIOUS RATING
Fully Satisfactory (FS)	
Performance meets or exceeds CNSC requirements and expectations. Striving for excellence should continue to be the goal.	A: Exceeds Requirements
Satisfactory (SA)	
Performance meets CNSC requirements and expectations. Some improvements could be undertaken.	B: Meets Requirements
Below Expectations (BE)	
Performance has deteriorated and fallen below expectations or programs deviate from the intent or objectives of CNSC requirements. Improvements are required.	C: Below Requirements
Unacceptable (UA)	
Performance is unacceptable to the extent that overall plant performance is undermined. Immediate corrective actions are required.	D: Significantly Below Requirements E: Unacceptable

2008 NPP performance summary

As a result of their assessments, CNSC staff concluded that NPPs in Canada operated safely during 2008.

- There were no serious process failures at the NPPs.
- No worker at any NPP, or member of the public, received a radiation dose above the regulatory limits.
- No environmental releases from the plants were above regulatory limits.
- Canada was able to meet its international obligations regarding the peaceful use of nuclear energy.

2008 NPP integrated plant ratings

NPP	OVERALL PLANT RATING
Bruce A	Fully Satisfactory
Bruce B	Fully Satisfactory
Darlington	Fully Satisfactory
Pickering A	Satisfactory
Pickering B	Satisfactory
Gentilly-2	Satisfactory
Point Lepreau	Satisfactory

The complete 2008 NPP Report, along with comparable reports from previous years, is available at nuclearsafety.gc.ca

Understanding worker safety

The CNSC monitors NPPs to ensure worker safety standards are met. One key indicator is a plant's accident severity rate, which measures the total number of days lost due to injury for every 200,000 person hours worked at the site. Figure 6 shows the average accident severity rates for NPPs from 2003 to 2008, demonstrating that NPP occupational health and safety practices are very safe for personnel. The overall trend decreased from 4.48 in 2003 to 2.39 in 2008.

REPORTABLE EVENTS

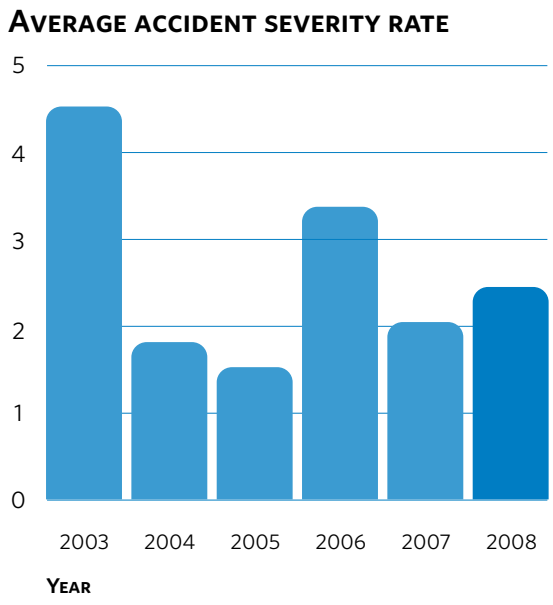
Licensees are required to submit operating reports to the CNSC according to their licence conditions and in line with *Reporting Requirements for Operating Nuclear Power Plants* (Regulatory Standard S-99). S-99 describes how a licensee may meet reporting requirements for operating NPPs derived from the *General Nuclear Safety and Control Regulations*, the *Class I Nuclear Facilities Regulations*, the *Radiation Protection Regulations*, and other reporting requirements set out in regulations or in licence conditions. It describes information that the CNSC requires and how, when and to whom the information is to be provided. The frequency of these submissions ranges from quarterly to annually. The CNSC analyzes licensee reports as another component in its evaluation of a facility's safety. These analyses aim to ensure that licensees have the proper processes in place for necessary corrective action and that they incorporate lessons learned into their ongoing operations.

Licensees are also required to notify the CNSC of significant events or situations that are outside the normal operations described in their licensing documents. While characterized as significant in regulatory terms, such events rarely, if ever, result in significant effects on the health and safety of people or the environment. This is because Canadian NPPs all have multiple layers of defence.

Where the CNSC determines that an event or situation may be significant, the event or situation is reported to the Commission Tribunal through a Significant Development Report (SDR).

The total number of S-99 reports provided by licensees, as shown in Figure 7, is a good indication that licensees have been thorough in their reporting. The declining number of SDRs over the last five years, as shown by Figure 8, indicates an improving trend in the number of significant events or situations that fall outside normal operations.

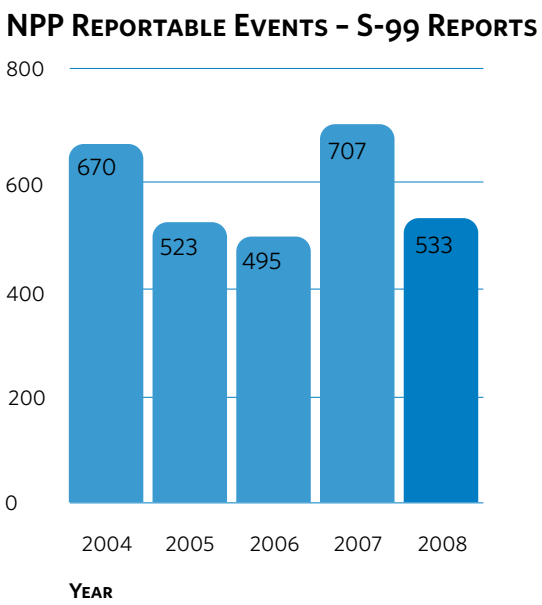
Figure 6: Worker safety



The average accident severity rate at Canadian NPPs showed a downward trend from 2003 to 2008.

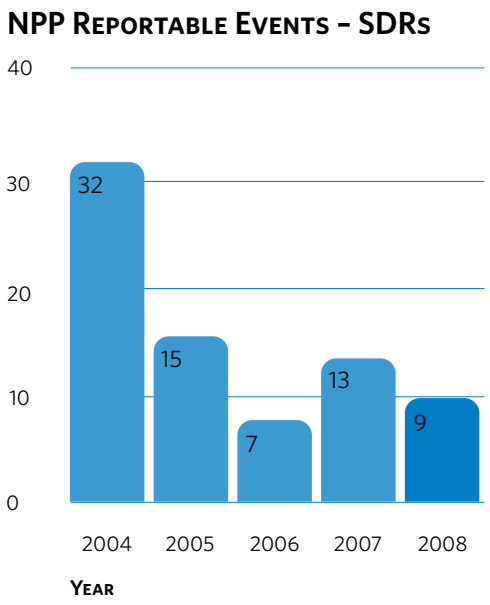
The Point Lepreau Nuclear Generating Station is located approximately 40 km west of Saint John, New Brunswick.

Figure 7: NPP reportable events – S-99 reports



Licensees were thorough in their reporting from 2004 to 2008.

Figure 8: Significant Development Reports for nuclear power plants

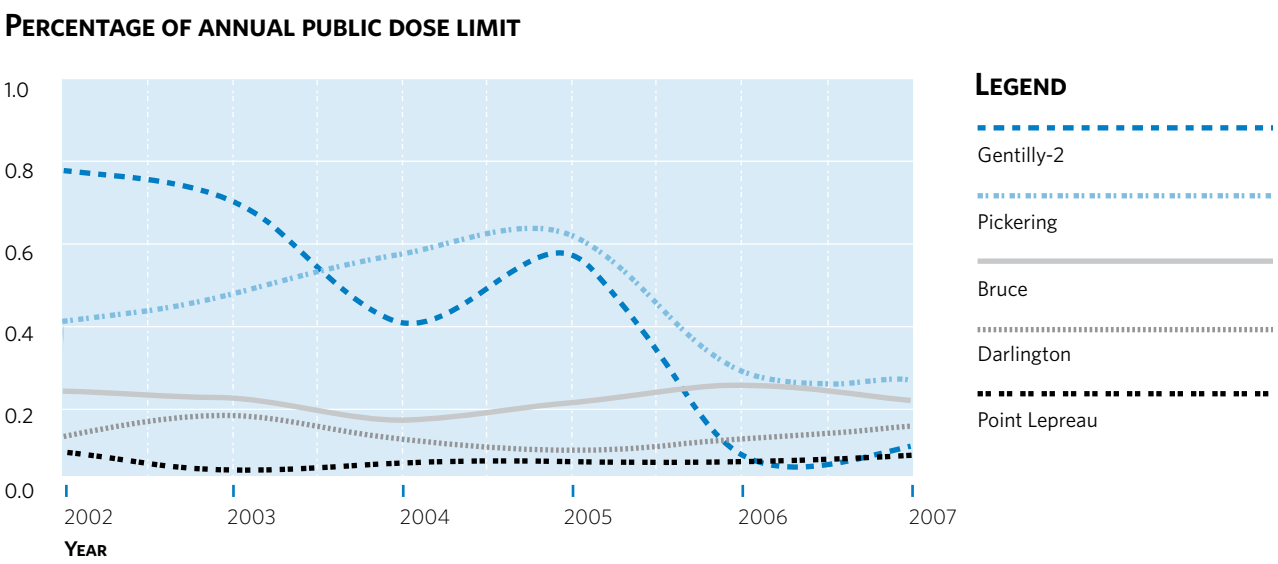


Significant Development Reports declined from 2004 to 2008, indicating improvements in preventing events that fall outside normal operations.

RADIATION PROTECTION

Figure 9 shows the average public doses from the five Canadian NPPs as a percentage of the public dose limit of 1 mSv. From 2002 to 2007, radiation dose levels for members of the public were well below the regulatory limits.

Figure 9: Public doses around NPPs as a percentage of annual public dose limit of 1 msv



Radiation doses for members of the public were well below regulatory limits from 2002 to 2007.

Performance indicators

The CNSC uses certain performance indicators to monitor a licensee's safety performance. These indicators can be used to measure an individual station's performance or the NPP industry's performance over time. Comparing station-to-station data in any particular year is difficult since many factors—such as the number of operating units, design, unit capacity and station governing documents—contribute to differences in performance indicator data. For a detailed look at the performance indicators used to monitor licensee safety performance, consult the complete 2008 NPP Report, available at nuclearsafety.gc.ca

ENSURING SAFETY FOR TOMORROW —NEW BUILDS

There has been much recent discussion about the need for new NPPs in Canada to meet a growing demand for electricity. These would be the first new NPPs in Canada since the 1980s. The CNSC is continuing its efforts to update its regulatory framework for nuclear NPPs and to draw upon international standards and best practices, should provinces choose to move towards nuclear power. During this fiscal year, the CNSC published *Design of New Nuclear Power Plants* (RD-337) and *Site Evaluation for New Nuclear Power Plants* (RD-346).

These regulatory documents complement *Safety Analysis for Nuclear Power Plants* (RD-310), which was released earlier in the year.

For licensing new NPPs, the CNSC has developed an approach that integrates assessment plans and staff review guides. This leading-edge regulatory practice guides and supports the CNSC's assessments of licence applications and EAs, and ensures appropriate and consistent reviews of all applications.

Bruce Power—Bruce site

Bruce Power's proposal to build and operate up to four new nuclear reactors (up to 4,000 MW) in Kincardine, Ontario, was the first major project to be referred to a Joint Review Panel (JRP) process under the NSCA and the CEAA.

The JRP, explained on page 28, allows for thorough public and Aboriginal participation and consultation, providing visibility and transparency throughout. The JRP Agreement signed by the President of the CNSC and the Minister of the Environment in August 2008 integrates licensing components into the EA process under the CEAA and facilitates efficient use of time and resources for all stakeholders.

The Pickering A and B Nuclear Generating Stations are located in Pickering, Ontario.

This project is also the first across the federal government to fall under the oversight of the Major Projects Management Office (MPMO). The MPMO provides all participants with a framework for keeping projects within set timelines and allows participating regulatory departments and agencies with to coordinate their respective regulatory reviews (including any EAs, if required) and approvals. This ensures that regulatory review of major projects can be carried out as effectively and efficiently as possible.

Ontario Power Generation—Darlington site

OPG has applied to build up to four new nuclear reactors (up to 4,800 MW) on the existing Darlington site. The federal Minister of the Environment announced in March 2008 that the Environmental Impact Statement (EIS) for the project would be referred to a JRP. The EIS Guidelines and the JRP Agreement were published in March 2009.

Bruce Power Alberta—Cardinal and Whitemud sites

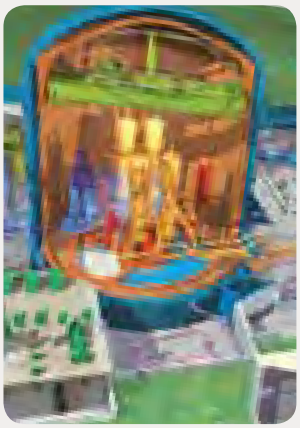
The CNSC received a letter from Bruce Power Alberta requesting to withdraw an application to prepare a site for the construction of a NPP. The proposed plant would have consisted of up to four new nuclear reactors (up to 4,400 MW) at Lac Cardinal, Alberta, about 30 km west of the town of Peace River and almost 500 km north of Edmonton. Bruce Power is currently evaluating a new site at Whitemud, about 30 km north of Peace River.

Bruce Power—Nanticoke site

The CNSC received the Bruce Power Erie Nanticoke project description and application for a licence to prepare site for two new nuclear reactors (up to 3,300 MW) on October 31, 2008. As of March 31, 2009, federal coordination was nearing completion and the CNSC was preparing to send a recommendation to the Minister of the Environment to pursue the EA as a Joint Review Panel.

Highlight 3

PRE-PROJECT VENDOR DESIGN REVIEWS FOR NEW NUCLEAR REACTORS



Pre-project reviews are underway for three reactor designs: AECL's ACR-1000, Westinghouse's AP1000, and AREVA's US-EPR.

Renewed interest in building nuclear reactors has spurred the development of various new designs. These designs may be presented as part of future applications for Canadian nuclear power plants. To date, Canada has only seen the construction of CANDU power reactors, so the CNSC must become familiar with and be ready to evaluate different technologies.

The CNSC has begun pre-project reviews of reactors from three vendors to determine if they would meet Canadian requirements. This will prepare the CNSC to evaluate applications for these reactors, should they be proposed in the future.

In the January 26, 2009 Speech from the Throne, the Government of Canada committed to ensuring Canada's regulatory framework would be ready to respond if the provinces chose to advance new nuclear projects. The CNSC is investing much effort to ensure its work is effective and efficient in meeting this demand.

Because of an increasing demand for nuclear power reactors around the world to keep pace with global electricity needs, vendors have been busy over the past several years working on new designs. These Generation III+ designs strive to produce less waste, increase safety and reduce costs.

In keeping with new design developments, the CNSC has also been updating its regulatory framework to reflect Canada's commitment to international standards and best practices, including International Atomic Energy Agency (IAEA) nuclear safety standards. The IAEA's standards set out high-level safety goals that apply to all reactor designs.

In response to possible demand in Canada for new builds, vendors are seeking the CNSC's opinion on whether their designs will meet Canadian regulatory requirements and safety specifications. In response, the CNSC is performing pre-project vendor design reviews for new nuclear power plant designs for AECL (ACR-1000 design), Westinghouse (AP1000 design) and AREVA (US-EPR design). These reviews are not licensing or certification activities. Reviews are offered in two optional phases that follow a clear and concise approach, with a defined scope and depth. The CNSC will inform vendors of the outcomes of each review phase in a final report.

PHASE I REVIEW

In this phase, the vendor submits documentation for CNSC review, demonstrating how a design meets the high-level requirements of *Design of New Nuclear Power Plants* (RD-337). It should be noted that this assessment is performed for only a limited number of agreed-upon topics and does not constitute a full review of the design.

The review's purpose is to ensure that regulatory expectations are understood and that vendors' statements of compliance for nuclear power plant designs reflect the intent of RD-337.

PHASE II REVIEW

The second phase goes into further details on the topics identified during Phase I, with a focus on identifying any potential fundamental barriers that would hinder licensing the vendor's NPP design in Canada.

Participating vendors are currently in various phases of pre-project design reviews:

- AECL (ACR-1000 design): Phase I is complete and Phase II is underway
- Westinghouse (AP1000 design): Phase I is underway
- AREVA (US-EPR design): Phase I is underway

The CNSC provides standardized pre-project vendor design reviews to provide clear and concise scopes of work and help vendors identify the level of service and timeframe they can expect from the CNSC. This approach demonstrates the CNSC's commitment to providing consistent, relevant reviews so that vendors know turnaround times, costs and reporting requirements. NPP designs are reviewed in depth as part of the CNSC's formal licensing process.

Waste Management

Safe, secure storage

All radioactive waste in Canada is stored safely and securely.

Radioactive waste in Canada is strictly regulated by the CNSC to ensure it poses no undue risks to people or the environment. Canadian government bodies and the nuclear industry are responsible for safely managing this waste, and the CNSC works with domestic and international partners to ensure Canada's regulatory regime meets international agreements.

FASTFACTS

4

Canada has four categories of radioactive waste: high-level, medium-level, low-level, and uranium mine waste, rock and mill tailings.

12

Canada has 12 licensed radioactive waste management facilities.

2002

The Nuclear Waste Management Organization was established in 2002.

160

OPG's proposed Deep Geologic Repository would manage about 160,000 m^3 of low- and intermediate-level waste.

The CNSC defines radioactive waste as any material (liquid, gaseous or solid) that contains a radioactive nuclear substance for which there is no use and that has been declared a waste product.

THE CNSC'S ROLE

The CNSC regulates and monitors the operation of Canada's radioactive waste management facilities to protect the health, safety and security of Canadians as well as the environment, and to respect Canada's international commitments on the peaceful use of nuclear energy.

The CNSC coordinates and implements policies, strategies and plans in collaboration with its federal and international partners and is dedicated to ensuring that historic, current and future nuclear waste is treated, handled and stored in a safe and secure manner.

Because of the wide variety of nuclear applications, the amounts, types and even physical forms of radioactive wastes vary considerably. Some wastes can remain radioactive for hundreds or thousands of years, while others may require storage for only a short period before they are disposed of by conventional means.

CATEGORIES OF RADIOACTIVE WASTE IN CANADA

High-level waste refers to the used nuclear fuel bundles discharged from reactors, and requires shielding and cooling.

Medium- or intermediate-level waste refers mostly to reactor components, filters and resins, and also requires shielding.

Low-level waste, which requires little to no shielding, includes used medical and industrial radioisotopes, contaminated clothing, rags, mops, tools, paper and other items.

Uranium mine waste rock and mill tailings are specific types of low-level radioactive waste generated during the mining and milling of uranium ore and production of uranium concentrate.

Industry organizations and long-term waste management

The Nuclear Waste Management Organization was established in 2002, in accordance with the *Nuclear Fuel Waste Act,* by OPG, Hydro-Québec and New Brunswick Power Nuclear to identify a strategy for the long-term management of Canada's nuclear used fuel.

Through the Low-Level Radioactive Waste Management Office, AECL is responsible for managing historic waste on behalf of the Government of Canada. Decommissioned uranium mine and mill sites are located in Ontario, the Northwest Territories and Saskatchewan.

All of these decommissioned sites are licensed by the CNSC. The owners are responsible for monitoring their sites, and for any future remedial work that may be required for the protection of public health and safety, and for the environment.

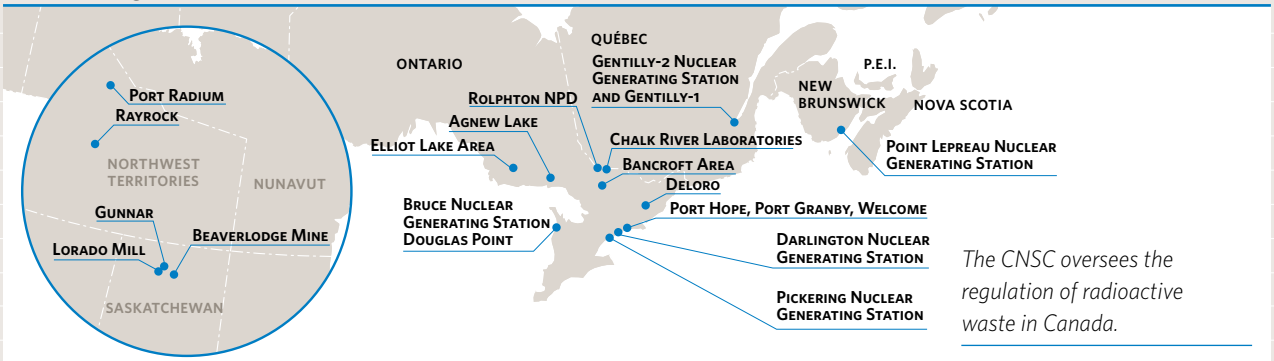
SECURE MANAGEMENT OF WASTE STORAGE

The CNSC regulates the management of radioactive waste to ensure that it will not pose undue risk to human health and the environment—now, or in future generations.

In Canada, all radioactive waste is placed in storage. Storage is a short-term management technique that requires human intervention for maintenance, monitoring and security, and that allows for recovery of the waste.

Radioactive waste is stored in above- or below-ground engineered structures. The management method used for a particular waste depends on the source and characteristics of the radioactive waste.

Waste management facilities



The CNSC oversees the regulation of radioactive waste in Canada.

A technician at a CNSC licensee facility inspects the storage of radioactive material in a cooling storage pool.

The used nuclear fuel from power reactors is stored at the reactor sites in storage pools enclosed by thick concrete walls that are lined with stainless steel. The water cools the fuel and blocks its radiation. After five or six years of cooling, the waste can be transferred to dry storage facilities made of concrete, which are located at the same reactor site.

Medium-level waste is stored in below-ground engineered structures such as tile holes or in-ground containers. These are storage cylinders encased in concrete and set vertically in the ground.

Most low-level waste is stored in above-ground (or just below-ground) engineered facilities like storage buildings or concrete bunkers.

Certain types of radioactive wastes, such as that from hospitals, universities, and industry, contain only small amounts of short-lived radioactive materials that decay quickly (in hours or days). After holding the waste until the radioactivity has decayed to CNSC-authorized acceptable levels, it can then be disposed of through conventional means.

Each facility in Canada that stores radioactive waste or spent fuel has a monitoring program to ensure it operates safely and will continue to do so. Samples are obtained at regular intervals at various locations around a site and analyzed for trends. The monitoring programs ensure that any radiation releases are detected and that steps are taken to control or stop any releases.

As a condition of their operating licences, licensees must submit the results of their monitoring programs to the CNSC at regular intervals.

DOMESTIC RESPONSIBILITY FOR RADIOACTIVE WASTE

Canadian government departments, agencies and the nuclear industry have clear roles and responsibilities to ensure the safe management of nuclear fuel waste and radioactive waste. The Canadian approach includes the "polluter pays principle" where waste producers are responsible for the management and funding of the radioactive waste they produce. Canada's approach includes the long-term management of used nuclear fuel and low- and intermediate-level radioactive waste, and the long-term management of uranium mining and milling waste close to mine and mill sites.

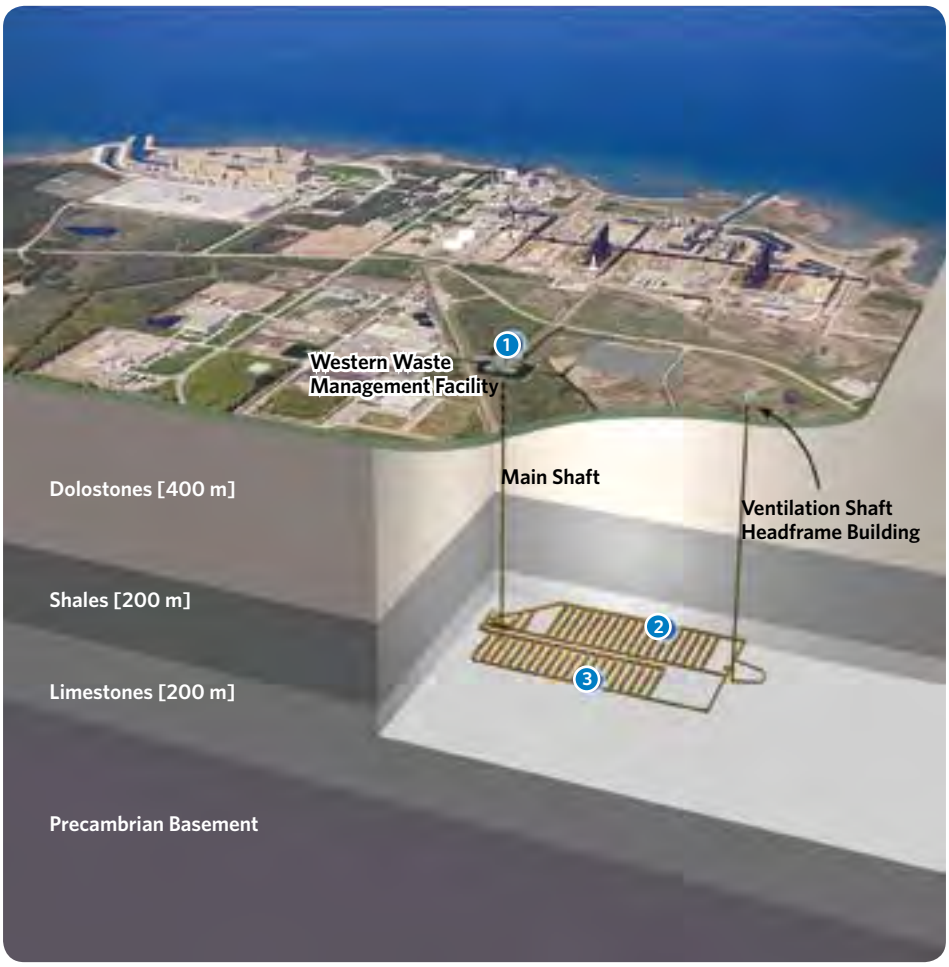
While numerous government departments, agencies and institutions (such as hospitals and universities) are involved in the short-term management of radioactive waste, only a few industry organizations are involved in long-term waste management.

INTERNATIONAL RESPONSIBILITY FOR RADIOACTIVE WASTE

The CNSC collaborates with various domestic and international organizations—including Foreign Affairs and International Trade Canada and its counterparts in other countries—to ensure the regulatory regime in Canada is consistent with international agreements.

For example, the CNSC participates in an international convention called the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*. This convention aims for the safe management of spent fuel and radioactive waste worldwide and achieves its objectives through peer review of member countries' waste management programs. The CNSC is responsible for coordinating Canada's responsibilities under the Joint Convention.

The CNSC imposes rigorous licensing and reporting requirements on the operators of nuclear waste management facilities, just as it would for any other nuclear facility. CNSC staff conducts facility inspections and audits to ensure waste management facilities comply with safety requirements.



OPG's proposed Deep Geologic Repository would be located about 680 m underground on the Bruce Power site and constructed in low-permeability limestone, capped by 200 m of low-permeability shale.

LONG-TERM WASTE MANAGEMENT

The Canadian nuclear industry and the Government of Canada are developing several long-term radioactive waste management solutions that the CNSC currently regulates or will in the future.

- The Nuclear Waste Management Organization (NWMO) has begun a dialogue with the Canadian public to collaboratively develop and implement a socially acceptable, technically sound, environmentally responsible and economically feasible management approach for the long-term care of Canada's used nuclear fuel. Once a site is selected, the NWMO will need to apply to the CNSC for a licence to construct any facility. The CNSC has signed an agreement with the NWMO to allow regulatory review of preliminary safety cases and other material, to help the NWMO in its assessment of potential sites.
- The Government of Canada's Nuclear Legacy Liabilities Program was launched in 2006 and provides a long-term strategy to manage legacy waste and contamination on AECL sites, including Chalk River Laboratories and Whiteshell Laboratories. All projects under this program are regulated under CNSC licences for AECL sites to allow safe oversight of the work.
- The Chalk River Laboratories site was established in the mid-1940s and since then has housed various nuclear operations and facilities, primarily related to research. Most of the nuclear and associated support facilities and buildings on the site are located within a relatively small industrial plant site area adjacent to the Ottawa River. Various waste management areas for radioactive and non-radioactive waste are located at the site. These areas provide waste management facilities for institutions like universities, hospitals and industrial users that have no other means to manage their waste.
- The Whiteshell Laboratories facility is a former nuclear research and test establishment in Manitoba on the east bank of the Winnipeg River, about 100 km northeast of Winnipeg. It is currently undergoing decommissioning.

WASTE LICENSING HIGHLIGHTS IN 2008–09

The CNSC's efforts focused on some major waste-related licensing projects in 2008–09: the Port Hope Area Initiative, the Cameco Corporation Vision 2010 decommissioning project, and the Deep Geologic Repository.

Port Hope Area Initiative

The Port Hope Area Initiative (PHAI) is a community-supported environmental remediation project. The waste in question resulted from radium and uranium refining that took place from the 1930s to 1980s and that was conducted by a former federal Crown Corporation and its private-sector predecessors. The PHAI's goal is to clean up and safely provide for the long-term management of low-level radioactive waste in the Port Hope area that resulted from these radium and uranium refining activities.

The federal government, through Natural Resources Canada, has contracted AECL to design, construct and manage a long-term waste management facility to house the waste. The project will require a CNSC licence, and the CNSC will continue to regulate and oversee the initiative's operations in accordance with the CNSC's compliance verification program.

The PHAI has two projects—the Port Hope project and the Port Granby project—that are at different stages of the CNSC licensing process. The Port Hope project has completed the EA stage and has entered into the licensing phase. The Port Granby project is still in the EA phase.

Cameco Corporation Vision 2010 project

In a letter to the CNSC, Cameco Corporation proposed the Vision 2010 project, which involves a comprehensive redevelopment of its Port Hope Conversion Facility located in Port Hope, Ontario.

The project consists of decommissioning and demolishing approximately 20 old or under-used buildings, removing contaminated soils, building materials and stored historical wastes, and constructing new replacement buildings. On-site plant operations would be maintained while the works are being carried out.

The proposed project is to be carried out in conjunction with the Port Hope Area Initiative; Vision 2010 is considered the near-term decommissioning component of the overall site decommissioning strategy.

Before the CNSC could make a licensing decision regarding this proposal, a comprehensive study EA of the proposal had to be conducted in compliance with the CEAA. The purpose of the EA was to identify

A CNSC Project Officer inspects the re-tube components storage facility at the Pickering Waste Management Facility. The facility stores non-fuel radioactive waste from refurbishment activities at the Pickering Nuclear Generating Station.

potential adverse environmental effects of the proposed project before irrevocable decisions were made.

In early March 2008, the CNSC invited public comment on the draft EA Guidelines for the proposed project.

In December 2008, the CNSC announced its decision to recommend to the federal Minister of the Environment that the EA of Cameco Corporation's proposed Vision 2010 project be continued as a comprehensive study. In March 2009, the Minister agreed and announced that the comprehensive study process was the most appropriate way to continue this EA.

Deep Geologic Repository

OPG's proposed Deep Geologic Repository (DGR) is a long-term nuclear waste facility for low- and medium-level waste that would be located at the Bruce nuclear site in the municipality of Kincardine, Ontario. OPG is proposing that a deep rock vault be constructed in the limestone layer hundreds of metres below ground. Both an EA and a regulatory review are underway for a site preparation and construction licence.

In 2008–09, two major milestones occurred with respect to the DGR:

- The Canadian Environmental Assessment Agency and the CNSC released the draft EIS Guidelines and the draft JRP Panel Agreement for public comment.
- The CEAA and the CNSC issued the final EIS Guidelines and the JRP Agreement.

INDUSTRY PERFORMANCE

Lost time incidents and reportable events

There have been no lost time incidents (LTIs) in the past few years at waste management facilities. However, Whiteshell Laboratories, which is currently under decommissioning, has reported five LTIs, one of which was a vehicle-related fatality. All of the LTIs were related to industrial occupational health safety and were not associated with radioactivity. As a result of the vehicle-related fatality, which occurred on a site that is regulated by the CNSC, an SDR was presented to the Commission in 2008–09 and the facility took steps to improve safety. Human Resources and Skills Development Canada, as the responsible regulator for this type of incident, took appropriate actions to address it.

Spent nuclear fuel is placed in secure storage canisters.

A cooling pool at a CNSC-licensed facility provides safe storage of radioactive material.

Medical, Academic and Industrial Uses

Diverse uses for nuclear substances

Radiation from nuclear substances and devices has many applications in everyday life and is used extensively in medicine, academia and industry.

Positron Emission Topography is a type of nuclear medicine imaging that uses small amounts of radioactive material to diagnose or treat cancer and other illnesses.

FASTFACTS

52

During 2008–09, the CNSC issued 52 new radiation device certificates.

1 MILLION

About 1,000,000 medical diagnostic procedures using Technetium-99m were performed in Canada during 2008–09.

2,989

There were 2,989 nuclear substance licensees in Canada during 2008–09.

G8

In January 2006, Canada implemented the National Sealed Source Registry, becoming the first G8 country with such a system.

In medicine, radiation is used to diagnose many illnesses, from cancer to cardiac diseases, to treat cancer and non-malignant tumours, and to irradiate blood products before transfusion. Approximately one million diagnostic nuclear medical procedures using the radioactive isotope Technetium-99m were performed in Canada last year.

Radioactive materials are used in a variety of academic research activities, such as obtaining functional images of the human brain for tracer studies (conducted outside the human body) to help researchers understand cellular functions and for ion implantation in materials science research.

Industrial uses of radiation range from the use of density gauges to determine the thickness of asphalt on roads to the use of gauges to verify fluid levels in bottling facilities. Radiation can also be used to test welds on pipes, for oil and gas exploration, and to sterilize medical equipment.

THE CNSC'S ROLE

The CNSC regulates the possession, use, storage, transport, import and export of nuclear substances and radiation devices to protect the health, safety and security of persons and the environment.

The CNSC is not responsible for the actual production of radioisotopes but, as a regulator, the CNSC ensures they are produced, stored, used, transported, imported and exported in a safe and secure fashion.

Radiation devices and radiation emitting equipment must be certified by the CNSC before they are used. Certification focuses on the radiation safety aspects of the equipment's design and ensures that the operator and public are protected when the equipment is operated, stored or transported. During 2008–09, the CNSC issued 52 new certificates for radiation devices.

Transportation of nuclear substances: a shared responsibility

In Canada, regulations regarding the packaging and transport of nuclear substances are a shared responsibility between the CNSC and Transport Canada. Transport Canada's *Transportation of Dangerous Goods Regulations* address the transport of all classes of dangerous goods, whereas the CNSC's *Packaging and Transport of Nuclear Substances Regulations* focus on the transport of nuclear substances, known as Class 7 dangerous goods.

Both sets of regulations apply to all persons who package, offer for transport, transport and receive nuclear substances, whether these persons are licensed or not. A memorandum of understanding between Transport Canada and the CNSC, signed on December 19, 2007, coordinates the activities of each agency to minimize duplication and overlap.

All industrialized countries use the IAEA's *Regulations for the Safe Transport of Radioactive Material* (TS-R-1) as the basis for regulating the packaging and transport of radioactive materials worldwide. The requirements of the IAEA regulations have formed the foundation of the CNSC's packaging and transport regulations since they were first adopted in the international community in 1961.

During 2008-09, the CNSC published *Joint Canada–United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages* (RD-364). This guide, developed by the CNSC, the United States Nuclear Regulatory Commission and the United States Department of Transportation, provides guidance to applicants in preparing applications to certify and validate transportation package designs. It is part of a Canada–United States certification framework to facilitate the approval process.

21 THOUSAND

There were more than 21,000 sources registered in the National Sealed Source Registry during 2008–09.

1,800

In 2008–09, CNSC Designated Officers made about 1,800 licensing decisions involving medical, academic and industrial uses of nuclear substances.

308

The CNSC issued 308 new nuclear substance licences during 2008–09.

5

The International Atomic Energy Agency has 5 categories of radioactive sealed sources.

STRINGENT LICENSING

The possession, use, storage, transport, import and export of nuclear substances and radiation devices are subject to licensing. For the licensing of most applications discussed in this section, decisions are made by a Designated Officer rather than the Commission Tribunal. This authority was delegated to Designated Officers by the Commission Tribunal in 2000.

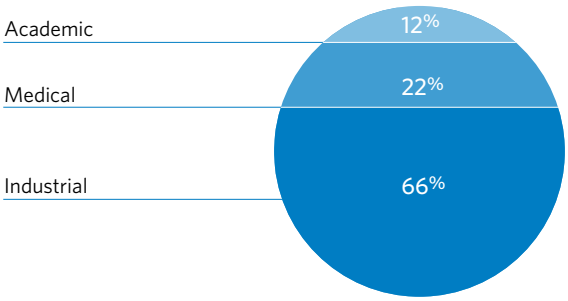
Licensing decisions by Designated Officers are based on recommendations made by licensing specialists. These specialists use risk-informed decision making and tools to ensure that licence applications meet the CNSC's regulations. The tools also ensure that licence assessments are consistent and that the process is efficient and effective.

In its regulation of licensees, the CNSC uses a comprehensive set of requirements and licence conditions that follow international practice. As shown in Figure 10, the total number of active licences in fiscal 2008–09 was just under 3,000 with roughly 66 percent in the industrial sector, 22 percent in the medical sector and the remaining 12 percent in the academic sector.

In 2008–09, nearly 1,800 licensing decisions were made by Designated Officers on matters that included issuing licences to construct radiation therapy centres and issuing licences to decommission sites no longer in use.

The CNSC issued 308 new licences and renewed 196 others. There was significant growth in the number of licences issued for the construction of new radiation therapy and cyclotron facilities over the past year. At the time of this report, there were more than 30 new radiation therapy facilities and five cyclotron facilities being constructed in various centres across Canada. This represents a twofold increase in the number of cyclotrons in a single year and stems from the growing popularity of positron emission tomography (PET) to diagnose cancer. PET uses radiopharmaceuticals that are produced by cyclotrons.

Figure 10: Nuclear substance licensees by sector for 2008–09



Total: 2,989

Once authorized by the CNSC, licensees are responsible for the safety of their licensed activities, for the security of nuclear substances in their possession, and for ensuring that they respect the NSCA, regulations and any additional licence conditions imposed by the CNSC. The CNSC is responsible for ensuring that licensees comply with the regulatory requirements and conditions of their licence.

Medical uses for nuclear substances and radiation devices

Nuclear medicine uses radioactive substances and isotopes incorporated into pharmaceutical products. These *radiopharmaceuticals* or *radiotracers* are designed to target specific tissues and organs, allowing the delivery of the radioactive substance to specific areas of the body. Radiopharmaceuticals are widely used in the diagnosis, management and treatment of disease.

In diagnostic nuclear medical imaging, the radiation emitted by a radiopharmaceutical (ingested, inhaled, or injected into the patient) is measured by an external detector, such as a gamma camera or a positron emission tomography (PET) scanner. Images are reconstructed by computer from the measurements to investigate specific processes within the body.

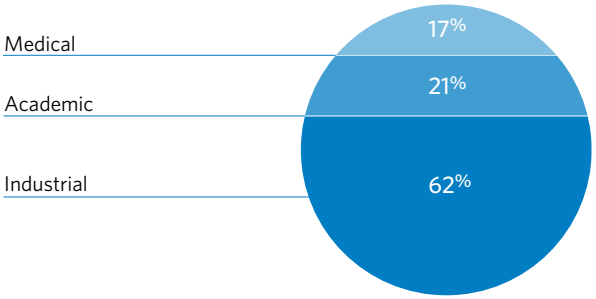
In therapeutic nuclear medicine, high doses of radiopharmaceuticals are administered to treat diseases such as thyroid cancer.

Radiation therapy is an important cancer treatment. Dose delivery in radiation therapy is done in one of two ways: teletherapy or brachytherapy. Teletherapy involves delivering high doses of radiation to a tumour using intense external beams of radiation. This can be delivered by medical linear accelerators or specially designed teletherapy machines that contain sealed radioactive sources. Brachytherapy involves placing sealed radioactive sources within the body to deliver a controlled radiation dose to the tumour.

Approximately two-thirds of isotopes used in nuclear medicine in Canada are produced domestically in cyclotrons or in reactors, both of which are regulated by the CNSC.

All of the above uses are subject to CNSC regulation.

Figure 11: CNSC inspections during 2008–09



Total: 1,533

MANAGING LICENSEES

To maintain effective regulatory oversight over the large number of licensees spread across Canada in this area, the CNSC has specially qualified inspectors in offices in Calgary, Mississauga, Ottawa and Laval. These offices enable trained CNSC inspectors to respond promptly to incidents, complaints and emergencies; as well, the inspectors are authorized to enforce compliance when licensees are non-compliant.

As shown in Figure 11, in 2008–09, CNSC inspectors conducted Type I (audits) and Type II inspections (snapshot inspections that are less comprehensive than an audit) of nearly 1,600 CNSC-licensed locations. Sixty-two percent of these inspections were in the industrial sector, 21 percent in the academic sector and 17 percent in the medical sector. In the majority of inspections, licensees were found to have implemented their radiation protection program, conducted staff training in radiation protection, controlled and monitored radiation exposure of employees, and tested their safety systems and the security of nuclear substances.

A gamma knife uses high doses of radiation to treat brain tumours.

The inspections included reviews of the annual compliance reports submitted by all licensees. These reports contained detailed information on their operations over the course of the previous year.

Information reviewed by CNSC staff in annual compliance reports includes statistics on occupational exposure to workers handling radioactive material. Ongoing CNSC concerns about occupational exposures in the radiography industry, even though these exposures are below regulatory limits, has led the CNSC to establish the Industrial Radiography Working Group.

INDUSTRIAL RADIOGRAPHY

Industrial radiography is an important industrial application of nuclear substances in which high-risk radioactive sealed sources (Iridium-192 and, to a lesser extent, Cobalt-60) are used to assess the integrity of materials, particularly where testing must be conducted at remote locations. A radioactive source is placed in a device certified by the CNSC as a transport package. A licence issued by the CNSC is subsequently required for an individual to possess, use and store these devices, and those operating the equipment must be certified.

At the end of March 2009, there were 132 industrial radiography licensees and approximately 5,000 certified radiographers in Canada. The magnitude of exposure resulting from incidents and events linked to the use of the devices led CNSC staff to develop a strategy to encourage improvements.

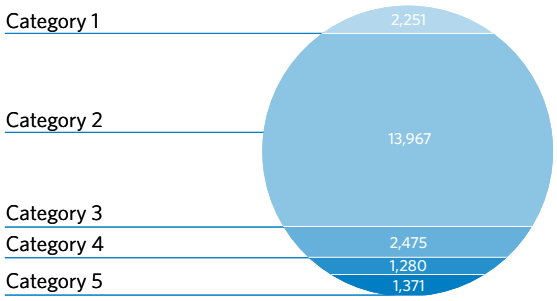
After consulting with industry, the CNSC established an industry working group to continue the dialogue between the CNSC and the licensees. This group will focus on improving communication, technical issues associated with industrial radiography, and compliance with CNSC regulatory requirements. Working group members have been identified from a cross-section of the industry and from both eastern and western Canada.

NATIONAL SEALED SOURCE REGISTRY

In January 2006, Canada became the first G8 country to develop a national registry of sealed sources and to implement a Web-based tracking system for high-risk sealed sources.

The National Sealed Source Registry (NSSR) was developed and is maintained by the CNSC. It contains

Figure 12: National Sealed Source Registry statistics for 2008–09 (number of sources registered)



Total: 21,344
The majority of sealed sources registered in 2008–09 were in the high-risk category.

information on sealed sources under licence in Canada. A sealed source is a radioactive substance that is sealed in a container and may be used in medical, academic and industrial applications.

The Sealed Source Tracking System (SSTS) is the NSSR module that records the movement of Category 1 and 2 sources in Canada, via a secure Web-based portal available to registered licensees. An annual report on registry's information is published on the CNSC's Web site at nuclearsafety.gc.ca

As shown in Figure 12, there were more than 21,000 sources in all categories registered in the National Sealed Source Registry in 2008–09. There were also more than 43,000 transactions in the registry.

IAEA CATEGORIZATION OF RADIOACTIVE SOURCES

The CNSC categorizes radioactive sealed sources and devices based on the IAEA's categorization of radioactive sources and in conjunction with the IAEA *Code of Conduct on the Safety and Security of Radioactive Sources*, to which Canada is a signatory:

Category 1 (very high risk): This amount of radioactive material, if not safely managed or securely protected, would be likely to cause permanent injury (and, in some cases, be fatal) to a person who handled it or was otherwise in contact with it for a period of a few minutes or it could be fatal if a person were close to it in an unshielded manner for a few minutes to an hour.

Category 2 (high risk): This amount of radioactive material, if not safely managed or securely protected, could cause permanent injury to a person who handled it, or was otherwise in contact with it for a short period of time (minutes to hours). Or, it could be fatal to a person who was close to it in an unshielded manner for a few days.

Category 3 (moderate risk): This amount of radioactive material, if not safely managed or securely protected, could cause permanent injury to a person who handled it or was otherwise in contact with it for some hours. It could be fatal (although it is unlikely) to be near this amount of unshielded radioactive material for a period of days to weeks.

Category 4 (low risk): It is very unlikely that anyone would be permanently injured by this amount of radioactive material. However, this amount of unshielded radioactive material, if not safely managed or securely protected, could possibly temporarily injure someone who handled it or was otherwise in contact with it, or who was close to it for a period of several weeks, although injury is unlikely.

Category 5 (very low risk): No one could be permanently injured by this amount of radioactive material.

Reference: Categorization of Radioactive Sources, IAEA Safety Standards Series No. RS-G-1.9

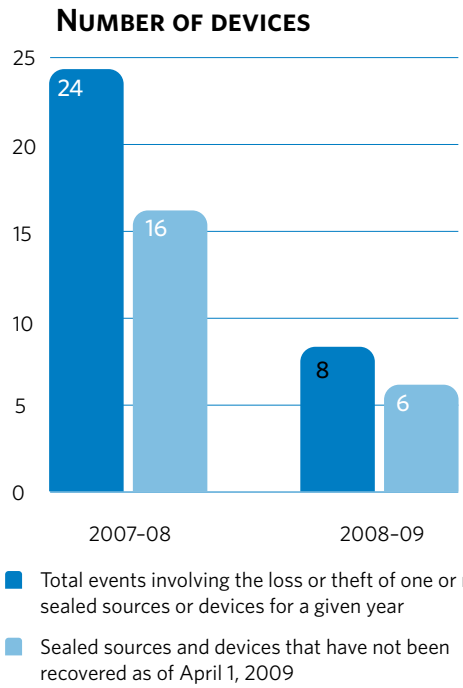
INDUSTRY PERFORMANCE

Radiation protection and reportable events

CNSC regulations stipulate that licensees notify the CNSC in case of unplanned events that could increased the risk of radiation exposure or of environmental contamination. The CNSC oversees and helps mitigate such events involving substances and devices, in proportion to the level of the event's risk. The CNSC focuses its inspections more heavily on situations where there is higher risk and where it has concerns about performance. Safety and security are key CNSC objectives, especially with unplanned events.

During 2008–09, all nuclear substances and radiation devices involved in unplanned events, except for those involving the loss or theft of high-risk sealed sources, posed little to no risk to the public or to individuals who responded to the events.

Figure 13: Lost and stolen sealed sources and devices in Canada



None of the losses or thefts of radioactive sources in 2008–09 involved high- or medium-risk substances.

The loss or theft of any nuclear substance may range from low to high risk and may pose a hazard to the public if it is not recovered. In 2008–09, there were eight reported losses of radioactive sources or devices containing sources. None of the events involved high- or medium-risk (Category 1, 2 or 3) radioactive substances. The *CNSC Report on Lost or Stolen Sealed Sources and Radiation Devices* summarizes information reported to the CNSC about losses and thefts of licensable sealed sources and radiation devices.

In 2008–09, the CNSC received 65 reports of radiation alarms at municipal waste management facilities and scrap metal processing or recycling facilities. All of these alarms were caused by short-lived medical isotopes or naturally occurring nuclear substances found in waste, and the number represents a significant decrease compared to the previous year. The decrease is due to individual provinces and municipalities taking on greater responsibility to lessen the occurrence of exposure to very low-risk materials.

In February 2009, the City of Ottawa informed the CNSC that two trucks transporting biosolids material from the City's sewage treatment plant had been denied entry at the American border in January 2009, because low-level radioactivity had been detected. Two more truckloads with biosolids similarly tested positive for low-level radioactivity in February. The material was placed in a secure location.

The City of Ottawa appropriately notified the CNSC. The CNSC sent an inspector to the sewage treatment plant to help the City identify the type and source of radioactive material.

Analyses at CNSC labs indicated that the detected radioactivity came from trace amounts of commonly used medical isotopes and that the material posed no risk to the health, safety and security of Canadians or the environment.

Thousands of packages containing nuclear substances are shipped to, from and within Canada every year. In December 2008, a licensee reported an incident involving the improper transport of a radioactive substance that may have resulted in two transport workers receiving a dose in excess of the regulatory public dose limit of 1 mSv per year. CNSC staff verified and confirmed the results of the dose calculations the licensee provided. Based on the most conservative assumptions, the CNSC determined that these individuals may have received a dose of 1.36 mSv from the event. The workers were informed of the potential doses and advised that no known health effects are associated with exposures at that level. An investigation is ongoing to determine the causes of the incident and what corrective measures can be introduced to ensure that similar incidents do not recur.

Due to the large number of licensees and the diversity of the licensed operations, it is impossible to make general or broad conclusions about the safety performance of this regulated sector. It can be stated, however, that nuclear substances and radiation devices were used and stored safely by CNSC licensees during the past fiscal year.

International Obligations and Undertakings

A significant role on the world stage

The CNSC is mandated to fulfill Canada's international obligations on the peaceful use of nuclear materials and technology and works with many partners around the world in its commitment to maintain a safe, secure and peaceful international nuclear sector.

CNSC representatives participated at the Third Review Meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste held in Vienna, Austria, in May 2009.

FASTFACTS

26

Canada has 26 nuclear cooperation agreements in place.

84

The CNSC issued 84 import licences during 2008–09.

133

CNSC staff participated in 133 IAEA inspections at Canadian nuclear facilities during 2008–09.

>12

The CNSC maintains more than a dozen nuclear regulator cooperation arrangements with foreign regulators.

As a signatory to the *Nuclear Non-Proliferation Treaty* (NPT), Canada has an obligation to use nuclear energy solely for peaceful purposes. The CNSC is designated as the authority responsible for implementing this obligation under a comprehensive safeguards agreement (CSA) and Additional Protocol (AP).

Canada's compliance with the commitments made in these documents is verified by the IAEA, the world's nuclear watchdog, through a system of verification measures known as safeguards. The CNSC also assists in developing and implementing Canada's nuclear non-proliferation policy, which is designed to ensure that Canada does not contribute, directly or indirectly, to the development of nuclear weapons or other nuclear explosive devices.

Further international commitments stem from a variety of instruments, including the *Convention on Nuclear Safety,* the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management,* the *Convention on the Physical Protection of Nuclear Material,* the *Code of Conduct on the Safety and Security of Radioactive Sources,* and the *Code of Conduct on the Safety of Research Reactors.*

The CNSC undertakes many other international initiatives, including sharing knowledge and experience with other nuclear regulators to stay current on regulatory best practices. The CNSC's advanced research activities help the IAEA remain at the forefront of emerging technologies for verifying safeguards.

By participating in several international fora, including the IAEA, the International Nuclear Regulators Association and the G8 Nuclear Safety and Security Group, the CNSC adds to the nuclear industry's collective knowledge by helping develop best practices, regulatory guides and standards.

The CNSC helps implement Canada's non-proliferation policy as it applies to nuclear exports, primarily by providing technical support and advice to the Department of Foreign Affairs and International Trade (DFAIT). The CNSC also regulates the import and export of controlled nuclear substances, equipment and information in collaboration with federal partners and the IAEA.

INTERNATIONAL OBLIGATIONS

In 2008, the IAEA drew what is called a positive safeguards conclusion for Canada, ensuring through international oversight that all nuclear materials and facilities were used for peaceful purposes, once again granting the country its highest safeguards rating for an IAEA Member State.[2] Out of 146 IAEA Member States, Canada is one of only 51 countries that received this result. As the agency responsible for implementing Canada's safeguards obligations, the CNSC was instrumental in bringing about the IAEA's conclusion:

- Throughout 2008–09 the CNSC made significant progress in implementing Canada's State-Level Integrated Safeguards Approach, a new way of managing safeguards that enables the IAEA to tailor its activities to a particular country.
- As part of the safeguards rating process, the IAEA carries out a variety of inspections, including inspection of nuclear materials, reviews of a facility's design and operation and book audits. While these activities are traditionally scheduled far in advance, Canada's State-Level Integrated Safeguards Approach includes a move towards a more randomized inspection regime where inspections can occur on short notice. In 2008–09, CNSC staff participated in 133 IAEA inspections at Canadian nuclear facilities.

2 IAEA conclusions are based on calendar years and therefore cover a slightly different period than the CNSC's fiscal year.

512

During 2008–09, the CNSC issued 512 export licences, of which 72 were for nuclear-related dual-use items.

1/51

Canada is 1 of 51 countries to be granted the IAEA's highest safeguards rating.

G8

Canada will assume the presidency of the G8 Nuclear Safety and Security Group in 2010.

50

The CNSC reports to the International Atomic Energy Agency about nuclear material inventories in more than 50 areas.

- In 2008, the CNSC submitted its annual declaration on Canada's nuclear fuel cycle to the IAEA. This declaration, which covers a wide variety of information gathered from more than 30 members of Canada's nuclear industry, is intended to provide the IAEA with a clearer understanding of Canada's nuclear undertakings. It also contributes to the information the IAEA draws on to issue its annual conclusion on the peaceful nature of Canada's nuclear activities.
- Canada has 50 different material balance areas that provide detailed reports to the CNSC on nuclear material inventories (for example, inventory changes, physical inventory lists and monthly summaries). CNSC personnel process this information and report it regularly to the IAEA. In 2008, the CNSC generated and submitted approximately 600 different types of reports to the IAEA, which assisted in meeting Canada's obligations as an IAEA Member State. Using these reports as a basis, the CNSC also cooperates with the IAEA to verify physical inventory.

Safeguards research

The CNSC manages and funds the Canadian Safeguards Support Program (CSSP), which helps the IAEA improve its safeguards regime, to support domestic and international nuclear non-proliferation objectives. The CSSP provides services, products and advice, and oversees research in diverse specialized areas that help Canada and other countries fulfill their international commitments on the peaceful use of nuclear materials.

In 2008–09, examples of CSSP research areas included:

- designing a device that uses laser-induced breakdown spectroscopy to identify nuclear materials in the field without the need for sending samples to a lab
- developing a Digital Cerenkov Viewing Device to help inspectors look for any evidence of spent fuel inventory tampering
- providing the IAEA with updated versions of software that allow large amounts of data to be analyzed in new ways
- providing advice to the IAEA on emerging technology and advanced techniques for satellite image processing and analysis used for safeguards verification
- designing a new data acquisition module that will allow remote monitoring of transfers of irradiated fuel to avoid the need for the costly and constant presence of IAEA inspectors

Nuclear cooperation agreements

Canada's major nuclear exports are governed by the non-proliferation provisions of bilateral nuclear cooperation agreements (NCAs) with countries to which nuclear exports are shipped. Canada currently has 26 NCAs in place. The NCAs are implemented by the CNSC through administrative arrangements (AAs), established under the NSCA in conjunction with the CNSC's nuclear export and import licensing program.

- Throughout 2008–09, the CNSC provided technical and policy support to DFAIT in bilateral negotiations with Jordan, Kazakhstan, the Republic of South Africa and India to establish new NCAs with each of these countries.
- The CNSC also provided technical support to DFAIT in consultations with China on nuclear cooperation, pursuant to the existing bilateral Canada-China NCA.
- The CNSC agreed to a technical draft of an AA with its Jordanian counterpart, the Jordanian Nuclear Regulatory Commission, and anticipates that this AA will be signed in 2009.
- During 2008–09, the CNSC held bilateral consultations with its regulatory counterparts from Australia, the United States, EURATOM (the European Atomic Energy Community) and China to address issues associated with the implementation of AAs.
- In November 2008, CNSC staff participated in the second meeting of the Quadripartite Group on AA implementation with counterparts from the United States, EURATOM and Australia. Discussions continued on the establishment of a best practices guide on implementing AAs.
- Throughout 2008–09, the CNSC maintained and administered notification, accounting and reporting procedures as required to implement the provisions of Canada's bilateral NCAs and AAs.

Risk-significant radioactive source export and import controls

Canada is a global leader in the export of radioactive sources of significant risk that are subject to the provisions of the IAEA *Code of Conduct on the Safety and Security of Radioactive Sources* (the Code) and the IAEA *Guidance on the Import and Export of Radioactive Sources* (the Guidance). The Government of Canada has made a commitment to implementing the import and export control provisions of these two important documents, and the CNSC puts the necessary licensing and control measures in place under the NSCA.

Inspectors use the Digital Cerenkov Viewing Device to verify spent nuclear fuel.

- In 2008–09, the CNSC issued 176 export licences for risk-significant radioactive sources.
- The CNSC is establishing AAs with its counterparts in various countries to encourage coordinated bilateral regulatory procedures that will aid in implementing export and import controls under the IAEA Code and Guidance. The first such AA was signed with the United States Nuclear Regulatory Commission in March 2007.
- In 2008–09, the CNSC established arrangements with Mexico and Colombia. Arrangements with Argentina, Brazil and Italy were finalized and are expected to be signed by mid-2009.

Nuclear and nuclear-related dual-use item export and import controls

In 2008–09, the CNSC issued 84 import and 512 export licences for nuclear and nuclear-related dual-use items pursuant to the NSCA and the *Nuclear Non-Proliferation Import and Export Control Regulations.* Of the 512 export licences issued, 72 were for nuclear-related dual-use items.

Amendments to the *Nuclear Non-proliferation Import and Export Control Regulations* have been proposed to reflect regulatory developments and evolving international obligations since the regulations came into effect in June 2000. The proposed amendments were published in the February 7, 2009 edition of *Canada Gazette, Part I,* initiating a 75-day public consultation period from February 7 to April 23, 2009.

Fourth review meeting of the Convention on Nuclear Safety

As a Contracting Party to the *Convention on Nuclear Safety*, Canada is legally committed to maintaining high levels of safety at its NPPs. The Convention covers NPP siting, design, construction and operation, along with radiation protection, quality assurance and emergency preparedness.

Under the Convention, contracting parties produce reports, which are reviewed by peers and discussed at meetings held every three years. As part of a broad delegation, the CNSC led Canada's participation in the Fourth Review Meeting of the Convention on Nuclear

The Vehicle and Cargo Inspection System (VACIS), used at border crossings, employs radiographic images to help inspectors examine the contents of trucks and containers.

Safety in Vienna, Austria in April 2008 and promoted the Convention's objectives through bilateral talks with other delegations and by influencing debates on issues of collective interest to the participating countries.

INTERNATIONAL UNDERTAKINGS

Regulatory cooperation arrangements

The CNSC maintains nuclear regulatory cooperation arrangements with more than a dozen foreign regulators. It also strives to develop additional protocols to share regulatory experience and ensure that best practices are available and used for the safety and security of Canadians. The nuclear regulatory cooperation arrangements include:

- an arrangement with the Argentina Nuclear Regulatory Authority (ARN) for technical cooperation and exchange of information in nuclear regulatory matters
- an arrangement with the Republic of Korea's Atomic Energy Bureau of the Ministry of Science and Technology on technical regulatory matters involving CANDU NPPs

Memoranda of Understanding

In 2008–09, the CNSC developed a series of Memoranda of Understanding (MOUs) with nuclear regulatory agencies in Finland, France, Romania and the USA. Once in place, the MOUs will facilitate the exchange of regulatory information between the CNSC and foreign regulators, and, through a specific focus on new NPPs, improve the CNSC's capacity to face the challenges of an expanding nuclear industry. The CNSC expects these MOUs will be signed in early 2009–10.

International fora

The CNSC works internationally with like-minded organizations to advance common goals. Through its involvement in international meetings, working groups and special projects, the CNSC develops, shares and updates its policies, regulatory framework and technical knowledge. During 2008–09, the CNSC participated in many key meetings and initiatives:

- IAEA activities: In 2008–09, the CNSC helped Canada play a leadership role in the IAEA's scientific and technical activities. This participation allowed the CNSC to promote and influence the development of nuclear safety and security standards and share and gain valuable regulatory knowledge in all areas

of its mandate, including seismic safety, human and organizational factors, the safety and security of radioactive sources, and safeguards.

- Fifty-second Regular Session of the IAEA General Conference: The CNSC provided support to DFAIT to develop positions and statements that further Canada's nuclear safety, security and safeguards interests.
- Nuclear Energy Agency activities: The CNSC maintained active participation in the the Organisation for Economic Co-operation and Development's Nuclear Energy Agency, a global focal point for in-depth discussion on nuclear issues. In 2008–09, the Agency created the Working Group on the Regulation of New Reactors. The CNSC's participation allowed it to remain up to date on international developments and key issues in the construction of new nuclear reactors.
- Nuclear Suppliers Group: The CNSC provided technical support to the Canadian delegation to meetings of the group, a multilateral body that establishes international guidelines on the export of nuclear and nuclear-related dual use goods and technology. Dual-use goods and technology are those that can be used for peaceful or non-peaceful purposes.
- Preparatory Committee Meeting of the *Nuclear Non-Proliferation Treaty*: The CNSC provided technical support to the Canadian delegation for a meeting on matters of non-proliferation, safeguards and export control measures.
- G8 Nuclear Safety and Security Group (NSSG): When Japan held the G8 NSSG presidency in 2008, three meetings were held in Tokyo, and the CNSC participated in conjunction with DFAIT. After Italy assumed the presidency in 2009, the first of three meetings was held in Rome, with the CNSC and DFAIT attending both. Canada will take on the G8 NSSG presidency in 2010, enabling the CNSC to further assume leadership in promoting the safe, secure and peaceful use of nuclear energy.
- Visits from foreign counterparts: The CNSC hosted visits from nuclear regulators from around the world, including Mongolia, the Netherlands, the Republic of Korea and South Africa. The visits were held to share best practices, improve the effectiveness of regulatory oversight and gain regulatory knowledge.
- Multinational Design Evaluation Programme: This is an initiative that allows regulators from various countries evaluating new reactor designs to pool their knowledge and experience, with a view to creating an internationally applicable set of codes, standards and safety goals for new NPPs. The CNSC's participation has given it valuable regulatory knowledge about NPP designs.

Contributing to international standards

The CNSC participates in international standards committees that directly affect nuclear and conventional health and safety.

The CNSC was solicited for comment on several safety requirement and safety guide documents under development at the IAEA. The IAEA requests feedback on these documents through the CNSC representative on the Safety Standard Committees, as well as through its Member States. Where necessary, CNSC staff provided comments and feedback on the safety requirements and guides. For example, CNSC staff participated in numerous workshops and technical meetings related to the revision of the Basic Safety Standards. This process is ongoing, and a significant amount of work was completed in 2008. The CNSC was also involved in several workshops related to the development of the International Commission on Radiological Protection's Publication 103: *Recommendations of the ICRP*, which was published in 2008.

About the IAEA safeguards system

The IAEA safeguards system was established several decades ago to curb the proliferation of nuclear weapons. As an IAEA Member State, Canada strongly supports the IAEA's safeguards objectives, and its own safeguards obligations are enshrined in CSA and AP. Together, these two agreements permit the IAEA to monitor and verify Canada's nuclear-related activities and nuclear material inventories, and give the IAEA access to Canadian nuclear sites and information about nuclear-related activities in Canada.

Based on its findings, the IAEA draws a wider conclusion about the correctness and completeness of Canada's reports and declarations under the CSA and AP. This conclusion, which must be reaffirmed every year and is reported annually in the IAEA's Safeguards Implementation Report, provides assurance to the Canadian public and the international community that Canada has not diverted nuclear materials to nuclear weapons or to other nuclear explosive devices.

Stakeholder Relations

Committed to sharing information

CNSC President Michael Binder spoke at the Canadian Nuclear Association annual conference in February 2009.

By fostering open interaction and communication with stakeholders, the CNSC continuously gathers input from all parties with an interest in Canada's nuclear sector.

FASTFACTS

80

The CNSC convened 2 regional meetings with about 80 industrial radiography licensees during 2008–09.

2

Two CNSC experts delivered presentations at the Intergovernmental Working Group on the Mining Industry Workshop, in Québec City in February 2009.

3

In September 2008, the Commission Tribunal held the second day of three public hearings in Saskatoon, Saskatchewan, to consider the renewals of 3 uranium mining facilities' operating licences.

5

The CNSC held public information sessions in 5 nuclear power plant host communities during the past year.

This ongoing dialogue is important for increasing public understanding and trust in our role of protecting Canadians, their health and the environment. It is also important for the part we play in implementing Canada's international obligations on the peaceful use of nuclear energy.

Many examples of how we communicate with our stakeholders have been mentioned throughout this report, as these activities support our greater mandate. This section further highlights how we have been working to hear stakeholder concerns, increase awareness of our role, share our knowledge and expertise, and forge partnerships.

CONSULTING WITH COMMUNITIES

The CNSC understands that communities with nuclear facilities have concerns about how these facilities may affect health and safety, the environment and the local economy. Recognizing that such communities often have similar questions and expectations, the CNSC maintains open lines of communication with the Canadian Association of Nuclear Host Communities. CNSC President Michael Binder met with association representatives in February 2009 and explained the key role played by mayors in informing other communities about nuclear activities and about the importance of mayoral participation in Commission Tribunal activities.

CNSC staff made a presentation to the Environmental Stewardship Council of at Chalk River Laboratories to inform them of our regulatory programs and activities at the Chalk River site. The Council is a public forum organized by AECL that gathers representatives from regional non-governmental organizations, municipal and federal governmental organizations and First Nations.

Following the publication of the 2007 *CNSC Staff Annual Report on the Safety Performance of the Canadian Nuclear Power Industry,* CNSC staff held public information meetings in five nuclear power plant host communities in Ontario, Québec and New Brunswick. These information sessions presented stakeholders with the results for each power plant for 2007 and updated them on other topics of interest specific to their communities. Topics included waste facilities, new reactors and refurbishment of existing reactors.

In 2008–09, the CNSC conducted outreach activities with the City of Toronto to clarify the CNSC's regulatory requirements and discuss issues associated with the presence of nuclear substances in the city's waste. As a result, the CNSC developed a trial arrangement with the City of Toronto to help move domestic waste containing nuclear substances so that it can be safely managed without increasing the risk to the public. This arrangement will enable the CNSC to gather data about nuclear substances found in domestic waste and to use that data to propose changes to the *Packaging and Transport of Nuclear Substances Regulations.*

A CNSC radiation protection expert participated in the May 2008 Cameco Community Forum held in Port Hope, informing the community on dose limits and how the CNSC regulates doses to workers and the population.

The CNSC met with officials of the municipality of Port Hope to discuss matters respecting licensing and compliance at two nuclear fuel fabrication facilities located there.

ENGAGING LICENSEES

The CNSC is committed to helping licensees understand and comply with the CNSC's regulatory regime. Throughout 2008–09, the organization undertook the following engagement activities:

- The CNSC convened two regional meetings with approximately 80 industrial radiography licensees to clarify regulatory requirements, respond to their

2

The CNSC participated in 2 CANDU Owners Group Nuclear Safety Committee meetings in 2008–09.

25

25 key stakeholders were invited to comment during the consultation period for Joint Canada-United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages (RD-364).

3

The CNSC provided keynote addresses at 3 major industry conferences during 2008–09 to promote its regulatory role.

2

The CNSC held 2 open houses in Summer 2008 about the Pickering B Refurbishment EA, related to the proposed refurbishment of the Pickering B Nuclear Generating Station.

concerns and present new regulatory initiatives. CNSC staff also conducted outreach with licensees in Victoria, Vancouver and Winnipeg, continuing a program of cross-country information presentations that were initiated in early 2007 and will continue in 2009–10.

- In February 2009, the CNSC convened a meeting with Cameco Fuel Services Division to discuss the CNSC's expectations for compliance.
- The CNSC conducted outreach activities to clarify regulatory requirements with Dalhousie University as it moves toward obtaining a licence for the future decommissioning of its Slowpoke reactor.
- In October 2008, CNSC safeguards staff met with licensees from across the nuclear industry to provide an update on the State-Level Integrated Safeguards Approach for Canada. This forum provided a unique opportunity for discussions on recent achievements and on the future direction for safeguards in Canada. CNSC staff made presentations on recent safeguards developments and on nuclear material reporting requirements. Senior representatives from the IAEA Department of Safeguards also participated in this meeting.

The CNSC is committed to helping licensees understand and comply with the regulatory regime.

- The CNSC participated in the Utility Certification and Training Advisory Group meeting, which involved policy-level discussions about the training and certification of nuclear power plant personnel. These meetings occur every year on a semi-annual basis. Members of the group include representatives from the CNSC and representatives for power plant licensees (Hydro-Québec, Ontario Power Generation, Bruce Power and New Brunswick Power Nuclear). This exchange of information is intended to enhance understanding between the CNSC and the nuclear industry about current and proposed regulatory initiatives and industry programs.
- The CNSC is committed to helping licensees understand and comply with the regulatory regimes at their sites. In 2008–09, the CNSC convened a workshop with major nuclear facility licensees in Ontario to clarify regulatory changes for independent third-party inspection services currently fulfilled under a CNSC-sponsored contract.
- The CNSC participated in two CANDU Owners Group Nuclear Safety Committee meetings. These meetings occur twice every year. The committee provides a mechanism for the industry to work with the regulator at a senior level, to promote common understanding of generic safety and licensing issues while helping achieve closure for all parties.

STRENGTHENING ABORIGINAL CONSULTATION

Since signing the MOU for the *Cabinet Directive on Improving the Performance of the Regulatory System for Major Resource Projects* in August of 2007, the CNSC has participated fully in the development of the Government of Canada's approach to consulting with Aboriginal groups for major resource projects.

This approach, like all CNSC interaction with Aboriginal communities, is guided by the *Interim Guidelines for Federal Officials to Fulfill the Legal Duty to Consult* that was issued in February 2008. The CNSC has been reviewing its policies and procedures as well as its regulatory regime and other guidance to prospective licensees to help meet its legal obligations for Aboriginal consultation on CNSC-regulated projects.

As a first step, the CNSC published a revised version of *Site Evaluation for New Nuclear Power Plants* to provide better guidance to proponents in the early stages of their engagement with Aboriginal groups. The CNSC is currently reviewing other regulatory documents and looking for opportunities to make similar improvements.

Many CNSC staff have participated in joint training sessions with Indian and Northern Affairs Canada and the Department of Justice on the constitutional requirements for Aboriginal consultation. Initial training through a workshop on best practices in Aboriginal consultation was also offered in Saskatoon.

Finally, to strengthen and coordinate Aboriginal consultation activities, policies and procedures across the CNSC, the organization established a senior-management level Aboriginal Consultation Steering Committee that meets monthly to review and provide advice on the subject.

IMPROVING TRANSPARENCY

The CNSC's Web site, nuclearsafety.gc.ca, was revamped in 2008–09 to provide convenient access to a greater range of information for licensees, the Canadian public and other stakeholders.

The CNSC launched an electronic comment form to expand its consultations for draft regulatory documents, which are made available for public comment. The new online form enables the CNSC to gather feedback from a broader audience, while making it simpler and more convenient for stakeholders to provide input. Stakeholders may continue to provide input by fax, email and conventional mail.

The CNSC used the new comment form to gather input on three draft regulatory documents, beginning with *Joint Canada-United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages* (RD-364), a collaborative effort between Canada and the US. After receiving Commission Tribunal approval to issue the draft RD-364 for public consultation, the CNSC posted it on its Web site in both official languages for a 75-day consultation period. Twenty-five key stakeholders, including industry, government and non-governmental organizations were invited to comment. All input was posted on the CNSC Web site for further feedback and the draft document underwent a consultative process in the US led by the CNSC's counterpart, the US Nuclear Regulatory Commission. RD-364 was revised based on all input, approved by the Commission Tribunal and published.

The CNSC held public consultations, regular licensee and stakeholders meetings, and conducted technical briefings and presentations during the development and implementation of the training and examination program that certifies people working at NPPs. Overall, the stakeholders' responses were minor. No major objections were expressed about the content and purpose of the regulatory document.

RECOGNIZING CNSC EXPERTISE

The CNSC's expertise is gaining increasing recognition and becoming highly sought after throughout the nuclear sector, as evidenced by invitations to share our knowledge both in Canada and internationally:

- At the request of the IAEA Director General, a CNSC representative from the International Safeguards Division currently chairs the Standing Advisory Group on Safeguards Implementation, which provides expert advice on the technical objectives and implementation parameters of IAEA safeguards.
- A CNSC expert specializing in environmental risk assessment acted as an expert reviewer of the work done for the PROTECT project. This project is a European Union-funded initiative to develop methods to assess the risks of exposures to ionizing radiation to plants and animals.
- Two CNSC experts, one specializing in environmental risk assessment and the other in ventilation for uranium mines and mills, delivered presentations at the Intergovernmental Working Group on the Mineral Industry Workshop, held in Québec city in February 2009. The workshop aimed to develop recommendations on how governments should address issues related to the public's perception of, and response to, uranium exploration and mining.

The CNSC has become a major player in the Community of Federal Regulators.

- A CNSC representative from the Uranium Mines and Mills Division was invited to speak at the Swiss Nuclear Forum in Olten, Switzerland in November 2008. The presentation provided an overview of the licensing of uranium mines and mills in Canada and of the CNSC's role in protecting the health, safety and security of Canadians, as well as the environment.
- A CNSC expert in environmental risk assessment was invited to present at the October 2008 meeting of the Integration Group for the Safety Case held by the Nuclear Energy Agency in France. The session was held to define issues and gather information about experiences and challenges related to operational safety at mine sites that might apply to the safe storage of nuclear waste at deep repositories. The presentation focused on conventional mine safety and nuclear safety.

- The CNSC also made presentations to the Canadian Council of Independent Laboratories Association, the Canadian Radiation Protection Association, Canadian Association of Medical Radiation Technologies, Canadian Organization of Medical Physicists and the Association of Western Canadian Radiation Therapy Professionals.

In addition, CNSC staff contributed to the revision, updating and modernizing of several Canadian Standards Association standards for nuclear power plants in 2008–09.

CONSULTING WITH GOVERNMENT, NGOS AND INDUSTRY

The CNSC continued its efforts in 2008–09 to engage the non-governmental organization (NGO) community through its NGO Regulatory Affairs Committee. This important connection enables the CNSC to provide key information to the NGO community and inform them of regulatory objectives, plans, activities and decisions. It also enables NGO members to provide input and advice to the CNSC on issues of nuclear regulation in Canada.

The CNSC continued to consult with the Canadian Nuclear Association regarding broad issues related to the regulation of the nuclear industry. This relationship allows the CNSC and industry to gain an appreciation of each others' priorities and operational challenges. For example, the CNSC was able to clarify the government directives and policies it must consider as it regulates the nuclear industry.

The CNSC also participated in several conferences and tradeshows, attending the Community of Federal Regulators (CFR) workshop and three industry conferences, all of which helped promote the CNSC's role as Canada's nuclear regulator.

Through the Canadian Nuclear Utilities Executive Forum, the CNSC consulted with industry on nuclear regulation issues. The CNSC also formed a CNSC-industry Large-Break Loss of Coolant Accident (LOCA) working group,

CNSC executives accept the Regulatory Excellence Award in Innovation from the Community of Federal Regulators. Pictured above with Dr. Malcolm Sparrow, Professor of the Practice of Public Management at Harvard's John F. Kennedy School of Government (second from left) are CNSC executives (from left to right) Ramzi Jammal, Executive Vice-President, Regulatory Operations and Chief Regulatory Operations Officer; André Régimbald, Director General, Nuclear Substance Regulation; Gordon White, Vice-President Corporate Services and Chief Financial Officer; Patricia McDowell, Vice-President, Regulatory Affairs.

CNSC wins Regulatory Excellence Award in Innovation

The Community of Federal Regulators (CFR) Awards recognize improvements in regulatory policy, working collaboratively and innovation. Through these awards, the CFR recognizes achievements and successful initiatives within the federal regulatory community.

The CNSC was the proud winner of the CFR Regulatory Excellence Award in Innovation for its National Sealed Source Registry-Sealed Source Tracking System (NSSR-SSTS). The primary scope of the NSSR-SSTS is the registration and tracking of more than 15,000 high-risk radioactive sources and radiation devices used in medical, academic and industrial practices in Canada. It also includes registration and tracking of the high-risk sources imported into or exported from Canada. To find out more about the NSSR-SSTS, visit nuclearsafety.gc.ca

CNSC staff visited Port Hope, where a presentation was made to the Mayor of the Municipality of Port Hope, Linda Thompson, and the Port Hope Municipal Council.

which provided technical support to the CNUEF as members worked to resolve the large-break LOCA safety margin issue.

The Uranium Producers Executive Forum was established to identify strategic challenges and opportunities that may influence the uranium mining industry and the CNSC, and to facilitate mutual understanding on:

- existing and emerging issues pertaining to the CNSC's mandate for health, safety, security, and the environment
- new industry developments and major projects
- respective focus areas and strategic plans and priorities where practical and appropriate

The CNSC has become a major player in the CFR. CNSC staff have taken this opportunity to reach out to the broader regulatory community of the CFR in areas such as common training initiatives related to the *Cabinet Directive on Streamlining Regulation*, performance measurement and best practices groups.

SUPPORTING UNIVERSITY STUDENTS

The CNSC continues to mentor engineering students by participating in the Universities' Network of Excellence in Nuclear Engineering (UNENE) activities and meetings, including a meeting during this fiscal year at the University of Western Ontario. The UNENE is an alliance of universities, nuclear power utilities, and research and regulatory agencies. Its mission is to support nuclear education, research and development in Canadian universities. Not only does the CNSC's involvement in the UNENE help prepare students for nuclear careers, it also helps influence the research done at participating universities—research that advances our knowledge and understanding of technical issues.

SOLIDIFYING PARTNERSHIPS

The CNSC continued to work with federal partners in regulating the Canadian nuclear industry, strengthening many relationships and realizing many achievements during 2008–09:

Natural Resources Canada

Natural Resources Canada (NRCan) is the lead department for the development and implementation of Canadian government policy on nuclear energy. It provides advice on energy policy, as well as institutional, legislative and financial frameworks for the nuclear industry in Canada.

- NRCan provides the CNSC with advice and is the lead agency responsible for the *Explosives Act* and its application to uranium mines. In the course of its activities, the CNSC has conducted joint inspections

of sealed sources in partnership with NRCan explosives inspectors.
- NRCan conducts exposure device operator examinations for the CNSC.
- Where required, the CNSC's matters are dealt with in Parliament by NRCan's Minister.
- The CNSC met with federal government partners to implement the Government Protocol on isotope supply. The CNSC led discussions with international regulators on isotope supply in early December 2008. The organization also contributed to the Canadian delegation led by NRCan to a Nuclear Energy Agency-hosted international workshop in January 2009.

Health Canada

Health Canada plays a key role in monitoring the supply of medical isotopes in the health care system and protecting Canadians from the risk of radiation exposure from medical procedures that use radioactive substances. It is the lead federal department responsible for the Federal Nuclear Emergency Plan and is a key department supporting the *Comprehensive Nuclear Test Ban Treaty*.

- The CNSC often consults with Health Canada on matters of public or worker health.
- Health Canada provides radiation exposure and protection guidelines to various government agencies, the industry and the general public. It manages the National Dose Registry, which contains occupational radiation dose records for all monitored radiation workers in Canada.
- Health Canada, the CNSC, the Department of National Defence and the provinces meet annually to discuss common issues as part of the Federal-Provincial-Territorial Radiation Protection Committee.
- While the CNSC prescribes the regulatory dose limits for nuclear energy workers and members of the public, Health Canada is responsible for publishing guidelines on dose limits that are adopted by Labour Canada.

Environment Canada

- The CNSC consults with Environment Canada on the environmental effects of nuclear substances, activities and waste, including non-radiological aspects that may harm the environment. Particular attention is paid to the *Species at Risk Act* and *Migratory Birds Convention Act*.
- Environment Canada provides advice to the CNSC on programs and legislation that affect NPPs, uranium mines and mills and other nuclear facilities across Canada.

Canadian Environmental Assessment Agency

- The CNSC often consults with the Canadian Environmental Assessment Agency for EAs that are undertaken for nuclear projects.
- The Agency serves Canadians by administering the *Canadian Environmental Assessment Act*, which is designed to help eliminate or reduce a project's potential effects on the environment at the planning stage. As a regulator, the CNSC is a Responsible Authority under that act.

Transport Canada

Transport Canada's role in the nuclear sector is to promote public safety during the transportation of dangerous goods.

- Transport Canada relies on the CNSC's advice on matters of transport or import of radioactive materials.
- Under the terms of a 2007 MOU, Transport Canada and the CNSC have a partnership that establishes clear notification procedures and avoids overlapping responsibilities under the provisions of the *Transport of Dangerous Goods Act* (TDGA) and its associated regulations. Transport Canada does not directly regulate the activities of the nuclear industry and workers, but is the enforcer of the TDGA, and it may, along with the provinces, impose fines for incidents that occur during the transport of nuclear substances.

The Canadian Security Intelligence Service and the Royal Canadian Mounted Police

- The CNSC has signed MOUs with the Canadian Security Intelligence Service and the Royal Canadian Mounted Police on the sharing of key security information.

Funding of Operations

The CNSC's workload and resource requirements are largely driven by the demand for licensing and regulatory oversight of Canada's expanding nuclear industry and by Canada's international commitments respecting nuclear safety, security and non-proliferation.

Before 2008–09, the CNSC was funded exclusively through an annual appropriation from Parliament. The CNSC recovers most costs associated with its regulatory activities from licensees in accordance with the *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations* (2003) and prior to 2008-09, all fees collected were deposited to the Government of Canada's Consolidated Revenue Fund as general revenues. The regulations also state that some licensees, such as hospitals and universities, are exempt from paying fees and fees are not charged for activities that result from CNSC obligations that do not provide a direct benefit to identifiable licensees. These include activities associated with Canada's international obligations (including the non-proliferation of nuclear weapons), public responsibilities such as emergency management and public information programs, and updating of the *Nuclear Safety and Control Act* and associated regulations as appropriate.

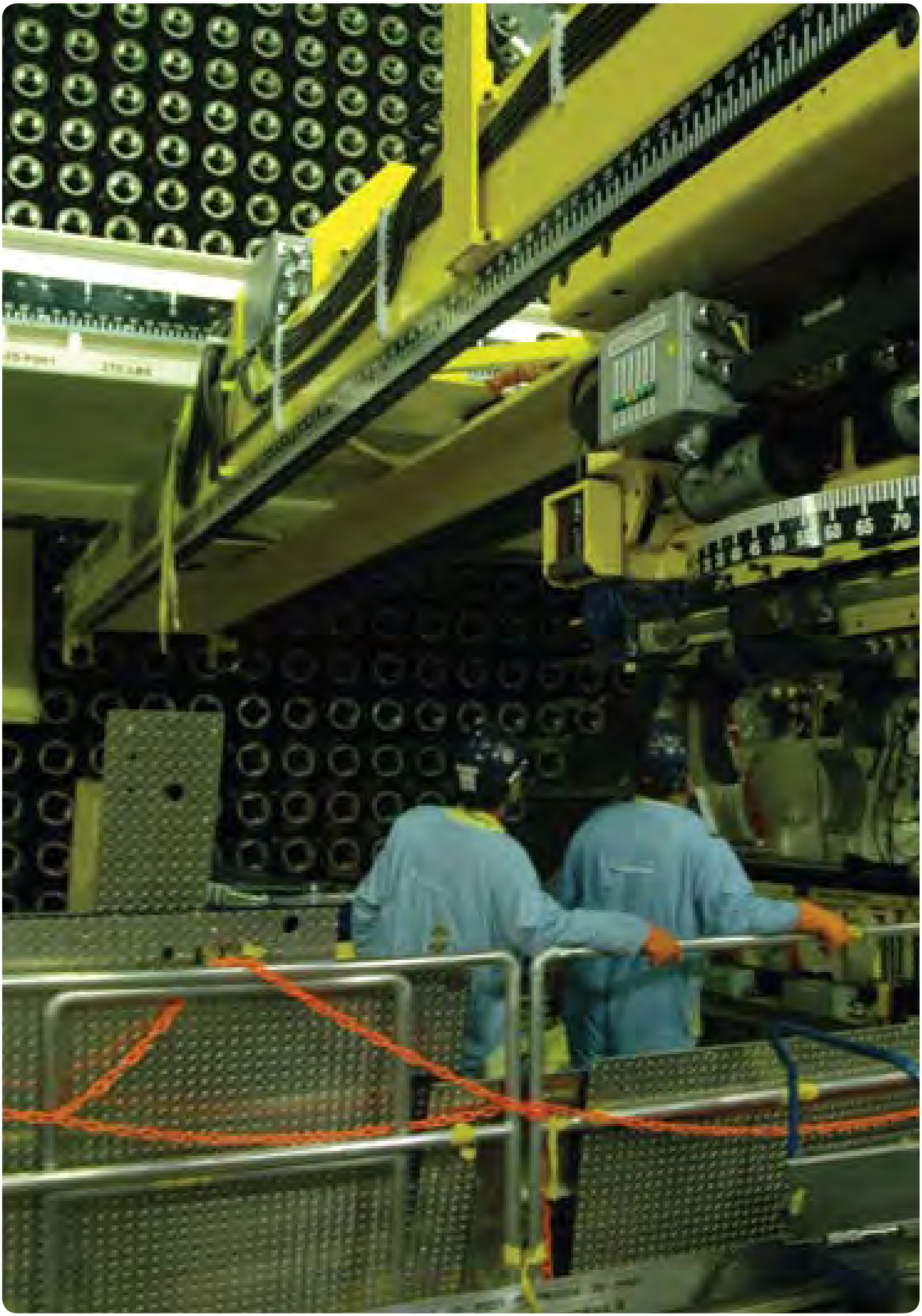
In 2007–08 the CNSC received Treasury Board approval to phase in a revenue spending authority, beginning in 2008–09 and with full implementation in 2009–10. The revenue spending authority allows the CNSC to re-spend revenues from fees and establishes a more sustainable funding regime. In 2008–09, the revenue spending authority was applied to new nuclear reactor applications as well as new uranium mine applications.

Effective 2009-10, CNSC's cost recovered activities will no longer be funded through an appropriation but rather will be funded through the revenue spending authority. This authority will provide a sustainable and timely funding regime to address regulatory oversight workload requirements associated with the Canadian nuclear industry growth.

ADDITIONAL FUNDING RESOURCES RECEIVED FOR 2008–09

For 2008–09, CNSC's actual expenditures were $118.0 million. Fees received were $87.0 million of which $19.1 million were from CNSC revenue spending authority. In addition to the Main Estimates level of $90.2 million, the CSNC sources of funds were further increased by a total of $30.3 million during the course of the year through the approval of the revenue spending authority, Supplementary Estimates and transfers from Treasury Board. The increase to the CNSC's funding is mainly explained by the following initiatives: $15.5 million for regulatory licensing activities and pre-licensing design reviews of new nuclear power plants and uranium mines under the revenue spending authority; $3.2 million for operating budget carry forward from 2007-08; $3.8 million for repayable funding for priority investments in office accommodation and system infrastructure to support CNSC growth; $3.7 million to address workload pressures associated with fee-exempt licensees; and $2.6 million for various compensation items.

The CNSC's cost of operations includes actual expenditures as identified above as well as services received without charge, depreciation and increase to severance and vacation liability for a total cost of operations of $131.9M.



Canadian Nuclear Safety Commission

Financial Statements

Canadian Nuclear Safety Commission

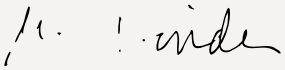
Management Responsibility for Financial Statements

The integrity and objectivity of the accompanying financial statements of the Canadian Nuclear Safety Commission (CNSC) for the year ended March 31, 2009, and all information included in its annual report, are the responsibility of CNSC management.

These financial statements have been prepared by management in accordance with Treasury Board accounting policies and year-end instructions issued by the Office of the Comptroller General, which are consistent with Canadian generally accepted accounting principles for the public sector. Some of the information in the financial statements is based on management's best estimates and judgement and gives due consideration to materiality. To fulfil its accounting and reporting responsibilities, management maintains a set of accounts that provides a centralized record of the CNSC's financial transactions. Financial information submitted to the *Public Accounts of Canada* and included in this annual report and the CNSC's *Departmental Performance Report* is consistent with these financial statements.

Management maintains a system of financial management and internal control designed to provide reasonable assurance that financial information is reliable, that assets are safeguarded and that transactions are in accordance with the *Financial Administration Act* and regulations as well as CNSC policies and statutory requirements such as the *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations*. Management also seeks to ensure the objectivity and integrity of data in its financial statements by careful selection, training and development of qualified staff, by organizational arrangements that provide appropriate divisions of responsibility, and by communication programs aimed at ensuring that regulations, policies, standards and managerial authorities are understood throughout the CNSC.

The CNSC's external auditor, the Auditor General of Canada, has audited the financial statements and at the specific request of the CNSC, compliance with the *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations*. The Auditor General has reported on her audit and compliance findings to the CNSC and to the Minister of Natural Resources.



Michael Binder
President

Gordon White
Vice-President,
Corporate Services and
Chief Financial Officer

Ottawa, Canada
June 19, 2009

Canadian Nuclear Safety Commission

Auditor's Report

To the Canadian Nuclear Safety Commission
and the Minister of Natural Resources

I have audited the statement of financial position of the Canadian Nuclear Safety Commission as at March 31, 2009 and the statements of operations, equity of Canada and cash flows for the year then ended and the Commission's compliance with the *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations* pursuant to the *Nuclear Safety and Control Act*. These financial statements and compliance with the *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations* are the responsibility of the Commission's management. My responsibility is to express an opinion, based on my audit, on these financial statements and compliance with the *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations* pursuant to the *Nuclear Safety and Control Act*.

I conducted my audit in accordance with Canadian generally accepted auditing standards. Those standards require that I plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement and whether the Commission has complied with the *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations*. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements and evidence supporting compliance. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation and compliance with the *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations*.

In my opinion, these financial statements present fairly, in all material respects, the financial position of the Commission as at March 31, 2009 and the results of its operations and its cash flows for the year then ended in accordance with Canadian generally accepted accounting principles. Further, in my opinion, the Canadian Nuclear Safety Commission has complied, in all significant respects, with the *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations* pursuant to the *Nuclear Safety and Control Act.*

Nancy Y. Cheng, FCA
Assistant Auditor General
for the Auditor General of Canada

Ottawa, Canada
June 19, 2009

Canadian Nuclear Safety Commission

Statement of Financial Position as at March 31

	2009	2008
Assets		
Financial assets:		
Due from the Consolidated Revenue Fund	$ 22,571,042	$ 17,461,994
Accounts receivable (note 4)	9,949,939	9,764,934
	32,520,981	27,226,928
Non-financial assets:		
Prepaid expenses	297,349	196,263
Tangible capital assets (note 5)	6,267,845	3,041,461
Total assets	**$ 39,086,175**	**$ 30,464,652**
Liabilities and equity of Canada		
Accounts payable and accrued liabilities	$ 13,002,018	$ 8,333,969
Payable to licensees	9,569,024	9,128,025
Vacation pay	4,869,847	4,644,528
Deferred revenue (note 6)	1,665,690	1,671,320
Employee severance benefits (note 7b)	18,623,776	13,534,978
	47,730,355	37,312,820
Equity of Canada	(8,644,180)	(6,848,168)
Total liabilities and equity of Canada	**$ 39,086,175**	**$ 30,464,652**

Contractual obligations and contingent liabilities (note 10)

The accompanying notes are an integral part of these financial statements.

Michael Binder
President

Gordon White
Vice-President,
Corporate Services and
Chief Financial Officer

Canadian Nuclear Safety Commission

Statement of Operations for the Year Ended March 31

	2009	2008
Revenues		
Licence fees	$ 83,603,723	$ 72,565,186
Special projects	3,409,312	—
Other	2,172	11,076
Total revenues (note 9)	87,015,207	72,576,262
Expenses		
Salaries and employee benefits	94,204,404	76,815,904
Professional and special services	16,812,204	17,094,416
Accommodation	5,886,225	5,755,992
Travel and relocation	5,131,285	4,256,915
Furniture, repairs and rentals	4,801,311	4,884,188
Communication and information	2,684,255	2,054,498
Grants and contributions	1,030,444	994,520
Utilities, materials and supplies	975,105	841,002
Other	434,066	740,533
Total expenses (note 9)	131,959,299	113,437,968
Net cost of operations	**$ 44,944,092**	**$ 40,861,706**

The accompanying notes are an integral part of these financial statements.

Canadian Nuclear Safety Commission

Statement of Equity of Canada as at March 31

	2009	2008
Equity of Canada at beginning of year	$ (6,848,168)	$ (9,644,124)
Net cost of operations	(44,944,092)	(40,861,706)
Services provided without charge (note 12a)	12,075,295	10,117,084
Net cash provided by government (note 3c)	25,963,737	24,484,980
Change in due from the Consolidated Revenue Fund	5,109,048	9,055,598
Equity of Canada at end of year	**$ (8,644,180)**	**$ (6,848,168)**

The accompanying notes are an integral part of these financial statements.

Canadian Nuclear Safety Commission

Statement of Cash Flows for the Year Ended March 31

	2009	2008
Operating activities		
Net cost of operations	$ 44,944,092	$ 40,861,706
Non-cash items:		
Amortization of tangible capital assets (note 5)	(404,449)	(426,500)
Services provided without charge by government departments and agencies (note 12a)	(12,075,295)	(10,117,084)
Net loss on disposal of surplus assets	—	(55,362)
Variations in statement of financial position:		
Increase in accounts receivable	185,005	1,440,746
Increase (decrease) in prepaid expenses	101,086	(385,769)
Increase in liabilities	(10,417,535)	(6,927,619)
Cash used by operating activities	22,332,904	24,390,118
Capital investment activities		
Acquisitions of tangible capital assets (note 5)	3,630,833	102,172
Proceeds on disposal of surplus assets	—	(7,310)
Cash used by capital investment activities	3,630,833	94,862
Net cash provided by government (note 3c)	**$ 25,963,737**	**$ 24,484,980**

The accompanying notes are an integral part of these financial statements.

Canadian Nuclear Safety Commission

Notes to the Financial Statements

❶ AUTHORITY AND OBJECTIVES

The Canadian Nuclear Safety Commission (CNSC) was established in 1946 by the *Atomic Energy Control Act*. Prior to May 31, 2000, when the federal *Nuclear Safety and Control Act* (NSCA) came into effect, the CNSC was known as the Atomic Energy Control Board (AECB). The CNSC is a departmental corporation listed in Schedule II to the *Financial Administration Act* and reports to Parliament through the Minister of Natural Resources.

The *Nuclear Safety and Control Act* provides comprehensive powers to the CNSC to establish and enforce national standards for nuclear energy in the areas of health, safety and environment. It establishes a basis for implementing Canadian policy and fulfilling Canada's obligations with respect to the non-proliferation of nuclear weapons. The CNSC is empowered to require financial guarantees, order remedial action in hazardous situations and require responsible parties to bear the costs of decontamination and other remedial measures.

The CNSC's objectives are to:

- regulate the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and information in order to: a) prevent unreasonable risk to the environment, to the health and safety of persons and to national security; and b) achieve conformity with measures of control and international obligations to which Canada has agreed; and
- disseminate scientific, technical and regulatory information concerning: a) the activities of the CNSC; b) the development, production, possession, transport and use of nuclear energy and substances; and c) the effects of nuclear energy and substances use on the environment and on the health and safety of persons.

The CNSC also administers the *Nuclear Liability Act*, including designating nuclear installations and prescribing basic insurance to be carried by the operators of such nuclear installations, and the administration of supplementary insurance coverage premiums for these installations.

Pursuant to the *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations*, the CNSC recovers costs related to its regulatory activities from users licensed under the NSCA. These costs include the technical assessment of licence applications, compliance inspections and the development of licence standards.

❷ SIGNIFICANT ACCOUNTING POLICIES

These financial statements have been prepared in accordance with Treasury Board accounting policies and year-end instructions issued by the Office of the Comptroller General, which are consistent with Canadian generally accepted accounting principles for the public sector. The significant accounting policies are:

A) PARLIAMENTARY APPROPRIATIONS AND RESPENDABLE REVENUE AUTHORITY

The CNSC is financed by the Government of Canada through parliamentary and statutory appropriations. Included in the statutory appropriation is a respendable revenue authority which allows the CNSC to respend licence fee revenue. Appropriations provided to the CNSC do not parallel financial reporting according to generally accepted accounting principles as appropriations are primarily based on cash flow requirements. Consequently, items reported in the statement of operations and the statement of financial position are not necessarily the same as those reported through appropriations from Parliament. Note 3 provides a high-level reconciliation between the two bases of reporting.

B) NET CASH PROVIDED BY GOVERNMENT

The CNSC operates within the Consolidated Revenue Fund (CRF), which is administered by the Receiver General for Canada. All cash received by the CNSC is deposited to the CRF and all cash disbursements made by the CNSC are paid from the CRF. The net cash provided by government is the difference between all cash receipts and all cash disbursements including transactions with federal government departments.

C) DUE FROM THE CONSOLIDATED REVENUE FUND

Due from the Consolidated Revenue Fund represents the amount of cash that CNSC is entitled to draw from the Consolidated Revenue Fund, without further appropriations, in order to discharge its liabilities.

D) REVENUE

Revenue is recognized in the period in which the underlying transaction or event occurred that gave rise to the revenue. Licence fee revenue is recognized on a straight-line basis over the period to which the fee payment pertains (normally three months or one year). Licence fees received for future year licence periods are recorded as deferred revenue.

On December 17, 2007, the Government of Canada conferred on the CNSC the authority to respend licence fee revenue. The authority is being phased in over the 2008–09 and 2009–10 fiscal years. The first phase, effective April 1, 2008, includes the following:

- new licence applications for Class I nuclear facilities received on or after October 1, 2007;
- applications for licences for new reactors received on or after August 17, 2006;
- new applications for uranium mines or mills, inclusive of all applications received on or after October 1, 2007, to construct or operate a mine or mill; and
- all new applications, received on or after October 1, 2007, for nuclear waste activities that are not located at a Class I or Class II nuclear facility or at a mine or mill.

The second phase, effective April 1, 2009, will include all other cost-recovered activities.

Certain educational institutions, not-for-profit research institutions wholly owned by educational institutions, publicly funded health care institutions, not-for-profit emergency response organizations and federal government departments are not subject to the *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations*.

The CNSC provides licences to these organizations free of charge. The value of licences provided free of charge is calculated on the same basis as licence fees for organizations subject to the regulations.

(E) PAYABLE TO LICENSEES

Payable to licensees represents the excess of collections on estimated fees charged over the actual fees earned as calculated at year end.

(F) VACATION PAY AND COMPENSATORY LEAVE

Vacation pay and compensatory leave are expensed as the benefits accrue to employees under their respective terms of employment.

(G) GRANTS AND CONTRIBUTIONS

Grants are recognized in the year in which the conditions for payment are met. Contributions are recognized in the year in which the recipient has met the eligibility criteria or fulfilled the terms of a contractual transfer agreement.

(H) SERVICES PROVIDED WITHOUT CHARGE BY OTHER GOVERNMENT DEPARTMENTS AND AGENCIES

Services provided without charge by other government departments and agencies are recorded as operating expenses at their estimated cost. These include services such as accommodation provided by Public Works and Government Services Canada, contributions covering employer's share of employees' insurance premiums and costs paid by Treasury Board Secretariat, salaries and associated legal costs of services provided by Justice Canada, audit services provided by the Office of the Auditor General, and workers' compensation benefits provided by Human Resources and Social Development Canada.

(I) PENSION BENEFITS

All eligible employees participate in the Public Service Pension Plan, a multi-employer plan, administered by the Government of Canada. The CNSC's contributions to the plan are charged to expenses in the year incurred and represent the total CNSC obligation to the plan. Current legislation does not require the CNSC to make contributions for any actuarial deficiencies of the plan.

(J) EMPLOYEE SEVERANCE BENEFITS

Employees are entitled to severance benefits, as provided for under their respective terms of employment. The cost of these benefits is accrued as employees render the services necessary to earn them. The obligation related to the benefits earned by employees is calculated using information derived from the results of the actuarially determined liability for employee severance benefits for the government as a whole.

(K) ACCOUNTS RECEIVABLE

Accounts receivable are stated at amounts expected to be ultimately realized; a provision is made for receivables where recovery is considered uncertain.

(L) CONTINGENT LIABILITIES

Contingent liabilities are potential liabilities that may become actual liabilities when one or more future events occur or fail to occur. To the extent that the future event is likely to occur or fail to occur, and a reasonable estimate of the loss can be made, an estimated liability is accrued and an expense recorded. If the likelihood is not

determinable or an amount cannot be reasonably estimated, the contingency is disclosed in the notes to the financial statements.

(M) TANGIBLE CAPITAL ASSETS

Tangible capital assets and leasehold improvement with an initial cost of $10,000 or more are recorded at their acquisition cost. Amortization is calculated on a straight-line basis over the estimated useful life of the asset as follows:

ASSET CLASS	AMORTIZATION PERIOD
Leasehold improvements	the lower of the useful life of the improvement or the remaining term of the lease
Buildings	20 to 30 years
Furniture and equipment	5 to 20 years
Informatics equipment and software	2 to 5 years
Motor vehicles	4 years

(N) NUCLEAR LIABILITY REINSURANCE ACCOUNT

The CNSC administers the Nuclear Liability Reinsurance Account on behalf of the federal government. The CNSC receives premiums paid by the operators of nuclear installations for the supplementary insurance coverage and credits these to the Nuclear Liability Reinsurance Account in the Consolidated Revenue Fund. Since the CNSC does not have the risks and rewards of ownership, nor does it have accountability for this account, it does not include any of the associated financial activity or potential liability in its financial statements. Financial activity and liability is, however, reported in note 11 of these financial statements.

(O) MEASUREMENT UNCERTAINTY

The preparation of these financial statements in accordance with Treasury Board accounting policies and year-end instructions issued by the Office of the Comptroller General, which are consistent with Canadian generally accepted accounting principles for the public sector, requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenues and expenses reported in the financial statements. At the time of preparation of these statements, management believes the estimates and assumptions to be reasonable. The most significant items where estimates are used are contingent liabilities, the liability for employee severance benefits and the useful life of tangible capital assets. Actual results could significantly differ from those estimated. Management's estimates are reviewed periodically and, as adjustments become necessary, they are recorded in the financial statements in the year they become known.

❸ PARLIAMENTARY APPROPRIATIONS

The CNSC receives its funding through Parliamentary and statutory appropriations. Items recognized in the statement of operations and the statement of financial position in one year may be funded through appropriations in prior, current and future years. Accordingly, the CNSC has different net results of operations for the year on a government funding basis than on an accrual accounting basis. These differences are reconciled below.

(A) RECONCILIATION OF NET COST OF OPERATIONS TO CURRENT YEAR APPROPRIATIONS USED

	2009	2008
Net cost of operations	$ 44,944,092	$ 40,861,706
Adjustments for items affecting net cost of operations but not affecting appropriations:		
Add (Less):		
Amortization of tangible capital assets	(404,449)	(426,500)
Vacation pay and compensatory leave	(225,319)	(652,231)
Services provided without charge by other government departments and agencies	(12,075,295)	(10,117,084)
Revenue not available for spending	71,526,893	72,576,262
Revenues pursuant to Subsection 29.1(1) of the *Financial Administration Act* (FAA)	15,488,314	—
Employee severance benefits	(5,088,798)	(2,010,357)
Bad debts	(34,191)	(205,728)
Other expenses	159,761	102,144
	69,346,916	59,266,506
Adjustments for items not affecting net cost of operations but affecting appropriations:		
Add (Less):		
Acquisitions of tangible capital assets	3,630,833	102,172
Variation in prepaid expenses	101,086	(385,769)
	3,731,919	(283,597)
Current year appropriations used	**$ 118,022,927**	**$ 99,844,615**

B) APPROPRIATIONS PROVIDED AND USED

	2009	2008
Parliamentary appropriations voted:		
Vote 15 – CNSC program expenditures	$ 93,487,723	$ 93,488,162
Statutory:		
Expenditures pursuant to Subsection 29.1(1) of the *FAA*	15,488,314	—
Spending of proceeds from the disposal of surplus assets	7,310	25,301
Contributions to employee benefit plans	11,532,937	9,974,686
Less:	120,516,284	103,488,149
Lapsed appropriation	2,493,357	3,643,534
Current year appropriations used	**$ 118,022,927**	**$ 99,844,615**

C) RECONCILIATION OF NET CASH PROVIDED BY GOVERNMENT TO CURRENT YEAR APPROPRIATIONS USED

	2009	2008
Net cash provided by government	$ 25,963,737	$ 24,484,980
Revenue not available for spending	71,526,893	72,576,262
Revenue pursuant to Subsection 29.1(1) of the *FAA*	15,488,314	—
Change in net position in the Consolidated Revenue Fund:		
Variation in accounts receivable	(185,005)	(1,440,746)
Variation in accounts payable and accrued liabilities	4,668,049	(72,427)
Variation in payables to licensees	440,999	9,128,025
Variation in deferred revenues	(5,630)	(4,790,567)
Other adjustments	26,404	(147,549)
Refunds of prior years' expenses	99,166	106,637
Current year appropriations used	**$ 118,022,927**	**$ 99,844,615**

4 ACCOUNTS RECEIVABLE

	2009	2008
Licence fees	$ 8,834,007	$ 9,663,089
Other government departments	1,199,547	172,225
Suppliers	156,304	135,348
Gross receivables	10,189,858	9,970,662
Allowance for doubtful accounts	239,919	205,728
Net receivables	**$ 9,949,939**	**$ 9,764,934**

❺ TANGIBLE CAPITAL ASSETS

	Cost				Accumulated Amortization				2009	2008
Capital asset class	Opening balance	Acquisitions	Disposals adjustments	Closing balance	Opening balance	Amortization	Disposals adjustments	Closing balance	Net book value	Net book value
Buildings	$ 23,805	$ 23,701	$ —	$ 47,506	$ —	$ 1,179	$ —	$ 1,179	$ 46,327	$ 23,805
Furniture and equipment	3,789,196	17,325	—	3,806,521	1,561,328	231,414	—	1,792,741	2,013,780	2,227,868
Informatics equipment and software	1,106,378	363,288	—	1,469,666	469,298	103,989	—	573,287	896,379	637,080
Leasehold improvements	—	2,056,000	—	2,056,000	—	—	—	—	$ 2,056,000	—
Motor vehicles	483,772	69,675	—	553,447	331,064	67,867	—	398,931	154,516	152,708
Work-in-progress — software	—	1,100,844	—	1,100,844	—	—	—	—	1,100,844	—
Total	**$5,403,151**	**$3,630,833**	**$ —**	**$ 9,033,984**	**$2,361,690**	**$ 404,449**	**$ —**	**$2,766,139**	**$6,267,845**	**$3,041,461**

Amortization for the current year amounts to $404,449 (2008 – $426,500) and is included in other expenses on the statement of operations.

❻ DEFERRED REVENUE

	2009	2008
Balance at beginning of year	$ 1,671,320	$ 6,461,887
Less: revenue recognized in licence fees in the year	(1,656,500)	(6,449,922)
Add: fees received in the year for future year licence periods	1,650,870	1,659,355
Balance at end of year	**$ 1,665,690**	**$ 1,671,320**

7 EMPLOYEE FUTURE BENEFITS

A) PENSION BENEFITS

The CNSC and all eligible employees participate in the Public Service Pension Plan, which is sponsored and administered by the Government of Canada. Pension benefits accrue up to a maximum period of 35 years at a rate of 2 percent per year of pensionable service, multiplied by the average of the best 5 consecutive years of earnings. The benefits are integrated with Canada/Québec Pension Plans and they are indexed to inflation. The employer's and employees' contributions to the plan were as follows:

	2009	2008
CNSC contribution to pension plan	$ 8,326,780	$ 7,271,546
Employees' contributions	$ 4,177,516	$ 3,575,784

The CNSC's responsibility with regard to the Plan is limited to its contributions. Actuarial surpluses or deficiencies are recognized in the financial statements of the Government of Canada, as the plan's sponsor.

B) EMPLOYEE SEVERANCE BENEFITS

The CNSC provides severance benefits to its employees based on eligibility, years of service and final salary. This benefit plan is not pre-funded. Benefits will be paid from future appropriations. Information about the severance benefits, measured as at March 31, is as follows:

	2009	2008
Accrued benefit obligation, beginning of year	$ 13,534,978	$ 11,524,621
Expense for the year	6,227,025	2,821,208
Benefits paid during the year	(1,138,227)	(810,851)
Accrued benefit obligation, end of year	**$ 18,623,776**	**$ 13,534,978**

8 LICENCES PROVIDED FREE OF CHARGE BY THE CNSC

The CNSC provides licences free of charge to educational institutions, not-for-profit research institutions wholly owned by educational institutions, publicly funded health care institutions, not-for-profit emergency response organizations, and federal departments. The total value of these licences amounted to $8,963,097 (2008 – $8,953,300).

❾ SUMMARY OF EXPENDITURES AND REVENUES BY COST RECOVERY FEE CATEGORY

	Revenue*	Licences provided free of charge (note 8)	2009 total value of licences and other revenue	2008 total value of licences and other revenue	2009 cost of operations	2008 cost of operations
Licensing, certification and compliance						
Power reactors*	$ 59,291,071	$ —	$ 59,291,071	$ 49,914,392	$ 59,291,071	$ 49,914,394
Non-power reactors	58,511	843,545	902,056	1,975,506	902,056	1,975,507
Nuclear research and test establishments	7,755,710	—	7,755,710	5,141,436	7,755,710	5,141,437
Particle accelerators	—	691,421	691,421	900,343	691,421	900,343
Uranium processing facilities	2,778,137	—	2,778,137	3,361,237	2,778,161	3,424,390
Nuclear substance processing facilities	497,307	—	497,307	652,625	497,307	844,045
Heavy water plants	40,058	—	40,058	10,145	40,058	10,145
Radioactive waste facilities	2,103,048	—	2,103,048	1,566,384	2,103,048	1,566,382
Uranium mines and mills*	5,860,131	173,600	6,033,731	5,601,627	6,062,155	5,601,628
Waste nuclear substance	459,404	1,078,154	1,537,558	1,104,481	1,537,558	1,193,429
Total regulatory plan activities fees	**78,843,377**	**2,786,720**	**81,630,097**	**70,228,176**	**81,658,545**	**70,571,700**
Nuclear substances	3,995,493	3,972,399	7,967,892	8,153,575	9,408,252	8,697,113
Class II nuclear facilities	259,878	2,171,178	2,431,056	2,563,178	3,281,201	3,294,172
Dosimetry services	39,825	3,300	43,125	44,507	667,250	1,123,965
Total formula fees	**4,295,196**	**6,146,877**	**10,442,073**	**10,761,260**	**13,356,703**	**13,115,250**
Transport licences and transport package certificates	185,150	26,500	211,650	203,650	638,813	696,757
Radiation device and prescribed equipment certificates	108,000	3,000	111,000	134,000	431,816	410,639
Exposure device operator certificates	172,000	—	172,000	191,400	143,586	141,307
Total fixed fees	**465,150**	**29,500**	**494,650**	**529,050**	**1,214,215**	**1,248,703**
Total licensing and certification	**83,603,723**	**8,963,097**	**92,566,820**	**81,518,486**	**96,229,463**	**84,935,653**
Non-licensing and non-certification						
Co-operative undertakings	2,172	—	2,172	11,076	16,945,080	19,399,365
Stakeholder relations	—	—	—	—	12,501,280	8,241,758
Regulatory framework	—	—	—	—	2,896,762	825,786
Special projects, other revenue and related expenses*	3,409,312	—	3,409,312	—	3,386,714	35,407
Total non-licensing and non-certification	**3,411,484**	**—**	**3,411,484**	**11,076**	**35,729,836**	**28,502,315**
Total	**$ 87,015,207**	**$ 8,963,097**	**$ 95,978,304**	**$ 81,529,562**	**$ 131,959,299**	**$ 113,437,968**

*Included in revenues are $19,059,003 in fees (2008 – $0) recovered from licensees for expenses incurred in providing services that fall under the first phase of the CSNC's Revenue Spending Authority. Of the $19,059,003 in fees charged, $15,488,314 (2008 – $0) was respendable by the CNSC.

10 CONTRACTUAL OBLIGATIONS AND CONTINGENT LIABILITIES

A) CONTRACTUAL OBLIGATIONS

The nature of CNSC's activities results in some multi-year contracts and obligations whereby CNSC will be committed to make some future payments when the services and goods are received. As of March 31, 2009, CNSC has significant future years' contractual obligations for the following:

	2010	2011	2012	2013	2014 and thereafter	Total
Acquisitions of goods and services	$ 4,861,318	$ 203,687	$ 158,923	$ 5,634	$ 2,700	$ 5,232,262
Operating leases	72,591	67,698	21,787	3,837	1,074	166,988
Total	**$ 4,933,909**	**$ 271,385**	**$ 180,710**	**$ 9,471**	**$ 3,775**	**$ 5,399,250**

B) CONTINGENT LIABILITIES

Claims have been made against CNSC in the normal course of operations. Legal proceedings for claims totalling approximately $55,250,000 (2008 – $55,250,000) were still pending at March 31, 2009. Some of these potential liabilities may become actual liabilities when one or more future events occur or fail to occur. To the extent that the future event is likely to occur or fail to occur, and a reasonable estimate of the loss can be made, an estimated liability is accrued and an expense recorded in the financial statements. The CNSC's management believes that the claim is unlikely to result in a liability.

11 NUCLEAR LIABILITY REINSURANCE ACCOUNT

Under the *Nuclear Liability Act* (NLA), operators of designated nuclear installations are required to possess basic and/or supplementary insurance of $75,000,000 per installation for specified liabilities. The federal government has designated the Nuclear Insurance Association of Canada (NIAC) as the sole provider of third-party liability insurance and property insurance for the nuclear industry in Canada. The NIAC provides insurance to nuclear operators under a standard policy.

The policy consists of two types of coverage: Coverage A and Coverage B. Coverage A includes only those risks that are accepted by the insurer; that is, bodily injury and property damage. Coverage B risks include personal injury that is not bodily; for example, psychological injury, damage arising from normal emissions and damage due to acts of terrorism.

The NIAC receives premiums from operators for both coverages; however, premiums for Coverage B risks are remitted to the federal government, which reinsures these risks under its reinsurance agreement with the NIAC. Through the reinsurance

agreement, the federal government assumes the liability associated with the difference between the basic insurance coverage provided by the NIAC and the full $75,000,000 of liability imposed by the NLA, as well as for events listed under coverage B. As of March 31, 2009, the total supplementary insurance coverage is $584,500,000 (2008 – $584,500,000).

All premiums paid by the operators of nuclear installations for the supplementary insurance coverage are credited to a Nuclear Liability Reinsurance Account in the Consolidated Revenue Fund. Premiums received in respect of coverage for damage due to acts of terrorism amount to $277,125 (2008 – $284,528). Claims against the supplementary insurance coverage are payable out of the Consolidated Revenue Fund and charged to the Account. There have been no claims against or payments out of the account since its creation.

As explained in note 2n), the CNSC administers the Nuclear Liability Reinsurance Account on behalf of the Government of Canada through a specified purpose account consolidated in the Public Accounts of Canada. During the year, the following activity occurred in this account:

	2009	2008
Opening balance	$ 1,675,873	$ 1,389,745
Receipts deposited	278,725	286,128
Closing balance	**$ 1,954,598**	**$ 1,675,873**

12 RELATED PARTY TRANSACTIONS

The CNSC is related as a result of common ownership to all Government of Canada departments, agencies, and Crown corporations. The CNSC enters into transactions with these entities in the normal course of business. Some of these transactions are on normal trade terms applicable to all individuals and enterprises, while others are services provided without charge to the CNSC. All material-related party transactions are disclosed below.

A) SERVICES PROVIDED WITHOUT CHARGE

During the year, the CNSC received services that were obtained without charge from other government departments and agencies. These are recorded at their estimated cost in the financial statements as follows:

	2009	2008
Accommodation provided by Public Works and Government Services Canada	$ 5,773,168	$ 5,681,677
Contributions for employer's share of employee benefits provided by the Treasury Board Secretariat	6,060,253	4,198,602
Salary and associated costs of legal services provided by Justice Canada	96,000	91,000
Audit services provided by the Office of the Auditor General of Canada	113,874	90,000
Other	32,000	55,805
Total	**$ 12,075,295**	**$ 10,117,084**

B) PAYABLES AND RECEIVABLES OUTSTANDING AT YEAR END WITH RELATED PARTIES

During the year, the CNSC incurred expenses $26,802,664 (2008 – $22,928,967) as a result of transactions with related parties, which included services provided without charge of $12,075,295 (2008 – $10,117,084) as described above. The CNSC also recognized licensing revenue of $11,141,046 (2008 – $6,837,879) as a result of transactions with related parties. These revenue activities result in accounts receivable in the amount of $776,908 (2008 – $465,582) and accounts payable in the amount of $931,126 (2008 – $0) as at March 31, 2009 and are included in the table below.

	2009	2008
Accounts receivable with other government departments and agencies	$ 1,976,454	$ 637,808
Accounts payable to other government departments and agencies	$ 4,131,620	$ 454,351

Canadian Nuclear Safety Commission

Annex

Annex: Commission Tribunal Hearings and Opportunities To Be Heard

HEARINGS

NUCLEAR POWER PLANTS

Bruce Power Inc.

- Decision to amend the power reactor operating licences to incorporate the requirements of Regulatory Document RD-204, Certification of Persons Working at Nuclear Power Plants — Public hearing (December 11, 2008)
- Decision to amend the power reactor operating licences for the Bruce A and B Nuclear Generating Stations to reflect administrative changes — Abridged hearing (May 2, 2008)
- Decision to amend the power reactor operating licences for the Bruce A and Bruce B Nuclear Generating Stations to reflect updates in documentation — Abridged hearing (July 25, 2008)
- Decision to amend the power reactor operating licences for Bruce A and Bruce B Nuclear Generating Stations — Abridged hearing (August 29, 2008)
- Decision to amend the power reactor operating licences for the Bruce A and Bruce B Nuclear Generating Stations to update Bruce A and B safety reports — Abridged hearing (October 22, 2008)

Hydro-Québec

- Decision to amend the power reactor operating licences to incorporate the requirements of Regulatory Document RD-204, Certification of Persons Working at Nuclear Power Plants — Public hearing (December 11, 2008)
- Decision to amend the Gentilly-2 Nuclear Generating Station operating licence — Abridged hearing (December 16, 2008)

New-Brunswick Power Nuclear Corporation

- Decision to amend the Power reactor operating licences to incorporate the requirements of Regulatory Document RD-204, Certification of Persons Working at Nuclear Power Plants — Public hearing (December 11, 2008)
- Decision to amend the Point Lepreau Nuclear Generating Station power reactor operating licence — Abridged hearing (May 8, 2008)

Ontario Power Generation Inc.

- Decision to renew the power reactor operating licence for the Pickering B Nuclear Generating Station — Public hearing (February 20 and May 14, 2008)
- Decision to accept the results of the screening Environmental Assessment of the Pickering Nuclear Generating Station B Refurbishment and Continued Operations Project, Pickering, Ontario — Public hearing (December 10, 2008)
- Decision to Amend the power reactor operating licences to incorporate the requirements of Regulatory Document RD-204, Certification of Persons Working at Nuclear Power Plants — Public hearing (December 11, 2008)
- Decision to Amend the Darlington Nuclear Generating Station power reactor operating licence to reflect a revision of the Chief Nuclear Officer expectations document — Abridged hearing (April 11, 2008)
- Decision to amend the Darlington Nuclear Generating Station power reactor operating licence to perform complete operational tests on shutdown systems every three years instead of two — Abridged hearing (June 17, 2008)
- Decision on the Environmental Assessment Guidelines (scope of project and assessment) for the proposal to place Pickering A Units 2 and 3 into a guaranteed defueled state — Abridged hearing (June 17, 2008)
- Decision to amend the power reactor operating licence for the Pickering A Nuclear Generating Station to reference the latest revision of the site plan and site security taut-wire fence layout and survey drawing — Abridged hearing (June 25, 2008)

- Decision on the Environmental Assessment Screening Report for the proposal to place Pickering A Units 2 and 3 into a guaranteed defueled state — Abridged hearing (November 28, 2008)
- Decision on licence amendments to Ontario Power Generation's Nuclear Generating Station power reactor operating licences for Darlington and Pickering A and B — Abridged hearing (November 28, 2008)

URANIUM MINES AND MILLS

Cameco Corporation

- Decision to renew the operating licence for the Key Lake Uranium Mill — Public hearing (June 11 and September 17, 2008)
- Decision to renew the uranium mine operating licence for the McArthur River Operation — Public hearing (June 11 and September 17, 2008)
- Decision to Renew the uranium mine operating licence for the Rabbit Lake Operation — Public hearing (June 11 and September 8, 2008)
- Decision to exempt five decommissioned satellite mine sites at the Beaverlodge mine and mill site from licensing and to release the sites into Saskatchewan's institutional control program — Public hearing (February 18, 2009)
- Decision to amend the Cigar Lake Project uranium mine construction licence — Abridged hearing (June 17, 2008)
- Decision to accept the Environmental Assessment Screening Report for the proposed increase of the annual production capacity at the Blind River Refinery — Abridged hearing (October 14, 2008)
- Decision to accept the Environmental Assessment Guidelines for the proposed mill services project at Key Lake, Saskatchewan — Abridged hearing (November 25, 2008)
- Decision to amend the Cigar Lake Project's financial guarantee — Abridged Hearing (February 25, 2009)

Cameco Corporation and AREVA Resources Canada Inc.

- Decision to accept the Environmental Assessment Screening Report for the proposed Rabbit Lake solution processing project — Public hearing (June 11, 2008)

PROCESSING AND RESEARCH FACILITIES

Atomic Energy of Canada Limited

- Decision to renew the nuclear research and test establishment decommissioning licence for the Whiteshell Laboratories — Public hearing (November 5, 2008)
- Decision to amend the Chalk River Laboratories nuclear research and test establishment operating licence — Abridged hearing (September 5, 2008)
- Decision to accept the Environmental Assessment Guidelines for the proposal to decommission the National Research Experimental (NRX) Ancillary Buildings at Chalk River Laboratories — Abridged hearing (October 24, 2008)
- Decision to Amend the Chalk River Laboratories Nuclear Research and Test Establishment Operating Licence to extend the unplanned event reporting in accordance with Regulatory Document S-99 — Abridged hearing (October 22, 2008)

Cameco Corporation

- Decision to accept the Environmental Assessment Track Report Regarding Cameco Corporation's Vision 2010 Project for the conversion facility in Port Hope, Ontario — Public hearing (November 6, 2008)

Canadian Light Source Inc.

- Decision to Amend the Class IB particle accelerator operating licence — Public hearing (September 18, 2008)

GE Hitachi Nuclear Energy Canada

- Decision to accept the Environmental Assessment Guidelines for the proposed low enriched uranium fuel bundle production at Peterborough facility — Abridged hearing (August 1, 2008)
- Decision to amend the Peterborough Nuclear Fuel Facility operating licence to include an additional licensed activity — Abridged hearing (August 29, 2008)

Saskatchewan Research Council

- Decision to accept the Environmental Assessment Track Report regarding SRC's proposed Gunnar Mine Site rehabilitation project — Public hearing (September 17, 2008)

SRB Technologies (Canada) Inc.

- Decision to resume the processing and use of tritium at the gaseous tritium light source facility in Pembroke, Ontario — Public hearing (April 3 and June 12, 2008).

TRIUMF Accelerators Inc.

- Decision to amend the Class IB Particle accelerator operating licence — Abridged hearing (August 26, 2008)

Zircatec Precision Industries Inc.

- Decision to amend the Class IB nuclear fuel facility operating licence for slightly enriched uranium fuel production — Public hearing (June 12, 2008)
- Decision to amend the nuclear fuel facility operating licence issued to Zircatec Precision Industries Inc. to reflect a name change to Cameco Fuel Manufacturing Inc. — Abridged hearing (November 28, 2008)

WASTE MANAGEMENT

Atomic Energy of Canada Limited

- Decision to accept the results of the screening Environmental Assessment for the construction and operation of the fuel packaging and storage facility at Chalk River Laboratories — Public hearing (May 15, 2008)
- Decision to accept the results of the screening Environmental Assessment for the decommissioning of the heavy water upgrading plant at Chalk River Laboratories — Public hearing (May 15, 2008)
- Decision on the Environmental Assessment Guidelines for the proposed construction and operation of a new dry storage system at Chalk River Laboratories, Chalk River, Ontario — Abridged hearing (October 14, 2008)
- Decision to amend the Chalk River Laboratories nuclear research and test establishment operating licence to allow construction and operation of additional shielded above ground storage buildings — Abridged hearing (February 25, 2009)

Hydro-Québec

- Decision to amend the Gentilly-2 radioactive waste facility operating licence — Abridged hearing (August 14, 2008)

New Brunswick Power Nuclear Corporation

- Decision to amend the Point Lepreau Nuclear Generating Station power reactor operating licence to be consolidated with the Point Lepreau solid radioactive waste management facility operating licence — Abridged hearing (August 29, 2008)

OPPORTUNITIES TO BE HEARD

588972 Alberta Limited operated as Enviropac

- Decision to revoke the Order and licences issued to Enviropac — Opportunity to be heard (October 9, 2008)

M. E. Kolewaski

- Decision to confirm the Designated Officer Order issued to Mr. E. Kolewaski on April 3, 2008, with respect to the premises located at 2236, 80th Avenue, Edmonton, Alberta, previously leased to Enviropac Inc. — Opportunity to be heard (May 15, 2008)
- Decision to revoke the Designated Officer Order issued to Mr. E. Kolewaski on April 3, 2008, and confirmed by the Commission on May 15, 2008 — Opportunity to be heard (October 9, 2008)

PricewaterhouseCoopers

- Decision to replace the Designated Officer Order Issued to PricewaterhouseCoopers Inc. on February 3, 2009 — Opportunity to be heard (February 19, 2009)

Western Cooperative Fertilizers Limited (Westco)

- Decision to amend the Designated Officer Order issued to Westco on November 19, 2007 — Opportunity to be heard (April 3, 2008)

nuclearsafety.gc.ca

Visit the CNSC's Web site for more information about the Canadian nuclear sector

ON THE CNSC'S WEB SITE, YOU'LL FIND:

- more about the CNSC and its role in nuclear safety
- links to laws and regulations governing Canada's nuclear sector
- information about nuclear facilities in Canadian communities
- news releases and updates on important issues affecting the nuclear sector
- fact sheets on nuclear-related topics
- how to get involved in public hearings or Environmental Assessments
- CNSC publications and reports
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