

# 2018

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YEARBOOK

## *ANNUAL INDUSTRY REVIEW & BUYER'S GUIDE*

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# CNS President's Report

By Peter Ozemoyah

2018



**Dan Gammage**

2017 was an outstanding year for the Canadian Nuclear Society (CNS) and the Canadian nuclear community. In the larger Canadian sphere, our industry had strong, positive experience with the ongoing refurbishment of Darlington Unit 2, accompanied by the go-ahead for Darlington Unit 3 by the Ontario government. Taken together with Bruce Power's program for the refurbishment of six of their reactors, maintaining eight unit operation, nuclear power will remain the dominant source of electricity in Canada's industrial heartland past the mid-point of this century.

For the first time in more than 50 years, we have the prospect before of new nuclear power development. By the end of this past summer, there were at least seven applications before the Canadian Nuclear Safety Commission (CNSC) seeking approval for new small modular reactor designs. Canadian Nuclear Laboratories (CNL) had also received nearly one hundred expressions of interest in partnerships for new reactor development.

Much of this new development was reflected in the CNS as well. The continued growth of our conferences and courses continued in 2017 with our 37th Annual CNS Conference and 41st CNS/CNA Annual Student Conference held in Niagara Falls. This very successful conference was accompanied by a large number of other events during the year:

- 11th International Conference on CANDU Maintenance and Nuclear Components;

- 2nd International CNS Conference on Fire Safety and Emergency Preparedness in the Nuclear Industry;
- 1st Student Job Fair for the Nuclear Industry;
- CANDU Reactor Technology and Safety Course;
- CANDU Thermalhydraulics Course;
- CANDU Fuel Technology Course;
- Nuclear 101 Course;

Particular attention should be given to our first ever student job fair. Superbly organized by Jacques Plourde, this was held at UOIT/ Durham College in Oshawa. With more than 600 students registered, it attracted the largest number of students who have ever participated in any CNS event.

I would like to thank personally all of the volunteers who helped organize all of the events here, and also all of our sponsors who make these events possible. The CNS Branches have also had new activity this year. Under the leadership of Ron Thomas, the CNS organized a speaker exchange program with the United Kingdom Nuclear Institute (UNKI). In 2017, the UKNI speaker Dr. Alys Gardner visited a large number of the CNS branches this past fall. The CNS will be reciprocating in 2018 with a CNS speaker visiting the UKNI chapters in the United Kingdom.

With respect to public activity, the CNS gave a strong presentation at the operating license renewal hearing of the Point Lepreau station. In fact, for the first time ever, the CNS presentation made strongly positive public news in New Brunswick for its support of former Premier Frank McKenna's call for new nuclear power at Point Lepreau. Past President Peter Ozemoyah, and Colin Hunt and Peter Easton are to be thanked for their contributions to the CNS regulatory activity during the year.

2017 also had a strong awards program, with the ceremonies taking place at the Annual Conference. Further details can be found in this Yearbook. I would like to thank the CNA for its generous support of this program which has continued successfully since the 1970s.

In conclusion, I would like to thank the CNS Council and all of our volunteers for making the CNS a strong and growing success during the year. I also commend highly Canada's nuclear employers which make possible all of the volunteer's time to make our programs happen.

I also would like to thank Dr. Peter Ozemoyah for his successful leadership in 2016-2017. I congratulate Dr. John Luxat for taking on the role of President starting in 2018, to wish him all the best during his tenure, and to offer him my support throughout the year. 🍁



CNS Past President Jacques Plourde (right), principal organizer of the first CNS Job Fair for the Nuclear Industry.



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# 2017 Year in Review

By Colin Hunt, Publisher and Editor, Nuclear Canada Yearbook

2018



Colin Hunt

## Introduction

2017 has been a highly successful year for Canada's nuclear industry. The year included ongoing construction on the refurbishment of Darlington Unit 2, strong performance by Canada's nuclear reactor fleet, and the release and acceptance of Canadian Nuclear Laboratories' (CNL) long term development plan for Chalk River Laboratories.

Consistent with its science and technology mandate, CNL unveiled its plan for redevelopment of the Chalk River site. The plan envisions decommissioning and removal of most of the more than 100 small, old research buildings, many dating back to the 1940s, from the site. They will be replaced by a large new campus of five buildings better suited to CNL's new research and development activities.

Nuclear operations in Canada also had a year of strong performance as shown in the data tables later in this Yearbook. CANDU reactors performed well during the year, both in Canada and around the world. Of particular importance during the year was the refurbishment of Darlington Unit 2, 40 percent completed by December 2017. The Ontario government also committed to continuing the refurbishment program with Darlington Unit 3.

2017 has also been a very successful year for the Canadian Nuclear Society (CNS). Some of these highlights are noted in the reports by President of the CNS Dan Gammage, and by the CNS Education and Communications and CNS Program Committees.

## CANDU 6 Nuclear Reactor Performance – 2017

Reactor	In Service	Capacity (MW)	Performance In 2017 (%)	Lifetime Performance (%)
Point Lepreau	1983	705	89.1	70.5
Wolsong 1*	1983	679	40.4	72.6
Wolsong 2	1987	678	90.0	92.4
Wolsong 3	1998	698	32.7	89.9
Wolsong 4	1999	703	99.2	94.0
Embalse	1983	648	0	74.0
Cernavoda 1	1996	707	96.3	90.1
Cernavoda 2	2007	705	89.5	94.0
Qinshan 4	2002	700	76.6	89.8
Qinshan 5	2003	700	94.4	91.5

<https://www.iaea.org/PRIS/CountryStatistics/CountryDetails.aspx?current=CA>

### Notes

1. Embalse under refurbishment in 2016.

## Nuclear Research in Canada

For the first time in decades, CNL solicited expressions of interest in other organizations interested in the development of new nuclear reactor technology. Issued in the spring of 2017, the request generated strong interest both in Canada and around the world. What CNL offered was research and development assistance and a site in which to host prototypes of new, advanced reactor technology.

CNL received more than 80 responses to its request. These included 19 requests to site demonstration or prototype reactors at Chalk River. Responses came from a broad range of stakeholders, including SMR technology developers, potential end users, host communities, supply chain companies and academic institutions. The new designs featured enhanced safety systems and greater levels of efficiency, while at the same time reducing capital costs. Many also proposed novel fuel types and engineered systems; these aspects will require intensive study and investigation prior to licensing and ultimately deployment. Responses to the report also explored the possibilities of the potential of SMR technology beyond the generation of electricity.

The request resulted in seven applications to Canadian Nuclear Safety Commission (CNSC) for approval in principle of their

designs., and one design had received affirmation from the CNSC by the end of 2017.

## Nuclear Operations in Canada

Nuclear plant operations in Canada were strong throughout 2017. Nine Canadian reactors performed at 90 per cent load factor during the year as noted in the data tables further on in this Yearbook. These included Point Lepreau, Pickering 6, Bruce Units 1, 2, 4, 7, 8, and Darlington Units 3 and 4.

Several observations should be noted here. First, the outstanding performance of the Bruce A reactors shows that reactors that were built and started operations in the 1970s can perform very well even while meeting or exceeding current regulatory standards for safety. There has been a consistent trend for the past decade of older units consistently exceeding their lifetime performance as shown in the data tables. What this in turn shows is that modern maintenance and operating methods can and have improved reactor performance over time.

This trend holds true for Pickering as well. During 2017, four of Pickering's six operating reactors ran at better than 80 per cent load factor. In all cases, this exceeds greatly the lifetime performance of these



More than 600 students registered for the CNS Job Fair.

units. Like the Bruce A reactors, Pickering's performance has been strong for a number of previous years. This greatly improved performance of Pickering constitutes the principal reason why the Ontario government wishes to extend operation of the station to 2024.

This continuing improved performance had direct impact on Ontario's electricity supply. During 2017, more than 63 per cent of Ontario's electricity was supplied by its 18 operating nuclear reactors. It is noteworthy that this is a higher proportion of nuclear-generated electricity in Ontario than at any time since the early 1990s. This performance was achieved even though two reactors, Pickering Units 2 and 3, were removed from service in 1998.

It is also noteworthy that two of the nine outstanding units, Bruce 1 and 2, had been fully refurbished. This has also lent confidence to the idea that refurbishment programs result in safer, better nuclear reactor performance than prior to

refurbishment and justifies both OPGs and Bruce Power's investments in such work.

The refurbishment program at Ontario Power Generation's (OPG) Darlington 2 continued throughout 2017. At one point during the year, the project was 30 days ahead of schedule and on budget. By December 19, 2017, the project for Unit 2 was 40 per cent complete. As OPG President Jeffrey Lyash noted at the time, "Projects which begin well tend to end well."

During the year, Bruce Power also revealed the schedule for its Major Component Replacement Program. The work will begin in 2020 with Unit 6, to be followed by Unit 7. Over the course of the next decade all Bruce Units 3-8 will be refurbished sequentially. Bruce Power has been and will be continuing to conduct refurbishment work on its units in a manner that does not require long term outages for replacement of large components. Bruce Power President Mike Renchek has indicated that when

completed the program will enable Bruce Power reactors to continue in service until the mid-2060s.

In summary, the completion of nuclear refurbishment in Ontario means that nuclear power will continue to generate the bulk of the province's non-emitting, reliable and dispatchable electricity production well past the mid-point of this century.

### **New Global Prospects for CANDU**

Turning to CANDU reactors outside Canada, the fleet performed well with five reactors, Wolsong 2 and 4, Cernavoda 1 and 2, and Qinshan 5, operating at a load factor of 90 per cent or better. Details are shown in the accompanying table of CANDU 6 reactors.

However, there are also extensive prospects for Canadian nuclear construction work overseas. At this time, the refurbishment of Embalse in Argentina is ongoing, with return to service expected in 2018. SNC Lavalin Nuclear also has strong prospects for new nuclear work in Argentina, having completed a pre-project assessment for what may be Argentina's fourth nuclear reactor, Atucha 3, in 2016. Work on this project continued in 2017; if launched, it will be the first new CANDU reactor since the completion of Cernavoda 2 in Romania in 2007.

### **Canadian Government Nuclear Policy**

Federal and provincial policy on commercial nuclear power developed during 2017 as well. The year commenced with a series of hearings in 2016 by the House of Commons Natural Resources Committee on the current state and future development of nuclear power in Canada. The Canadian Nuclear Society was summoned on the first day of hearings to testify on its views about the current and future state of the industry.

By the middle of 2017, the Committee had produced a detailed report. It noted that nuclear power was one of Canada's strategic economic strengths. It recommended strongly the support of small modular



reactors (SMRs) as a means of providing reliable electricity to remote locations within Canada, particularly remote mining and other industrial sites, as well as Northern off-grid communities.

The support for nuclear power on an economic basis was supported by two reports during the year, one from the Financial Accountability Officer (FAO) of Ontario, and the other from the Fraser Institute. The FAO report, concluded that refurbishing Ontario's four reactors at Darlington and six at Bruce is the best supply option for new electricity generation in the province. It also noted that the cost of refurbishment would be \$80.70/MWh to 2064, substantially lower than cost of natural gas, wind, solar or bioenergy, as well as the province's average power cost of \$115/MWh from all sources.

Ontario Energy Minister Glenn Thibeault indicated that there was no alternative to nuclear power in Ontario that could be installed with comparable cost; as well, the Ontario Energy Board observed that options for importing electricity from Quebec were also limited and noted that Hydro-Quebec expects lower surplus electricity to be available in the future.

For its part, the Fraser Institute also weighed in during the year on Ontario electricity costs, which it could be expected to rise over the next two decades. It found that the revenues paid for power generation were: Hydro \$58/MWh, Nuclear \$66/MWh, Wind \$140/MWh, and Solar \$480/MWh.

However, the Fraser Institute also found that provincial generating capacity also rose despite an overall decline in electricity consumption. It attributed this increased generating capacity to the need for additional gas-fired generation to backstop wind and solar generation which, being intermittent, require such backup power capability. Together, wind and solar account for less than 9 per cent of Ontario's electricity supply and thus, according to the Fraser Institute, have a disproportionate impact on electricity prices and future increases, principally because of the need for

backup generation, principally from gas plants.

Taken together, these two reports supported strongly the Ontario government's decision to proceed with the refurbishment of Darlington, as well as Bruce Power's decision to proceed at Bruce; a particularly significant decision as the refurbishment program is funded by private capital.

The activity and strong performance of Canada's nuclear technology led to initiatives at the federal government level as well. The most notable event was the leadership of Kim Rudd, Parliamentary Secretary to the Minister of Natural Resources, with responsibility is for all things nuclear. During 2017 she led the Canadian delegation to the Clean Energy Ministerial (CEM), an international meeting of energy ministers. Canada was an initiating member of this meeting, and she urged international co-operation in raising the profile of nuclear energy as a clean, safe, reliable and economic energy source. At this time, she had agreement with the United States and Japan to raise the profile of nuclear power.

Canada will be the host of the CEM meeting in 2019.

### New Sources for Radioisotopes

With the impending shutdown of NRU (Nuclear Research Universal) research reactor at Chalk River in 2018, there were a number of new arrangements made for new radioisotope supply in 2017. One of the most prominent of these was the agreement among Bruce Power, Nordion and Cameco Corporation.

At this time, most of the world's supply of Cobalt-60 is produced in Ontario. Nearly all of this was produced at the NRU reactor. During 2017, the three companies agreed that new Cobalt-60 would be produced in the power reactors at Bruce. Cameco Fuel Manufacturing Inc. would fabricate the new fuel bundles with cobalt, to be shipped to Bruce for irradiation. The irradiated cobalt will then be sent to Nordion in Kanata for manufacture into new Cobalt-60 sources.

One of the most interesting developments during the year was the announcement by OPG of its agreement with NASA (National Aeronautics and Space Administration) to provide new sources of Plutonium-238. By 2017 NASA had less than 35 kg of Pu-238 remaining in its inventory for use in its deep space probes, of which only 1 kg was usable.

Pu-238 is essential for deep space probes as a power supply. Typically a probe needs 4.5 kg of Pu-238 for its thermoelectric generator. It is also needed to keep scientific instruments warm enough in space to function. As the strategic facilities to produce Pu-238 in the United States no longer existed, it cannot produce the isotope domestically. In short, the United States was out of space fuel, prohibiting any future manned or unmanned space exploration.

In 2017, OPG President Jeffrey Lyash announced that OPG will be providing new supplies of Pu-238 starting in 2020.

### New Developments in Waste Management

Canada's plan for the long term management of used nuclear fuel took a large step forward in 2017. The Nuclear Waste Management Organization (NWMO) began borehole drilling at Ignace Ontario, to obtain geologic core samples to help determine site suitability.

At this time, approximately half a dozen Ontario communities remain as potential active sites, for selection. Acceptance of locating a permanent deep geologic waste site for long-term storage of Canada's high level radioactive wastes, is, and will be entirely voluntary on the part of any community participating in the selection process.

Also during 2017, CNL revealed its plans for management of low level wastes at the Chalk River site. The renovation of the laboratories will produce large amounts of very low level radioactive wastes, including concrete, flooring, siding and similar rubble from the removal of old buildings.



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CNL has produced its plan to manage these volumes of irradiated material, the Near Surface Disposal Facility (NSDF), with the environmental assessment of the plan expected to begin in 2019.

## The CNS in 2017

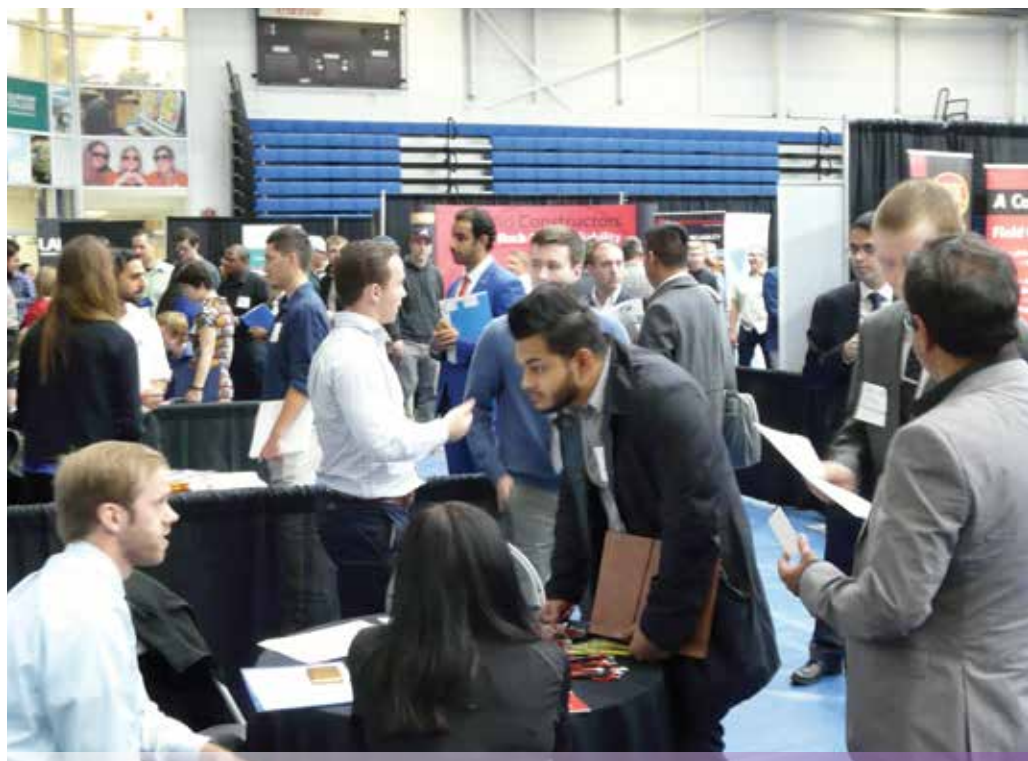
The Canadian Nuclear Society (CNS) has also had a very successful year in 2017. Of particular note is the strong and growing program of courses and conferences offered by the CNS. Two conferences specifically were outstandingly successful: the 2nd CNS International Conference on Fire Safety and Emergency Preparedness in the Nuclear Industry; and, the 11th International Conference on CANDU Maintenance and Nuclear Components. Details of these conferences can be found later in this Yearbook in the report by the Program Chair.

The CNS launched a new event in 2017, the Student Job Fair for the Nuclear Industry in October 2017. This event was held at Durham College in Oshawa, and it was the first such event held in Canada. More than 600 registrants attended, the most students ever attracted to any CNS event. The CNS will now hold the job fair as an annual event.

With respect to public information, as mentioned earlier, the CNS was requested to testify in November 2016 at the hearings on the current state of Canada's nuclear industry by the House of Commons Standing Committee on Natural Resources. The Committee's report was tabled in Parliament in June 2017, and the government's response was tabled and released in October. The CNS was significantly quoted in the Committee report, and its views were reflected extensively in the Committee recommendations. The government response endorsed the Committee's findings.

## In Closing

Governments in Canada made a number of policy decisions about nuclear power and technology starting in 2015, including its recognition by the Federal Government as a non-emitting, reliable source of electricity. Implementation of them began in 2016 and carried through in 2017. During the



More than 40 companies and institutions met with students at the 2017 Job Fair.

past year, we have seen the success to date in the project to refurbish Darlington 2 and the Ontario government's decision, based in part on that success, to continue with Darlington 3.

As mentioned earlier, all three nuclear operating utilities in Canada finished 2017 with strong performances of their nuclear fleets. This strong performance was mirrored by the operators of CANDU reactors outside Canada as well. For approximately the next half-century, Canadian nuclear power reactors are likely to remain as dominant sources of electricity within their respective jurisdictions.

Beyond CANDU, we have seen new developers emerge with new reactor technologies and configurations coming to Canada seeking partnerships. During 2017, the first of these was accepted in principle by the CNSC as in conformity

with Canadian safety standards. With the ongoing renovation of Chalk River Laboratories, Canada is well-placed as an international partner of choice for the development and possibly demonstration of new nuclear reactor prototypes.

It's not happening by accident. Canada is one of the few nations in the world possessing research and manufacturing facilities and personnel to carry out the full spectrum of the research and development required for the successful completion of the various new nuclear technologies. Just as in the late 1940s, Canada is emerging again as a world leader in nuclear science and development. Before many more years have passed, the future may well see Canadian nuclear fuel powering the probes that will carry out the further exploration and development of near-Earth space and the outer reaches of the solar system. 🍁

# Education and Communications Committee Report for 2017

By Ruxandra Dranga and John Roberts, Co-Chairs Education and Communications Committee

In 2017 the Education and Communications Committee (ECC) continued to be a key contributor towards the CNS's core objectives, through a number of activities and programs that encourage education in, and knowledge about nuclear science and technology, increase members' involvement in public educational programs, and facilitate the exchange of information between CNS members and the general public.

## Geiger Kits to High Schools across Canada

CNS thanks the Canadian Nuclear Safety Commission (CNSC) for a generous grant given specifically in support of the Geiger Program. Bryan White, who is the single point of contact between the CNS and high schools across Canada that have a Geiger kit, continued providing technical support for science teachers. The CNSC grant has allowed for 15 new Geiger kits to be purchased, assembled and distributed to science teachers across Canada. Further materials will be purchased in 2018, which will be used to facilitate training sessions for volunteers and support the expansion of the Geiger program. CNSC has been provided with quarterly updates on the Geiger program.

An additional important component of the Geiger program is the Ionising Radiation Workshop, which demonstrates the use of the detector in a classroom setting.

Geiger kit demonstrations were performed during the Science Teacher's Association of Ontario Conference, which was attended last November. A total of 16 new requests for Geiger kits were received during this Conference.

## Courses

2017-2018 was once again successful year for the "Nuclear 101" course, with a course taking place in May 2017 in Ottawa. The "Nuclear 101" course is specifically design for individuals with or without a technical background who are part of the nuclear science and technology community and who find themselves interacting with the public. The course has been very popular amongst individuals in the nuclear community (both technical and non-technical) and received excellent reviews from all participants.

A three-hour seminar version of the "Nuclear 101" course has also been created, titled "Nuclear-for-Everyone" (N4E). This course is for individuals who do not directly work in the nuclear industry, but who collaborate and interact with organizations which are part of the nuclear community was again organized as an embedded seminar in the Technical Program for the 2017 CNS Annual Conference in Niagara Falls. In addition to the Nuclear-for-Everyone course, a Nuclear 101 / N4E Facilitators' workshop was organized during the 2017 Annual

Conference, to develop new facilitators for these courses. Both seminar and Facilitators' workshop were well attended and received positive feedback. Five N4E seminars were presented at the Oshawa job fair in 2017 by alumni from the Facilitators' workshop!

Lecturers for both courses are strongly encouraged to continue mentoring individuals to support expansion of this program. CNS continues to seek qualified volunteers to expand the frequency of delivering Nuclear 101 and Nuclear for Everyone Courses.

## Nuclear Science Week


The third year of Canada's involvement in Nuclear Science Week was a success. Events were held across Canada (Alberta, Saskatchewan and Ontario) and were universally well received. The events were fun and informative; there is wide agreement that we should do this again.

In Alberta, Jason Donev worked with a team at the University of Calgary to put on a public event at the Rothney Astrophysical Observatory. The event completely sold out with more than 500 people in attendance, filling up the facility to full capacity.

In Ontario, Jacques Plourde coordinated the first, and extremely successful, Nuclear Job Fair held in Oshawa. The fair attracted 400 students from four Provinces and 34 employers/exhibitors. Planning for the 2018 event is well advanced.

Nuclear Safety Culture Foundation Course  
The first Nuclear Safety Culture foundation course was delivered, with positive feedback being received. Development of additional course material is scheduled for 2018 with the expectation that requests for delivery of further courses will be received.

## Public Advocacy – Further Information

For further information on the CNS' activities in Education and Communication, contact Ruxandra Dranga or John Roberts (Co-Chairs, CNS Education and Communication Committee) at [ECC@cns-snc.ca](mailto:ECC@cns-snc.ca). 



The CNS Nuclear Industry Job Fair will become an annual event after being first held in 2017.



# Program Committee Chair Report for 2017

By Ruth Burany and Keith Stratton, Co-Chairs Program Committee

2018

Organizing conferences and presenting courses is a primary way the CNS fulfills its objectives. Please review the 2018 – 2020 Events Calendar elsewhere in this Yearbook and at <https://www.cns-snc.ca/media/printable-calendar.pdf> to see the planned conferences and courses. The printable calendar on the CNS website is updated regularly. Upcoming CNS Conferences of particular note are the 38th Annual CNS Conference & 42nd Annual CNS/CNA Student Conference in Saskatoon in June, the 8th International Conference on Numerical Methods in Nuclear Science and Engineering in October, and the 1st International Conference on Generation IV and Small Reactors in November (both in Ottawa). Watch the CNS web site for courses and local chapter events organized as the year progresses.

The following highlights the events held during 2017:

## CNS CANDU Reactor Technology & Safety Course

March 27-29, Courtyard by Marriott Downtown Toronto

The CANDU Reactor Technology and Safety Course is intended to enhance the professional and technical capabilities of its members (and non-members) working in, or interested in, the nuclear industry. It provides an introduction to the basic design, technology, and operation of nuclear reactors. The course presents the major systems in a nuclear plant, as well as the important CANDU reactor safety principles and systems. Preparation and execution of safety analysis to meet licensing demands is also covered.

The course is ideally suited for beginning professionals, but also beneficial to experienced professionals. It continues to be one of the most popular courses organized by the CNS and has been offered since 1996.

This year there were 42 registrants and 12 speakers. The banquet speaker was Richard Wiens (of Nordion) who spoke on the topic of “High-Activity Cobalt Production in Bruce Reactors”.



Blair Bromley, Dan Gammage, John Luxat (left to right), CNS Student Poster Competition.

## Nuclear 101

May 1-2, Fairfield Inn & Suites Toronto Airport Toronto, Ontario

The two-day Nuclear-101 course is specifically designed for individuals (including students) within the nuclear community (with or without a technical background) who may interact with the public. The course enables a good understanding of nuclear and energy fundamentals, along with the tools to explain to others in simple, factual terms how the technology works, some of the interesting twists and turns of its exciting history, and the important contribution nuclear science and technology makes to our society. It consists of three modules, and includes demonstrations, Q&A, and a discussion of each module's relevance to public outreach.

This year there were 48 registrants with 3 speakers.

## 37TH CNS ANNUAL CONFERENCE AND 39TH CNS/CNA STUDENT CONFERENCE

June 4-7, 2017, Niagara Falls, ON

The central objective of the CNS annual conference is to provide a forum for exchanging views, ideas and information relating to the application and advancement

of nuclear science and technology, and for discussing energy-related issues in general. The theme for the 2017 conference was “Our Nuclear Future: Renewal and Responsibility”. Daniel Gammage was the Executive Chair and succeeded Peter Ozemoyah as CNS President at the Annual General Meeting held in conjunction with the conference. Gary Newman (Chief Engineer, Senior Vice President of Engineering, Bruce Power Nuclear Generating Station) was the Honorary Chair of the conference. The Harold A. Smith Lecture was presented by Paul Spekkens, Director of Nuclear Technologies, Kinectrics and the lecture provided reflections on the nuclear industry in Canada. There were six plenary sessions with 26 speakers and 24 technical sessions with 128 speakers. There were 29 exhibit booths by the nuclear industry. Including Sponsors and Exhibitors, there were 360 paid registrants.

The CNS and CNA jointly recognized 8 recipients for their outstanding contributions within the Canadian Nuclear industry and the Canadian nuclear research and academic communities.

*continued on page 13...*

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Go to <https://cns-snc.ca/cns/awards/> to see the complete list of recipients.

There was also a very successful Student Program, with students at the Bachelor's, Master's and Ph.D. levels presenting their research at a Student Poster Session.

### 2nd CNS Conference on Fire Safety and Emergency Preparedness for the Nuclear Industry

September 17–20, 2017 Toronto  
Marriott Eaton Centre

Leveraging the success of the 1st Technical Meeting on Fire Safety and Emergency Preparedness, the 2nd International Meeting on Fire Safety and Emergency Preparedness provided a forum for nuclear professionals to network and communicate changes presently impacting the industry. The 2.5-day core program was comprised of 3 plenary sessions and 6 technical sessions where the latest work and information in the important areas of fire safety and emergency preparedness and mechanisms of emergency management and response that support enhanced interoperability were shared.

Rudy Cronk and Ann Turney were co-chairs with Frank Saunders of Bruce Power fulfilling the role of Honorary Chair for the conference. Stephanie Durand, Director General, Public Safety Canada was the keynote speaker for FSEP 2017. Eleven plenary speakers filled out the morning plenary program, followed by 48 technical sessions on the Monday and Tuesday afternoon. Including Sponsors and Exhibitors, there were 94 paid registrants.

### 11th International Conference on CANDU Maintenance and Nuclear Components

October 1-4, 2017 Toronto Marriott  
Eaton Centre

CMNCC 2017 followed the same approach as previous CANDU maintenance conferences, but with broadened scope to include all major components found in nuclear power plants worldwide. The Conference Theme was "Delivering Clean Energy through CANDU® Life Extension". Aman Usmani was the Conference General Chair and Shane Rider of OPG was the Honorary Chair.

The CMNCC 2017 conference was very successful with new innovative ideas added to the agenda. These included a NAYGN/ WiN-Canada Mix and Mingle with Alex DeLorey, 2017

Canadian Astronaut Finalist. An evening Utility Engagement event was very effective and generated some good ideas towards solving utility identified challenges in an open forum. A "CANDU around the World" Dinner event provided opportunity to mix and mingle and build relationships with the Honorable Energy Minister of Ontario Glenn Thibeault presenting a very positive message in support of the nuclear industry and nuclear power in Ontario. He also made a round of all the exhibits (during dinner event).

The conference had a full agenda, with 6 plenary sessions and 17 technical sessions over 3 days. Including Sponsors and Exhibitors, there were 258 paid registrants. The conference was preceded with the CANDU® Configuration Overview Course. This course complements CMNCC 2017 by providing the opportunity for participants to become familiarized with the basic layout of a nuclear station and the function of nuclear plant equipment.

### CANDU Fuel Technology Course

October 12-13, 2017 Hilton Garden  
Inn, Ajax

The aim of this course is to provide an understanding of the CANDU fuel design, performance and operation, and how the fuel interacts with the interfacing systems. The course will be of great interest to the fuel designers, manufacturers, station operations, fuel channel and fuel handling system designers, safety analysts, and performance and inspection staff. This course was successful, with a total 31 participants and 18 speakers.

### CANDU Thermalhydraulics Course

December 4-5, 2017 Marriott  
Downtown Toronto Courtyard by  
Marriott Downtown Toronto

This CNS course presents an extensive overview of the important disciplines in CANDU reactor technology and safety. This includes an introduction to the basic design, technology, and operation of nuclear reactors. The major systems in a nuclear plant as well as the important CANDU reactor safety principles and systems were presented and how to prepare and execute safety analysis to meet licensing demands was discussed. 42 participants registered for this course with 8 speakers presenting. The banquet speaker was David Novog on "On the Ground of Fukushima". 🍁



The organizing committee of the 2017 CNS 11th International Conference on CANDU Maintenance and Nuclear Components.



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# Canadian Nuclear Association (CNA) President's Report Vision and Growth

By John Barrett, President and Chief Executive Officer, Canadian Nuclear Association

2018



2017 was a very active year for the Canadian nuclear industry and the Canadian Nuclear Association (CNA). Strong industry engagement with the CNA coupled with the federal government's focus on climate change has resulted in nuclear gaining favour as an essential part of Canada's path towards deep decarbonization.

## Vision 2050

This year the CNA released its Vision 2050 document that outlines nuclear technology's role in leading the way to a low-carbon energy future. Developed by the CNA and multiple representatives from the nuclear industry, the document sets out the pathways, as well as the steps necessary, to lead Canada to a sustainable, clean-energy future, which includes working across a broad engagement of stakeholders, such as potential host communities, Indigenous leaders, the broader public, and all levels of government. This document not only became the basis of the CNA's submission to Natural Resource Minister Jim Carr's Generation Energy policy process, it will be a cornerstone of the CNA's advocacy work.

## Government Outreach

CNA's outreach, at both federal and provincial levels, continued to position nuclear as one of the important low-carbon sources of energy to combat climate change. This year, the CNA hosted three lobbying days at Queen's Park and on Parliament Hill, which allowed CNA members to meet face to face with MPs, MPPs and key departmental and ministerial staff. This included the first Hill Day with Women in Nuclear.

Our industry's outreach efforts are making a difference. On October 5, the federal government responded to the recommendations in the Standing Committee on Natural Resource's report on Canada's nuclear sector, by endorsing all the

committee's recommendations, including the creation of a Nuclear Innovation Council, for which the CNA specifically advocated.

In Ontario, the CNA and its members were substantial participants in the provincial government's consultations over the 2017 Long-Term Energy Plan (LTEP). When it was released on October 26, the government had reaffirmed its commitment to nuclear refurbishments and the life extension of the Pickering Nuclear Generating Station to 2024.

## Natural Resources Canada, Global Affairs Canada and the SMR Project Roadmap

Natural Resources Canada (NRCAN) reached out to the CNA on numerous occasions in 2017, starting with Parliamentary Secretary Kim Rudd's request to host two early-morning policy roundtable events on the margins of the CNA's annual conference in February.

NRCAN and Global Affairs Canada (GAC) continued to work with the CNA to build the Nuclear International Markets Working Group (NIMWG). The working group then organized the Canadian delegation to the International Atomic Energy Agency's (IAEA) General Conference in Vienna in September. The CNA worked closely with federal government partners to execute a Team Canada approach to the events, present and staff the Canada booth, support Parliamentary Secretary Rudd's political-level leadership of the delegation, and ensure a successful program of bilateral meetings and connections – leveraging a strong relationship with the federal government to build stronger global networks for the industry.

Later in the year, NRCAN asked the CNA to provide the Secretariat for a national SMR Roadmap Project, which had been

conceived in the NRCAN-chaired Inter-Utility Working Group on small modular reactors (SMRs). The SMR Roadmap Project is not only hugely valuable in exploring the user requirements and concerns around deploying an SMR fleet in Canada; it also strengthens and institutionalizes CNA's relationships inside the federal government, as well as with northern territorial governments, utilities and other communities of interest.

## International Prominence and Other National Initiatives

On the international front, CNA participated in the World Nuclear Association Symposium and the US Nuclear Energy Assembly, and helped host a visit to Ottawa by the US Nuclear Infrastructure Council.

Noteworthy national initiatives in 2017 included preparing for NAFTA renegotiations through meetings convened by the Canadian Manufacturing Coalition, the Canadian Global Affairs Institute, and Global Affairs Canada; bringing the Calgary-based Canadian Energy Research Institute (CERI) around from virtually disregarding nuclear in a major study to recognizing it as an integral part of the Canadian clean energy system; and attending alongside Ontario Power Generation, Canadian Nuclear Laboratories, and others, the Arctic Energy and Emerging Technologies (AEET) conference in Inuvik – a crucial forum for introducing north-of-sixty-degrees communities to nuclear's potential to meet their human and economic needs.

## Microsites, Public Outreach and Key Messages

The CNA, as part of the Ontario's Nuclear Advantage Committee, successfully managed the "Ontario's Nuclear Advantage" campaign and associated microsite leading up to the provincial election in June 2018.

*continued on page 17...*







# Canadian Nuclear Association (CNA) President's Report

## Vision and Growth *continued from page 15*



2018

In tandem, the CNA began developing a microsite targeting the wider Canadian public, called Nuclear + You, focusing on the everyday applications of nuclear technology.

The CNA continued to develop its print and digital messaging in the form of a public newsletter, op-eds, targeted advertising, and a strong social media presence. The 2017 Factbook was published

and distributed to over 20,000 individuals and institutions across Canada. The CNA also identified and shared key messages via its website and a free app to encourage industry alignment. 



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# Canadian Nuclear Workers Council (CNWC)

The collective voice of organized labour in the nuclear industries

By David Shier, President and CEO

2018

The Canadian Nuclear Workers Council (CNWC) is an umbrella organization of Unions representing workers in all sectors of the Canadian nuclear industry. **The CNWC is the collective voice of the Unions in the Nuclear Industry.** Founded in 1993, it represents sectors including electric power utilities, uranium mining and processing, radioisotope production for medical and industrial purposes, nuclear research, construction and trades in Ontario and labour councils in host communities. CNWC membership includes 24 local unions and four labour councils.

CNWC activities are focused on the following objectives:

To support and promote the benefits of Canada's Nuclear Industry to Canadian Workers and the public by providing fact-based information.

Specifically, this industry's:

1. Strong safety record;
2. Strong regulatory oversight
3. Contribution to cleaner air, economic growth and medical treatments
4. High-skill, high quality jobs
5. Support for the enhancement of Canadian scientific, engineering, technological innovation and skilled trades' expertise.

During 2017, several presentations and briefs were made on behalf of the membership. The CNWC participated in hearings associated with the licence extension for Canadian Nuclear Laboratories, McClean Lake Uranium Mill in Saskatchewan, Point Lepreau, the Nuclear Power Plant Regulatory Oversight Report, Uranium Mines & Mills Facilities Regulatory Oversight Report and the

Uranium and Nuclear Substance Processing Facilities Regulatory Oversight Report. Our organization, in conjunction with 12 other trade unions, was also engaged in the CNSC's Fitness for Duty Regulation – Hours of Work and D&A Testing and Safety Culture Regulation consultations. The CNWC also participated in our industry's Nuclear Leadership Forum and the development of a Canadian Nuclear Innovation Agenda.

During 2017, the CNWC undertook several communication and outreach initiatives. The council issued a quarterly newsletter in both official languages to provide our membership and others with information about significant happenings in Canada's nuclear sector and elsewhere. The council's website was updated including Fact Sheets on a range of nuclear-related topics that can be downloaded. CNWC support also continued for a website profiling the Ontario's nuclear energy advantage.

The Council's annual conference was held in Peterborough, Ontario in October. The conference titled, "*The Nuclear Fuels Sector and Looking Ahead to the Future of Nuclear Power in Canada*", updated unionized workers on national and international developments in the industry. CNWC members staffed a display booth and answered questions at other conferences and conventions: Candian Nuclear Association; CUPE National; Ontario Federation of Labour; and IBEW Nuclear.


During 2017, CNWC representatives engaged federal and provincial elected officials, regulators and government agencies. As well, with the support of our employers, the CWNC hosted several

facility tours (Darlington & Pickering) for elected municipal, provincial and federal officials, candidates standing for office and labour councils.

In 2018, CNWC education and outreach activities will focus on: expansion of the membership from nuclear supply chain companies, construction union, and local labour councils; Bruce Power's and OPG's refurbishment projects; the extended operation of Pickering NGS; Bruce Power licence renewal; OPG's DGR facility; Nuclear Waste Management Organization; CNL waste facility and SMR demonstration(s);

During 2018, the CNWC plans to continue to support its current outreach initiatives.

## CNWC Member Unions:

- District Labour Councils (Grey/Bruce, Durham, Northumberland, Lindsay)
- International Association of Firefighters (160)
- Federation of Professional & Technical Engineers (160 & 164)
- International Brotherhood of Electrical Workers (37, 353, & 804)
- Ontario Construction & Building Trades Council
- Power Workers' Union
- Professional Institute of the Public Service of Canada (PIPS)
- CRPEG
- Union of Professional Engineers & Associates (SPEA)
- Society of United Professionals Union
- UNIFOR (S-48, O-599, O-252, 524)
- United Steel Workers (14193, 13173, 8562, 8914, 7806, 1568) 



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# Organization of Canadian Nuclear Industries (OCNI), President's Report

By Ron Oberth, President and CEO Organization of Canadian Nuclear Industries (OCNI)

2018

The year began with significant milestones achieved by Ontario Power Generation on the Darlington Unit 2 Refurbishment Project- the first stage of a \$12.8B 12-year project to refurbish all four Darlington units and extend their operating lives to 2060. With OPG's commitment to a 96% project spend in Ontario – this is great news for the Canadian nuclear supply chain. The \$13B Bruce Power Major Component Replacement (MCR) project is now well advanced in detailed planning with the first unit of this six-unit project to come off line in 2020. Bruce Power has announced plans to source more than 90% of MCR products and services from Ontario.

OCNI membership continues to grow reaching 238 at year-end. Small and medium sized enterprises (SME's) in particular benefit from OCNI's support for a vertically integrated and collaborative supplier network through organizing "supplier days" at customer sites, technical workshops on important and emerging supplier topics and general knowledge sharing and networking events. Signature supplier days are planned at OPG Pickering on May 31st, Canadian Nuclear Laboratories on September 14th, and OPG-Darlington September 21st. Dates for the Bruce Power and SNC Lavalin supplier

days will be confirmed in late June. The Ontario Ministry of Advanced Education and Skills Development's (MAESD) "Skills Catalyst Fund" recently awarded a grant of nearly \$495,000 to OCNI to undertake a talent development program that will promote education and training in skilled trades to underrepresented groups including youth, women, and indigenous peoples. The OCNI-led project will provide career opportunities for under-represented groups while enhancing the pipeline of skilled trades people required to refurbish and replace major components at 10 nuclear generating units at the Darlington and Bruce sites.

OCNI lead a strong delegation of 15 Canadian nuclear suppliers to the Nuclear Industry China (NIC) Exhibition in Beijing during the week of March 26 – 30th. Trade mission delegates had high level meetings with China General Nuclear Power Corporation (CGN) on the Cernavoda 3&4 project in Romania and with China National Nuclear Corporation (CNNC) on the Atucha 3 project in Argentina. Delegates also had constructive discussions with China Nuclear Power Operations Technology Corporation (CNPO), China Nuclear Power Engineering Company (CNPEC), and Suzhou Nuclear Power

Research Institute (SNPI). Delegates met with many other Chinese and international nuclear organizations at the Canadian Pavilion at NIC 2018 an event that also attracts many high-ranking Chinese government officials.

OCNI in collaboration with Bruce Power Indigenous Relations Supplier Network (IRSN) officially opened its satellite office at 625 Goderich Street in Port Elgin on March 21, 2018. Our new office will support OCNI member companies in fostering stronger working relationships with Bruce Power in support of the MCR Program and site infrastructure investments. Bruce Power and its supplier partners have created the IRSN in order to further strengthen their relationships with local Indigenous communities

OCNI with support of OPG, the Aecon-SNC-Lavalin Joint Venture launched a "Local Supplier Engagement Program" in which Darlington Refurbishment Project milestones were celebrated in the presence MPP's and local politicians and media while recognizing the resulting quality jobs and local economic impacts. OCNI managed 10 events over 10 months at small and medium sized suppliers from Sarnia in the west to Arnprior in the east. 🍁



Darlington. (Photo courtesy of OPG)





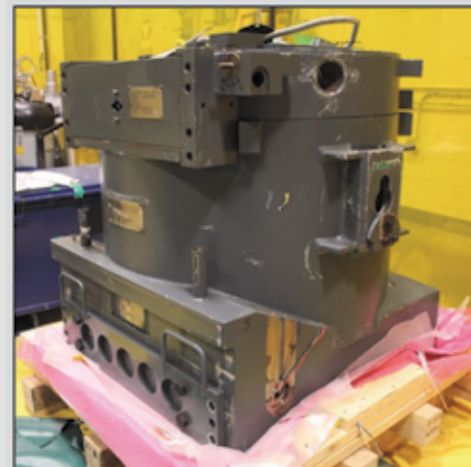
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<b>MOBILE SUPPLY STORE (MSS)</b>	<ul style="list-style-type: none"> <li>• An MSS added to the laundry program puts consumables through security allowing storage/issue from within the Unzoned Area.</li> <li>• Gets needed items into the worker's hands quickly – no down time waiting for materials coming from the warehouse.</li> <li>• Stocking list is customized to meet customer requirements.</li> <li>• No inventory overhead – only pay for what you use.</li> <li>• Restocked from laundry truck – no security issues.</li> <li>• Secondary packaging dispositioned as value added service.</li> </ul>
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<b>DECON / CHANGE-OUT TRAILER RENTAL</b>	<ul style="list-style-type: none"> <li>• Designed to order – clean and hot side, monitoring equipment, calibration, etc. all turnkey on a rental basis.</li> <li>• No decommissioning cost for trailers at the end of the project.</li> </ul>
<b>CONTAMINATION MONITOR RENTAL</b>	<ul style="list-style-type: none"> <li>• When you need to supply instruments for your project, a UniTech rental program can save both time and money.</li> <li>• Can accommodate short/long term (months/years).</li> <li>• Personnel exit monitors, small article monitors, hand held instrumentation, and dosimetry services.</li> </ul>
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# Women in Nuclear (WiN) Canada President's Report

By Heather Kleb, President WiN-Canada

2018

With the increased attention to women's rights and gender parity over the past year, the mission of Women in Nuclear Canada (WiN-Canada) has become more relevant to the greater public discourse than ever before. WiN-Canada increased its public outreach in 2017 in an effort to elevate member voices and communicate the role nuclear plays in addressing the most important issue we face as a global community – climate change.

In 2017 WiN-Canada was proud to launch its new website: <https://canada.womeninnuclear.org>, which features a clean and modern design and allows our 1,800+ members, in six Chapters across the country, to connect with each other, and the public, through online profiles.

As the premier association for women working in all things nuclear, we received overwhelming support from the industry, including Ontario Power Generation, Bruce Power, SNC-Lavalin, and the Nuclear Waste Management Organization. E.S. Fox, the Canadian Nuclear Association and New Brunswick Power support our youngest members through scholarships and Kinectrics supports our Speakers' Clearinghouse.

New partnerships and MOUs were also forged with the Canadian Institute for Non-Destructive Evaluation and the Women of PowerLine Technicians. As demonstrated in this report, WiN-Canada has had a very successful year of programming, advocacy and member engagement.

## Fostering Professional Development in Women in Nuclear-Related Occupations

The 2017 WiN-Global Conference in Beijing, China provided another opportunity to connect with members around the world. WiN-Canada members played an active role in the conference, and presented a Country Report on behalf of the organization. Canada continued to be a leader in the WiN-Global organization, spearheading the Mentorship Committee, the Communications Committee, and filling the role of WiN-Global Vice President.

WiN-Canada had strong representation at a number of industry events. Members attended the 2017 Canadian Nuclear Association Conference, the Canadian Nuclear Society Conference, and co-hosted an event with the CANDU Owners Group and NAGYN. Representatives from WiN-Canada also participated in the EUCI Leadership Conference for Women in Energy.

Our local Chapters continued to grow with many actively recruiting for Executive Committee members over the past year. WiN-Canada volunteers are dedicated to advocating for nuclear energy and radiation technologies and forging meaningful relationships within their communities. Each Chapter has hosted or participated in a variety of events this past year to encourage membership growth and professional development, including:

- Leadership Development Seminars
- Trade and Tech Galas
- Paint Nite Fundraiser for Missing and Murdered Indigenous Women

To celebrate Canada 150, WiN-Canada held its 14th Annual Conference in the Ottawa area. Some 200 members from across the country gathered to discuss trends in the nuclear industry and professional development, under the theme "NYOUclear". Delegates enjoyed tours of the Canadian Science and Technology Museum, the Canadian Nuclear Laboratories and the Canadian Nuclear Safety Commission.

## Advancing the Public Profile of the Nuclear Industry in Canada

WiN-Canada strengthened its relationship with local, provincial and federal governments in 2017 through Hill days and meetings with elected officials. Board members shared their expertise and opinions on the importance of nuclear technologies to the Canadian quality of life during meetings in Ottawa.

WiN-Canada intervened in support of Canadian Nuclear Safety Commission licence renewal applications at public hearings. The organization supported Canadian Nuclear Laboratories' application for Chalk River Laboratories and a WiN-Canada member presented at the public hearings.

## Promoting a Variety of Career Opportunities for Women and Students

In 2017 WiN created an Awards Committee to oversee the annual WiN-Canada Award, which is presented at the Annual Conference, as well as the new scholarships offered to female students pursuing studies in the field of nuclear science and related industries. The Committee looks forward to the increased development and promotion of the awards program.

After a successful launch of the Speakers Clearinghouse in 2016, the initiative is building momentum! In 2017, the roster of speakers has grown over 30 venues, schools and conferences have been identified for future outreach. WiN-Canada also continues to engage students, teachers and educational institutions to inspire youth to pursue studies and careers in STEM. Some education-focused initiatives from 2017 include:

- Collaborations with Skills Ontario and Skills New Brunswick
- Sessions at the CNS Nuclear Job Fair at the University of Ontario Institute of Technology (UOIT)
- Promotion of the Speakers Clearinghouse at the Science Teachers Association of Ontario Conference, in partnership with CNS

For more information about our Speakers Clearinghouse or to learn more about our goals and objectives you can visit us online at: [www.canada.womeninnuclear.org](http://www.canada.womeninnuclear.org)  
[www.facebook.com/womeninnuclear.canada](https://www.facebook.com/womeninnuclear.canada)  
[twitter.com/win\\_canada](https://twitter.com/win_canada) 🍁

# 2017 Canadian Nuclear Achievement Awards



## W. B. Lewis Medal

Presented to

**Arthur B. McDonald**

for demonstrating exceptional technical achievements and strong leadership in the field of particle physics research in Canada. Dr. McDonald was the 2015 winner of the Nobel Prize for Physics for his work at the Sudbury Neutrino Laboratory.



## Ian McRae Award

Presented to

**Joan Miller**

for leadership and outstanding contributions in decommissioning and waste management, particularly for the Nuclear Legacy Liabilities Program, and the Port Hope Area Initiative.



## Harold A. Smith Outstanding Contribution Award

Presented to

**Igor Pioro**

in recognition of a career of exceptional leadership and technical contributions to the nuclear industry in Canada and the world.



## George C. Laurence Award for Nuclear Safety

Presented to

**Barclay Howden**

for demonstrating a strong commitment to safety and for the instrumental role he played in ensuring nuclear safety in Canada.



## John S. Hewitt Team Achievement Award

Presented to

**the CWEST Team**

for the design, manufacturing, and application of a circumferential wet-scrape tool used to reduce outage duration and personnel dose during hydrogen-equivalent sampling at the Bruce Power station.

*Left to Right (Top Row): Jeff Gervacio, Ben Goodman, Michael Schmidt, Simon Bérubé.*

*Left to Right (Bottom Row): Mark Icaro, Sasha Antler, Andrew Hrycko, Farhan Zameer, Scott Da Silva.*

*Missing: Andrew Grieve, Nick Finelli, Tony Ceranic, Nigel White, Dylan Steed.*



## Education and Communication Award

Presented to

**Jason M. K. Donev**

for enthusiasm and commitment to teaching and communicating with the public about nuclear science and nuclear energy.



## Education and Communication Award

Presented to

**Robert Liddle**

for passion and commitment as a tireless educator and advocate for the nuclear industry.



## Fellow of the Canadian Nuclear Society

Presented to

**Wei Shen**

for long-term extensive contributions to the Canadian Nuclear Society and to the nuclear industry.



## R.E. Jervis Award

Presented to

**Mojtaba Momeni**

for outstanding academic accomplishments in the area of corrosion of Cr-Fe-Ni alloys in nuclear reactor environments.



This programme lists events which are organized or co-sponsored by the Canadian Nuclear Society or considered to be of interest to its members.

The current listing of events is posted on the CNS website at [www.cns-snc.ca](http://www.cns-snc.ca)

## June 3 - 6, 2018

38th Annual CNS Conference & 42nd Annual CNS/CNA Student Conference  
Sheraton Cavalier Hotel, Saskatoon, SK  
Organized by: CNS  
**Contact: Canadian Nuclear Society Office**  
Tel: 416-977-7620  
Email: [cns-snc@on.aibn.com](mailto:cns-snc@on.aibn.com)  
[www.cns-snc.ca](http://www.cns-snc.ca)

## June 17-21, 2018

ANS Annual Meeting  
Philadelphia, PA  
Organized by: ANS  
[www.ans.org/meetings](http://www.ans.org/meetings)

## September 9-14, 2018

21st International Conference on Water Chemistry in Nuclear Reactor Systems  
Hyatt Regency, San Francisco, CA, USA  
Organized by: EPRI  
Co-sponsored by: CNS  
[www.cvent.com/events/Calendar/Calendar.aspx?cal=22e6c583-7b72-4ba0-9898-598e801ee421](http://www.cvent.com/events/Calendar/Calendar.aspx?cal=22e6c583-7b72-4ba0-9898-598e801ee421)

## Sept 26-28, 2018

14th Annual WiN-Canada Conference  
Saskatoon, Saskatchewan, CA  
[www.canada.womeninnuclear.org/calendar](http://www.canada.womeninnuclear.org/calendar)

## Sept. 30-Oct. 5, 2018

PBNC 2018  
[San Francisco, CA, ]  
[www.pacificnuclear.net/pnc/pbnc.html](http://www.pacificnuclear.net/pnc/pbnc.html)  
[www.ans.org/meetings/c\\_2](http://www.ans.org/meetings/c_2)

## October 2018

Student Job Fair for the Nuclear Industry  
UOIT/Durham College North Oshawa Campus  
Organized by the Durham Region, UOIT, Toronto, Sheridan Park & Golden Horseshoe Branches. In collaboration with UOIT, Durham College and OCNi  
**Contact: Canadian Nuclear Society Office**  
Tel: 416-977-7620  
Email: [cns-snc@on.aibn.com](mailto:cns-snc@on.aibn.com)  
[www.cns-snc.ca](http://www.cns-snc.ca)

## Oct. 10-11, 2018

International Conference on Simulation Methods in Nuclear Engineering  
Organized by: CNS NSE Division  
**Contact: Canadian Nuclear Society Office**  
Tel: 416-977-7620  
Email: [cns-snc@on.aibn.com](mailto:cns-snc@on.aibn.com)  
[www.cns-snc.ca](http://www.cns-snc.ca)

## November 6-8, 2018

Generation IV and Small Reactors (G4SR-1) International Conference  
Organized by: CNS G4SRT Division  
**Contact: Canadian Nuclear Society Office**  
Tel: 416-977-7620  
Email: [cns-snc@on.aibn.com](mailto:cns-snc@on.aibn.com)  
[www.cns-snc.ca](http://www.cns-snc.ca)

## November 11-15, 2018

2018 ANS Winter Meeting  
Orlando, FL  
Organized by: ANS  
[www.ans.org](http://www.ans.org)

## February 2019

CNA Nuclear Industry Conference and Tradeshow  
Westin Hotel Ottawa, ON  
Organized by: CNA  
[www.cns-snc.ca](http://www.cns-snc.ca)

## March 2019

CANDU Technology & Safety Course  
Organized by: CNS NSE Division  
**Contact: Canadian Nuclear Society Office**  
Tel: 416-977-7620  
Email: [cns-snc@on.aibn.com](mailto:cns-snc@on.aibn.com)  
[www.cns-snc.ca](http://www.cns-snc.ca)

## Nuclear 101

Ottawa  
Organized by: CNS Education and Communication Committee  
**Contact: Canadian Nuclear Society Office**  
Tel: 416-977-7620  
Email: [cns-snc@on.aibn.com](mailto:cns-snc@on.aibn.com)  
[www.cns-snc.ca](http://www.cns-snc.ca)

## March 10-13, 2019

11th International Symposium on Supercritical Water-Cooled Reactors (ISSCWR-11)  
Vancouver, BC  
Organized by: CNS NS&E Division  
**Contact: Canadian Nuclear Society Office**  
Tel: 416-977-7620  
Email: [cns-snc@on.aibn.com](mailto:cns-snc@on.aibn.com)  
[www.cns-snc.ca](http://www.cns-snc.ca)

## Spring 2019

Reactor Physics Course  
**Contact: Canadian Nuclear Society Office**  
Tel: 416-977-7620  
Email: [cns-snc@on.aibn.com](mailto:cns-snc@on.aibn.com)  
[www.cns-snc.ca](http://www.cns-snc.ca)

## May 2019

3rd CNS Conference Fire Safety and Emergency Preparedness for the Nuclear Industry  
Organized by: CNS  
**Contact: Canadian Nuclear Society Office**  
Tel: 416-977-7620  
Email: [cns-snc@on.aibn.com](mailto:cns-snc@on.aibn.com)  
[www.cns-snc.ca](http://www.cns-snc.ca)

## May-June 2019 (Tentative)

1st Innovative Materials, Chemistry and Fitness-For-Service solutions for Nuclear Power Systems Conference  
Organized by: CNS MCF Division  
**Contact: Canadian Nuclear Society Office**  
Tel: 416-977-7620  
Email: [cns-snc@on.aibn.com](mailto:cns-snc@on.aibn.com)  
[www.cns-snc.ca](http://www.cns-snc.ca)

## Late Spring, 2019

CRPA Annual Conference  
<http://crpa-acrp.org/home>

## June 9-13, 2019

ANS Annual Meeting  
Minneapolis, MN  
Organized by: ANS  
[www.ans.org/meetings](http://www.ans.org/meetings)

## June 23-26, 2019

39th Annual CNS Conference & 43rd Annual CNS/CNA Student Conference  
Westin Hotel, Ottawa, Ont  
**Contact: Canadian Nuclear Society Office**  
Tel: 416-977-7620  
Email: [cns-snc@on.aibn.com](mailto:cns-snc@on.aibn.com)  
[www.cns-snc.ca](http://www.cns-snc.ca)

## July 21-24, 2019

International Conference on CANDU Fuel  
Organized by: CNS FT Division  
**Contact: Canadian Nuclear Society Office**  
Tel: 416-977-7620  
Email: [cns-snc@on.aibn.com](mailto:cns-snc@on.aibn.com)  
[www.cns-snc.ca](http://www.cns-snc.ca)

## September 8-11, 2019

Waste Management, Decommissioning and Environment Restoration for Canada's Nuclear Activities  
Ottawa Marriott Hotel, Ottawa, ON  
Organized by: CNS E&WM Division  
**Contact: Canadian Nuclear Society Office**  
Tel: 416-977-7620  
Email: [cns-snc@on.aibn.com](mailto:cns-snc@on.aibn.com)  
[www.cns-snc.ca](http://www.cns-snc.ca)

# CANDU Nuclear Reactor Performance and World Uranium Production

## CANDU Nuclear Reactor Performance – 2017

Reactor	In Service	Capacity (MW)	Performance In 2017 (%)	Lifetime Performance (%)
Point Lepreau	1983	705	89.1	70.5
Wolsong 1	1983	679	40.4	72.6
Wolsong 2	1987	678	90.0	92.4
Wolsong 3	1998	698	32.7	89.9
Wolsong 4	1999	703	99.2	94.0
Embalse	1983	648	0	74.0
Cernavoda 1	1996	707	96.3	90.1
Cernavoda 2	2007	705	89.5	94.0
Qinshan 4	2002	700	76.6	89.8
Qinshan 5	2003	700	94.4	91.5
Pickering 1	1971	542	57.8	64.2
Pickering 4	1973	542	87.8	66.9
Pickering 5	1983	540	63.8	73.6
Pickering 6	1984	540	98.1	78.5
Pickering 7	1985	540	83.0	77.3
Pickering 8	1986	540	85.6	75.5
Bruce 1	1977	825	96.6	68.9
Bruce 2	1978	825	97.4	65.3
Bruce 3	1978	825	83.8	73.5
Bruce 4	1979	825	4.2	73.3
Bruce 5	1985	872	70.3	84.6
Bruce 6	1984	872	80.2	81.9
Bruce 7	1986	872	92.8	84.5
Bruce 8	1987	872	97.7	83.2
Darlington 1	1992	934	60.3	83.6
Darlington 2	1990	934	0	76.0
Darlington 3	1993	934	93.9	86.2
Darlington 4	1993	934	98.7	85.8

<https://www.iaea.org/PRIS/CountryStatistics/CountryDetails.aspx?current=CA>

### Notes

1. Darlington 2 entered plant refurbishment, October 2016.
2. Embalse undergoing plant refurbishment.
3. All reactor performance now based on Load Factor, not Capacity Factor

## World Uranium Production – 2016

Country or area	Production (tU)					Known Resources
	2012	2013	2014	2015	2016	
Australia	6991	6350	5001	5654	6315	1 664 100
Brazil	231	198	231	40	44	276 800
Botswana	-	-	-	-	-	73 500
Canada	8999	9332	9134	13 325	14 039	509 800
China*	1500	1450	1500	1616	1616	272 500
Czech Rep	228	225	193	155	138	-
France	3	0	3	2	0	-
Germany	50	27	33	0	0	-
India*	385	400	385	385	385	-
Jordan	-	-	-	-	-	47 700
Kazakhstan	21 317	22 567	23 127	23 800	24 575	743 300
Malawi	1101	1132	369	0	0	-
Namibia	4495	4315	3255	2993	3654	267 000
Niger*	4667	4528	4057	4116	3497	291 500
Pakistan*	45	45	45	45	45	-
Romania*	90	80	77	77	50	-
Russia	2872	3135	2990	3055	3004	507 800
South Africa	465	540	573	393	490	322 400
Tanzania	-	-	-	-	-	58 100
Ukraine*	960	1075	962	1200	1005	115 800
USA	1596	1835	1919	1256	1125	62 900
Uzbekistan*	2400	2400	2400	2385	2404	130 100
Other	-	-	-	-	-	232 400
<b>Total</b>	<b>58 394</b>	<b>59 673</b>	<b>56 252</b>	<b>60 946</b>	<b>62 336</b>	<b>5,718,400</b>

\*WNA estimate

All figures taken from the World Nuclear Association  
WNA most recent update was July 2017



# World Reactor Capacity

2018

## World Reactor Capacity – 2017

Country	Operating		Planned or Under Construction 03/01/16		Electricity Generation 2017	
	No	MW	No	MW	%	TWh
Argentina	3	1627	5	3277	5.6	7.7
Armenia	1	376	1	1060	34.5	2.6
Bangladesh			2	2400		
Belarus			4	4788		
Belgium	7	5943			51.7	41.3
Brazil	2	1901	5	5405	2.9	15.9
Bulgaria	2	1926	1	950	35	15.8
Canada	19	13553			15.6	97.4
Chile			4	4400		
China	36	32637	200	228786	3.6	210.5
Czech Rep.	6	3904	3	3600	29.4	22.7
Egypt			4	4800		
Finland	4	2764	3	4400	33.7	22.3
France	58	63130	2	3500	72.3	384.9
Germany	8	10728			13.1	80.1
Hungary	4	1889	2	2400	51.3	15.2
India	22	6219	69	72900	3.4	35
Indonesia			5	4030		
Iran	1	915	9	8300	2.1	5.9
Israel			1	1200		
Italy						
Japan	42	39952	14	19848	2.2	17.5
Jordan			2	2000		
Kazakhstan			4	1200		
Korea (N)			1	950		
Korea (S)	25	23081	11	15800	30.3	154.2
Lithuania			2	2700		
Malaysia			2	2000		
Mexico	2	1600	2	2000	6.2	10.3
Netherlands	1	485	1	1000	3.4	3.8
Pakistan	5	1355	3	3492	4.4	5.1
Poland			6	6000		
Romania	2	1310	3	1965	17.1	10.4
Russia	37	28961	53	53024	17.1	179.7
Saudi Arabia			16	17000		
Slovakia	4	1816	3	2142	54.1	13.7
Slovenia	1	696	1	1000	37.2	6.1
South Africa	2	1830	8	9600	6.6	15.2
Spain	7	7121			21.4	56.1
Sweden	8	8376			40	60.6
Switzerland	5	3333	3	4000	34.3	20.3
Taiwan	6	4927	2	2700	na	na
Thailand			5	5000		
Turkey			8	9300		
Ukraine	15	13107	13	13900	52.3	81
UAE			14	20000		
UK	15	8883	13	17900	20.4	65.1
USA	99	99535	46	39312	19.7	805.3
Vietnam			10	10700		
<b>World</b>	<b>446</b>	<b>393880</b>	<b>566</b>	<b>620729</b>		<b>2461.7</b>

### Notes

All figures taken from the World Nuclear Association, March 1, 2016.

# CNS Council and Staff

## CNS Executive



**Dan Gammage**  
President



**John Luxat**  
1st Vice-President



**Keith Stratton**  
2nd Vice-President



**Peter Ozemoyah**  
Past President



**Mohamed Younis**  
Treasurer



**Colin Hunt**  
Secretary



**Benjamin Rouben**  
Executive Director



**Ken Smith**  
Financial  
Administrator



**Peter Easton**  
Communications  
Director

## The Canadian Nuclear Society

The Canadian Nuclear Society (CNS) was established in 1979 as an organization of individual members, paying membership dues. It was established as an independent section of the Canadian Nuclear Association (CNA) to benefit from the office support structure of the CNA. In 1997, after twenty years of operation in this mode, and after building its own asset base, the CNS obtained a federal charter as an independent not-for-profit organization. The CNS, through its base of individual members, promotes the exchange of information on all aspects of nuclear science and technology – including uranium mining and refining, electricity generation by nuclear power, medical and industrial uses of radionuclides, management of radioactive wastes, and various associated research and development activities.

The activities of the CNS are managed by a Council that is elected by the CNS members at the Annual General Meeting, normally held in June. The Council term of office is one year. The elected Council consists of six Officers plus up to 30 Members-at-Large – all volunteers. Various members of Council are appointed to Chair Committees that look after specific issues. The Council is supported by a full time Office Manager, and by other part-time specialists.

### Elected Executive for June 2017 to June 2018:

**Dan Gammage**  
President

**John Luxat**  
1st V-P

**Keith Stratton**  
2nd V-P

**Colin Hunt**  
Secretary

**Mohamed Younis**  
Treasurer

**Peter Ozemoyah**  
Past President

### Part-time Specialists and Office Staff:

**Ben Rouben**  
Executive  
Director

**Ken Smith**  
Financial  
Administrator

**Brian Blosser**  
Accountant

**Amanda Blosser**  
Bookkeeper

**Bob O'Sullivan**  
Office Manager

**Peter Easton**  
Communications  
Director

The CNS is organized into Branches and Technical Divisions, both directed towards involvement of the individual member. Branches are established on a geographical basis, and hold local meetings on issues of interest. Technical Divisions are established for specific technical areas of interest – and are responsible for organizing topical conferences, courses, and seminars.

Members of the CNS Council and staff are listed on the next page.

An outline of the activities of the CNS, including a list of upcoming conferences and courses, is provided elsewhere in this Yearbook.



## CNS Council Members at Large



**Parva Alavi**



**Andrew Ali**



**John Barrett**  
President and CEO, CNA



**Ruth Burany**



**Chris Ciaravino**



**Peter Easton**



**Mohinder Grover**



**Emma Hauch**



**Jerry Hopwood**



**Paul Jones**



**Raphael Kouyoumdjian**



**Wilson Lam**



**Kris Mohan**



**E.M (Dorin) Nichita**



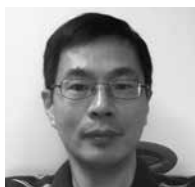
**Peter Ottensmeyer**



**John Roberts**



**Nick Sion**



**Wei Shen**



**Jerzy Szpunar**



**Ron Thomas**



**Aman Usmani**



**Kamal Verma**



**Stephen Yu**

## CNS Staff



**Bob O'Sullivan**  
CNS Office Manager



**Colin Hunt**  
Publisher  
CNS Bulletin



**Ric Fluke**  
Editor  
CNS Bulletin



**Brian Blosser**  
Accountant



**Amanda Blosser**  
Bookkeeper

# International Nuclear Organizations

## ARGENTINA

Autoridad Regulatoria Nuclear (ARN)  
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(1429) Buenos Aires  
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Fax: [+54 11] 6323-1771/1798

Comision Nacional de Energia Atomica (CNEA)  
Avenida del Libertador 8250  
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Tel: [+54-11] 4704-1000

## AUSTRIA

International Atomic Energy Agency (IAEA)  
Wagramerstrasse 5  
P.O. Box 100  
A-1400 Vienna, Austria  
Tel: +431 2600-0

United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR)  
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A-1400 Vienna, Austria  
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New Illawarra Road  
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Kirrawee DC NSW 2232  
Tel: +61 2 9717 3111  
Fax: +61 2 9543 5097

Uranium Information Centre Ltd.  
GPO Box 1649N  
Melbourne, 3001  
Tel: 03 9629 7744  
Fax: 03 9629 7207

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Bangladesh Atomic Energy Commission  
G.P.O. Box 158, 4 Kazi Nazrul  
Islam Avenue, Dhaka-1000  
Tel: +880 2 502 600  
Fax: +880 2 861 3051

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Commission of the European Communities Nuclear Safety Research Directorate  
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Joint Research Centre (JRC) Commission of the European Communities  
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B-1049 Brussels, Belgium  
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Service des applications Nucléaires  
North Gate III, boul. du Roi Albert 11, 16  
1000 Bruxelles  
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Union of the Electricity Industry EURELECTRIC  
Bd de l'Impératrice 66  
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## BRAZIL

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22294 Rua General Severiano 90  
Rio de Janeiro, R.J.  
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c/o P.O. Box 1268  
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National Nuclear Safety Administration (NNSA)  
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Nasr City – Cairo  
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Fax: +39 6-36272591/2777

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Fax: +39 332 789 903

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Control (CNCAN)  
14 Libertatii Blvd.  
Bucharest - 5, Romania  
Tel: 401 410 27-54  
Fax: 401 411 14 36

## SOUTH AFRICA

National Nuclear  
Regulator (NNR)  
PO Box 7106  
CENTURION 0046  
Tel: 27 12 663 5500  
Fax: 27 12 663 5513

## SPAIN

Cosejo de Seguridad  
Nuclear (CSN)  
c/o Justo Dorado,  
11 - 28040 Madrid  
Tel: 34-913 460105  
Fax 34-913 460103

Foro de la industria  
nuclear espanola  
Boix y Morer 6 - 28003 Madrid  
Tel: +34 1 553 63 03  
Fax: +34 1 535 08  
Email: correo@foronuclear.org

Sociedad Nuclear  
Espanola (SNE)  
Campoamor 17  
E-28004 Madrid  
Tel: +34 1 308 63 18

## SWEDEN

International Commission  
on Radiological Protection  
(ICRP)  
SE-171 16 Stockholm, Sweden  
Tel: +46 8 729 727 5  
Fax: +46 8 729 729 8

Statens Karnkraftinspektion  
(Swedish Nuclear Power  
Inspectorate)  
Klarabergsviadukten 90  
SE-106 58 Stockholm  
Tel: 468 698 8400  
Fax: 468 661 9086

## Stockholm International Peace Research Institute (SIPRI)

Signalistgatan 9  
SE-16970, Solna, Sweden  
Tel: +46 8 655 9700  
Fax: +46 8 655 9733

## Swedish Atomic Forum

C/o Energiforum AB  
Allhegonavagen 25  
S-61135 Nyköping  
Tel: 46 155 281070

## SWITZERLAND

### CERN European Laboratory for Particle Physics

CH-1211 Geneva 23  
Switzerland  
Tel: +41 22 767 61 11

### European Nuclear Society

Belpstrasse 23  
P.O. Box 5032  
CH-3001 Berne, Switzerland  
Tel: +41 31 320 6111

### Hauptabteilung für die Sicherheit der Kernanlagen (HSK)

CH-5232 Villigen – HSK  
Tel: 41 56 310 39 36  
Fax: 41 56 310 49 36

### Schweizerische Vereinigung für Atomenergie (SVA) [Swiss Association for Atomic Energy]

Postfach 5032  
Ch-3001 Bern  
Tel: +41 31 32 065 25

## TAIWAN

### Atomic Energy Council

No. 67, Lane 144, Sec. 4  
Keelung Rd.  
Taipei, Taiwan, R.O.  
Tel: 886 2 2363 4180

## TURKEY

### Turkish Atomic Energy Authority (TAEK)

Eskisehir Yolu 9. km  
Lodumlu, 06530 ANKARA  
Tel: 90-312 287 1529  
Fax: 90-312 285 1537

## UNITED KINGDOM

### British Nuclear Energy Society (BNES)

1-7 Great George Street  
London SW1P 3AA  
Tel: +44 20 7222-7722

### British Nuclear Industry Forum (BNIF)

First Fl., Whitehall House  
41 Whitehall  
London, SW1A 2BY  
Tel: +44 20 7766 6640  
Fax: +44 20 7839 4695

### British Nuclear Fuels PLC (BNFL)

Risley Warrington  
Cheshire WA3 6AS  
Tel: +44 925 832 000

### CNSC-H&SE/NII

Railway Inspectorate  
2nd floor SW, Rose Court  
2 Southwark Bridge  
London SE1 9HS  
Tel: 44-171 717 6887  
Fax: 44-171 717 6095

### JET Joint Undertaking

Abingdon, Oxfordshire  
United Kingdom OX14 3EA  
Tel: +44 235 528 822  
Fax: +44 235 464 755

### Scottish Power (Head Office)

Cathcart House, Spean St.  
Glasgow, Scotland G44 4BE  
Tel: +44 41 637 7177

### United Kingdom Atomic Energy Authority (UKAEA)

Marshall Bldg.  
521 Downs Way  
Harwell, Didcot, Oxfordshire  
OX11 0RA  
Tel: +44 1235 820 220

### Women in Nuclear Global (WiN)

c/o World Nuclear Association  
Carlton House  
22a St. James' Square  
London SW1Y 4JH  
United Kingdom  
Tel: +44 (0)207 451-1520  
Fax: +44 (0)207 839-1501

### World Association of Nuclear Operators (WANO)

King's Buildings,  
16 Smith Square  
London, United Kingdom  
SW1P 3HQ  
Tel: +44 71 828 2111  
Fax: +44 71 828 6691

### World Energy Council (WEC)

5th Floor, Regency House  
1-4 Warwick St.  
London, United Kingdom  
SW1B 5LT  
Tel: +44 20 7734 5996  
Fax: +44 20 7734 5926

### World Nuclear Association

22a St James's Square  
London, United Kingdom  
SW1Y 4JH  
Tel: +44 (0)20 7451 1520  
Fax: +44 (0)20 7839 1501

## UNITED STATES

### American Nuclear Society (ANS)

555 North Kensington Ave.  
La Grange Park, Illinois 60526  
Tel: (708) 352-6611

### Argonne National Laboratory (East)

9700 South Cass Ave.  
Argonne, Illinois 60439  
Tel: (630) 252-2000

### Argonne National Laboratory (West)

P.O. Box 2528  
Idaho Falls, Idaho  
83403-2528  
Tel: (208) 533-7341

### Brookhaven National Laboratory (BNL)

Upton, NY 11973-5000  
Tel: (631) 344-8000

### CNSC-USNRC Office of Public Affairs (OPA)

Washington, D.C. 20555  
Tel: 301-415 0317  
Fax: 301-415 2395

### Edison Electric Institute (EEI)

701 Pennsylvania Ave. NW  
Washington, D.C.  
20004-2696  
Tel: (202) 508-5000

### Electric Power Research Institute (EPRI)

3412 Hillview Ave.  
P.O. Box 10412  
Palo Alto, California 94303  
Tel: (415) 855-2000

### Environmental Protection Agency (EPA)

1200 Pennsylvania Ave., NW  
Washington, D.C. 20460  
Tel: (202) 260-2090

### Lawrence Livermore National Laboratory

P.O. Box 808  
Livermore, CA 94551-0808  
Tel: (925) 422-1100

### Los Alamos National Laboratory (LANL)

P.O. Box 1663  
Los Alamos, N.M. 87545  
Tel: (505) 667-7000

### National Council on Radiation Protection and Measurements (NCRP)

7910 Woodmont Ave.  
Suite 800  
Bethesda, Maryland  
20814-3095  
Tel: (301) 657-2652

### Nuclear Energy Institute

1776 I Street, NW, Suite 400  
Washington, D.C.  
20006-3708  
Tel: 202.739.8000  
Fax: 202.785.4019

### Nuclear Regulatory

Commission (NRC)  
Mail Stop TA-13  
Washington, D.C. 20555  
Tel: (301) 415-8200

### Oak Ridge National Laboratory (ORNL)

P.O. Box 2008  
Oak Ridge, Tennessee 37831  
Tel: (615) 574-4160

### Sandia National Laboratories

Albuquerque, N.M.  
87185-5800  
Tel: (505) 844-5678

### U.S. Department of Energy (DOE)

1000 Independence Ave., S.W.  
Washington, D.C. 20585  
Tel: (202) 586-5000

## YUGOSLAVIA

### Yugoslavia Federal Secretariat for Energy and Industry

Bulevar AVNOJ-A 104 11070  
Novi Beograd  
Tel: (38-11) 195 244



## FEDERAL GOVERNMENT

**Atomic Energy of Canada Limited (AECL)**  
Place de Ville, Tower B112  
Kent St., Suite 501  
Ottawa ON K1P 5P2  
Tel: (613) 589-2085

**CNL Chalk River Laboratories**  
Chalk River ON K0J 1J0  
Tel: 1-866-513-2325

**CNL Low-level Radioactive Waste Management**  
National Office  
Suite 200  
1900 City Park Drive  
Ottawa ON K1J 1A3  
Tel: 1-866-513-2325

**CNL Whiteshell Laboratories**  
P.O. Box 550  
Pinawa MB R0E 1L0  
Tel: 1-866-513-2325

**Canadian Nuclear Safety Commission**  
P.O. Box 1046  
280 Slater Street  
Ottawa ON K1P 5S9  
Tel: (613) 995-5894

**Department of Foreign Affairs and International Trade (DFAIT)**  
Lester B Pearson Bldg.  
125 Sussex Dr.  
Ottawa ON K1A 0G2  
Tel: (613) 996-9134

**Environment Canada**  
351 Joseph Blvd.  
Hull QC K1A 0H3  
Tel: (613) 997-2800

**Health and Welfare Canada**  
A.L. 0900C2  
Ottawa ON K1A 0K9  
Tel: (613) 957-2991

**National Energy Board**  
444 Seventh Ave. S.W.  
Calgary AB T2P 0X8  
Tel: (403) 292 4800

**National Research Council Canada Institute for Scientific and Technical Information (CISTI)**  
Bldg. M55, Room 148  
Montreal Rd. Campus  
Ottawa ON K1A 0S2  
Tel: (613) 993-1600

**Natural Resources Canada (Uranium, Nuclear Energy & Waste Management)**  
580 Booth Street  
Ottawa ON K1A 0E4  
Tel: (613) 995-0947

**Natural Sciences and Engineering Research Council of Canada (NSERC)**  
350 Albert St., Tower 2  
Ottawa ON K1A 1H5  
Tel: (613) 995-5992

**Nuclear Waste Management Organization (NWMO)**  
22 St. Clair Avenue East  
Sixth Floor  
Toronto ON M4T 2S3  
Tel: 416-934-9814  
Fax: 416.934.9526

## PROVINCIAL ORGANIZATIONS

**Hydro-Québec**  
75 René-Lévesque Blvd., West  
Montréal QC H2Z 1A4  
Tel: 514 289-2211

**New Brunswick Power**  
515 King Street  
P.O. Box 2000  
Fredericton NB E3B 4X1  
Tel: 1-800-663-6272

**New Brunswick Point Lepreau Generating Station**  
P.O. Box 600  
Lepreau NB E5J 2S6  
Tel: (506) 659-2220

**Ontario Power Generation (OPG)**  
700 University Ave.  
Toronto ON M5G 1X6  
Tel: (416) 592-2555

**Ontario Power Generation Darlington Generation Station Information Centre**  
P.O. Box 4000  
Bowmanville ON L1C 3Z8  
Tel: (905) 623-7122

**Ontario Power Generation Pickering Generating Station Information Centre**  
1675 Montgomery Park Rd.  
Pickering ON L1V 2R5  
Tel: (905) 839-0465

## ASSOCIATIONS

**Association of Consulting Engineers of Canada**  
130 Albert St., Suite 420  
Ottawa ON K1P 5G4  
Tel: (613) 236-0569

**Association of Major Power Consumers of Ontario (AMPCO)**  
65 Queen Street West  
Suite 1510  
Toronto ON M5H 2M5  
Tel: (416) 260-0280  
Fax: (416) 260-0442

**Canadian Association of Medical Radiation Technologists**  
85 Albert St., Suite 1501  
Ottawa ON K1P 6A4  
Tel: (613) 234-0012

**Canadian Association of Radiologists**  
600 – 294 Albert Street  
Ottawa ON K1P 6E6  
Tel.: 613 860-3111  
Fax: 613 860-3112

**Canadian Electricity Association**  
275 Slater Street, Suite 1500  
Ottawa ON K1P 5H9  
Tel: (613) 230-9263  
Fax: (613) 230-9326

**Canadian Standards Association (CSA)**  
178 Rexdale Blvd.  
Rexdale ON M9W 1R3  
Tel: (416) 747-4000

**Engineering Institute of Canada**  
1295 Hwy 2 East  
Kingston ON K7L 4V1  
Tel: (613) 547-5989

**Electricity Distributors Association**  
3700 Steeles Ave. W.  
Woodbridge ON L4L 8K8  
Tel: (905) 265-5300

**Institute de Recherche d'Hydro-Québec (IREQ)**  
1800, boul. Lionel-Boulet  
Varennes QC J3X 1S1  
Tel: (450) 652-8011

**Radiation Safety Institute of Canada**  
1120 Finch Avenue W.  
Suite 607  
Toronto ON M3J 3H7  
Tel: (416) 650 9090

## Guide to Nuclear-Related Organizations *continued from page 33*

### UNIVERSITY/ EDUCATION

**Association of Universities  
and Colleges of Canada**  
350 Albert St., Suite 600  
Ottawa ON K1R 1B1  
Tel: (613) 563-1236

**Carleton University**  
1125 Colonel By Drive  
Ottawa ON K1S 5B6  
Tel: (613) 788-7400

**Dalhousie University**  
1459 Oxford St.  
Halifax NS B3H 4R2  
Tel: (902) 494-2211

**École Polytechnique**  
C.P. 6079 Centre-Ville  
Montréal QC H3C 3A7  
Tel: (514) 340-4711

**Institut Armand-Frappier**  
531, boulevard des Prairies  
C.P. 100  
Laval QC H7V 1B7

**Institut National de la  
Recherche Scientifique  
(INRS)**  
2600, boulevard Laurier  
C.P. 7500  
Ste-Foy QC G1V 4C7  
Tel: (418) 654-2500

**McGill University**  
845 Sherbrooke St. W.  
Montréal QC H3A 2T5  
Tel: (514) 398-4455

**McMaster University**  
1280 Main St. W.  
Hamilton ON L8S 4L8  
Tel: (905) 525-9140

**Queen's University**  
99 University Ave.  
Kingston ON K7L 3N6  
(613) 533-2000

**Royal Military  
College of Canada**  
Station "Forces"  
P.O. Box 17000  
Kingston ON K7K 7B4  
Tel: (613) 541-6000

**Trent University**  
1600 West Bank Dr.  
Peterborough ON K9J 7B8  
Tel: (705) 748-1011

**University of Alberta**  
114 Street – 89 Ave.  
Edmonton AB T6G 2M7  
Tel: (708) 492-3111

**University of British Columbia**  
2329 West Mall  
Vancouver BC V6T 1Z4  
Tel: (604) 822-2211

**University of Manitoba  
Department of Physics  
and Astronomy**  
Winnipeg MB R3T 2N2  
Tel: (204) 474-8880

**Université de Montréal**  
C.P. 6128, Succursale A  
Montreal QC H3C 3J7  
Tel: (514) 343-6111

**University of New Brunswick**  
3 Bailey Dr.  
P.O. Box 4400  
Fredericton NB E3B 5A3  
Tel: (506) 453-4864

**University of Ontario  
Institute of Technology**  
2000 Simcoe Street North  
Oshawa ON L1H 7L7  
Tel: (905) 721-3190

**University of Ottawa**  
550 Cumberland  
P.O. Box, 450 Stn. A  
Ottawa ON K1N 6N5  
Tel: (613) 562-5700

**University of Saskatchewan  
Physics Department**  
116 Science Place  
Saskatoon SK S7N 5E2  
Tel: (306) 966-4343

**University of Toronto –  
Centre for Nuclear  
Engineering**  
Contact: Brian C.  
Wallberg Bldg.  
184 College Street  
Toronto ON M5S 3E5  
Tel: (416) 978-2127

**University of Victoria  
Faculty of Engineering**  
PO Box 3055, EOW 248  
Victoria BC V8W 3P6  
Tel: (250) 721-8677

**University of Western Ontario**  
1151 Richmond Street  
Suite 2  
London ON N6A 5B8

**University Network of  
Excellence in Nuclear  
Engineering (UNENE)**  
For more information  
please contact your local  
UNENE representative

**World Nuclear  
University (WNU)  
Atoms for Sustainable  
Development**  
For more information  
please visit their website  
at [www.world-nuclear-university.org](http://www.world-nuclear-university.org)

**Nuclear Power  
Plant Operators  
Bruce Power Inc.**  
P.O. Box 1540, B32  
Tiverton ON N0G 2T0  
Tel: (519) 361-7777

**Hydro-Québec Gentilly 2  
Nuclear Power Station**  
4900 Becancour Blvd.  
Gentilly QC G0X 1G0  
Tel: (819) 298-2943

**New Brunswick  
Point Lepreau  
Generating Station**  
P.O. Box 600  
Lepreau NB E5J 2S6  
Tel: (506) 659-2220

**Ontario Power Generation  
Darlington Generation  
Station Information Centre**  
P.O. Box 4000  
Bowmanville ON L1C 3Z8  
Tel: (905) 623-7122

**Ontario Power Generation  
Pickering Generating Station  
Information Centre**  
1675 Montgomery Park Rd.  
Pickering ON L1V 2R5  
Tel: (905) 839-0465

**National Organizations  
Canadian Nuclear  
Association**  
130 Albert Street  
Suite 1610  
Ottawa ON K1P 5G4  
Tel: (613) 237-4262

**Canadian Nuclear  
Society (CNS)**  
700 University Avenue  
4th floor  
Toronto ON M5G 1X6  
Tel: (416) 977-7620

**Canadian Nuclear  
Workers Council**  
244 Eglinton Ave. E.  
Toronto ON M4P 1K2  
Tel: (416) 484-4491

**CANDU Owners Group**  
480 University Ave.  
Suite 200  
Toronto ON M5G 1V2  
Tel: (416) 595-1888

**The Canadian Centre  
for Energy Information**  
201, 322 – 11 Avenue, S.W.  
Calgary AB T2R 0C5  
Tel: (403) 263-7722

**Organization of Canadian  
Nuclear Industries (OCI)**  
1730 McPherson Court Unit 2  
Pickering ON L1W 3E6  
Tel: (905) 839-0073



## INTERNATIONAL ORGANIZATIONS

### Commission of the European Communities Nuclear Safety Research Directorate

200, rue de la Loi  
B-1049 Brussels, Belgium  
Tel: +32 2 2299 11 11

### European Nuclear Society

Rue Belliard, 15-17  
1040 Brussels, Belgium  
Tel: +32 2 505 30 50  
Fax: +32 2 502 3902

### FORATOM – European

Atomic Forum  
Rue Belliard, 15-17  
1040 Brussels, Belgium  
Tel: +32 2 502 4595  
Fax: +32 2 502 3902

### International Atomic Energy Agency (IAEA)

Wagramerstrasse 5  
P.O. Box 100  
A-1400 Vienna, Austria  
Tel: +43 12600-0

### International Energy Agency (IEA)

9, rue de la Fédération  
75739 Paris, Cedex 15 France  
Tel: +33 140 5765  
Fax: +33 140 57 6559

### International Radiation Protection Association (IRPA)

Route du Panorama  
BP48-F92263  
Fontenay-aux-Roses Cedex  
France  
Tel: +33 1 46 547 476  
Fax: +33 1 40 849 034

### (OECD) Organisation for Economic Cooperation and Development Nuclear Energy Agency (NEA)

Le Seine Saint-Germain  
12, boulevard des les  
F-92130 Issy-les-Moulineaux,  
France  
Tel: +33 (1) 45 24 82 00  
Fax: +33 (1) 45 24 11 10

### United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR)

P.O. Box 500  
A-1400 Vienna, Austria  
Tel: +43 1 211 31, ext. 4330

### World Association of Nuclear Operators (WANO)

Tower House  
10 Southampton Street  
London, United Kingdom  
WC2E 7HA  
Tel: +44 (0)20 7451 1520

### World Council of Nuclear Workers

49 rue Lauriston  
75116 Paris, France  
Tel: +33 (0)1 53 70 88 99  
Fax: +33 (0)1 53 70 01 08

### World Energy Council (WEC)

5th Floor, Regency House  
1-4 Warwick St.  
London, United Kingdom  
SW1B 5LT  
Tel: +44 20 7734 5996  
Fax: +44 20 7734 5926

### World Nuclear Association

12 Floor, Bowater House W.  
114 Knightsbridge, London  
SW1X 7LJ, UK  
Tel: +44 20 7225 0303  
Fax: +44 20 7225 0308

### World Nuclear Transport Institute

Remo House  
310-312 Regent Street  
London, W1B 3AX  
Tel: +44 (0) 207 580 1144  
Fax: +44 (0) 207 580 5365  
[www.wnti.co.uk](http://www.wnti.co.uk)



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Cleveland, OH 44139  
440-542-3628  
[www.Victoreen.com](http://www.Victoreen.com)  
email: [sales@victoreen.com](mailto:sales@victoreen.com)  
[linkedin.com/company/victoreen](https://www.linkedin.com/company/victoreen)

# Canada's Nuclear Facilities

This list contains, by licence type, power reactors, uranium mine/mill facilities, uranium refineries and fuel fabrication facilities, radioisotope management facilities, research reactors, particle accelerators and radioisotope uses licensed by the Canadian Nuclear Safety Commission in Canada.

Information is based upon Canadian Nuclear Safety Commission licensing information in 2013.

## Power Reactor Licences

Facility and Location	Type and Number of Units/Capacity	Startup	Status
Pickering Nuclear Generating Station A Pickering, Ontario (Ontario Power Generation)	CANDU-PHW 2 x 500 MW(e)	1971	Operating
Pickering Nuclear Generating Station A Pickering, Ontario (Ontario Power Generation)	CANDU-PHW 2 x 500 MW(e)	1971	Shutdown To be decommissioned
Pickering Nuclear Generating Station B Pickering, Ontario (Ontario Power Generation)	CANDU-PHW 4 x 500 MW(e)	1983	Operating
Darlington Nuclear Generating Station Bowmanville, Ontario (Ontario Power Generation)	CANDU-PHW 4 x 850 MW(e)	1989	Operating
Bruce Nuclear Generating Station A Tiverton, Ontario (Bruce Power)	CANDU-PHW 4 x 750 MW(e)	1976	Operating
Bruce Nuclear Generating Station B Tiverton, Ontario (Bruce Power)	CANDU-PHW 4 x 840 MW(e)	1984	Operating
Gentilly-2 Nuclear Generating Station Gentilly, Québec (Hydro-Québec)	CANDU-PHW 1 x 600 MW(e)	1983	Shutdown To be decommissioned
Point Lepreau Generating Station Lepreau, New Brunswick (New Brunswick Power Corp.)	CANDU-PHW 1 x 600 MW(e)	1982	Operating

## Non-Power Reactor Licences

Unit	Type	In Service	Status
University of Toronto, Toronto, Ontario	Subcritical Assembly	1958	Decommissioned
McMaster University, Hamilton, Ontario	Pool-Type 5 MW(T)	1959	Operating
École polytechnique, Montréal, Québec	Subcritical Assembly	1974	Operating
University of Toronto, Toronto, Ontario	SLOWPOKE-2 20 kW(t)	1976	Decommissioned
École polytechnique, Montréal, Québec	SLOWPOKE-2 20 kW(t)	1976	Operating
Dalhousie University, Halifax, Nova Scotia	SLOWPOKE-2 20 kW(t)	1976	Decommissioned
University of Alberta, Edmonton, Alberta	SLOWPOKE-2 20 kW(t)	1977	Operating
Saskatchewan Research Council, Saskatoon, Saskatchewan	SLOWPOKE-2 20 kW(t)	1981	Operating
Royal Military College, Kingston, Ontario	SLOWPOKE-2 20 kW(t)	1985	Operating
Atomic Energy of Canada Ltd., Chalk River, Ontario	Maple 1 & 2 Reactors 10 MW(t)		Shutdown pending decommissioning

## Nuclear Research and Test Establishment Licences

Unit	Type	Status
<b>Chalk River Laboratories (AECL)</b>		
NRX Reactor	42 MW(t)	Decommissioning
NRU Reactor	135 MW(t)	Shutdown March 2018
Recycle Fuel Fabrication Laboratories	Manufacture of small quantities of mixed oxide fuel for research and demonstration	Operating
PTR Reactor	100 W(t)	Decommissioned and released
ZED-2 Reactor	200 W(t)	Operating



**Nuclear Research and Test Establishment Licences** *(continued)*

Unit	Type	Status
Universal Cells	3 isolation cells for examining radioactive material	Operating
Molybdenum-99 Production Facility	Production of Mo-99 and Xe-133	Operating
Health Physics Neutron Generator	Electrostatic accelerator 150 KeV	Operating
Gamma Beam Irradiator GC60	Irradiation Facility	Operating
Gamma Beam 150 C Irradiation Facility	Irradiation Facility	Operating
Waste Treatment Centre and Associated Facilities	Treatment of solid and liquid waste	Operating
Fuels and Materials Cells	12 isolation cells for examining radioactive material	Operating
Waste Management Areas	Storage and handling of waste	Operating/Shutdown
Nuclear Fuel Fabrication Facility	Production of low enriched uranium fuel for research reactors	Operating
Nuclear Fuel Fabrication Facility	Production of low and high enriched uranium fuel targets for research reactors	Operating
Heavy Water Upgrading Facility	Upgrading of heavy water	Decommissioning
CECEUD Test Facility	Upgrade and detritiate heavy water	Shutdown pending decommissioning
Tritium Laboratory	Processing of tritium	Operating
<b>Whiteshell Laboratories (AECL)</b>		
WR-1 Reactor	Organically cooled experimental reactor	Decommissioning
WL Concrete Canister Storage Facilities	Storage of irradiated fuel	Operating
Van de Graaf Accelerator	Proton accelerator, >30 microamps	Decommissioned
14 MeV Neutron Generator		Decommissioned
Active Liquid Waste Treatment Centre	Treatment of liquid waste	Operating
WL Shielded Facilities	Post irradiated examination of fuels, reactor core components and other	Decommissioning
WL Waste Management Area	Storage and handling of waste	Operating
SLOWPOKE Demonstration Reactor	2 MW pool-type reactor	Decommissioned

**Uranium Mine and Mill Facility Licences**

Facility	Activity	Status
Beaverlodge, Saskatchewan (Cameco Corporation)	Long-term monitoring	Decommissioned
Cigar Lake Project, Saskatchewan (Cameco Corporation)	Mining	Operating
Cluff Lake, Saskatchewan (AREVA Resources Canada Inc.)	Long-term monitoring	Decommissioned
Key Lake Operation Saskatchewan (Cameco Corporation)	Milling	Operating
McArthur River Project, Saskatchewan (Cameco Corporation)	Mining	Operating
McClellan Lake Project, Saskatchewan (AREVA Resources Canada Inc.)	Milling	Operating
Rabbit Lake Saskatchewan (Cameco Corporation)	Mining and milling	Decommissioning
Denison Mines, Elliot Lake, Ontario (Denison Mines Ltd.)	Above-ground tailings	Decommissioned
Stanrock, Elliot Lake, Ontario (Denison Mines)	Above-ground tailings	Decommissioned
Madawaska Bancroft, Ontario (Madawaska Mines Ltd.)	Long-term monitoring	Decommissioned

## Canada's Nuclear Facilities *continued from page 37*

### Refinery and Fuel Fabrication Facility Licences

Facility	Annual Licensed Production Limit	Status
GE Hitachi Nuclear Energy Canada Inc., Toronto, Ontario	1,800 tonnes of uranium	Operating
GE Hitachi Nuclear Energy Canada Inc., Peterborough, Ontario	1,800 tonnes of uranium	Operating
Port Hope Fuel Manufacturing Facility, Port Hope, Ontario (Cameco)	125 tonnes of UO <sub>2</sub>	Operating
Blind River Uranium Refinery, Blind River, Ontario (Cameco)	24,000 tonnes of uranium as UO <sub>3</sub>	Operating
Port Hope Uranium Conversion Facility, Port Hope, Ontario (Cameco)	12,500 tonnes of uranium as uranium hexafluoride 3,800 tonnes of uranium as UO <sub>2</sub> 1,000 tonnes of uranium as ammonium diuranate 2,000 tonnes of uranium metals	Operating

### Waste Management Licences

Facility	Activity	Status
Radioactive Waste Operations Site 1 Tiverton, Ontario (OPG)	Storage of intermediate level radioactive waste from the Douglas Point nuclear reactor in in-ground concrete trenches and tile holes. The licence was amended in July 2006 to include the Spent Solvent Treatment Facility as minor amounts of nuclear substances remain in the facility from the past processing of spent solvents contaminated with nuclear substances. No new radioactive waste is accepted at the facility.	Storage with surveillance
Western Waste Management Facility, Tiverton, Ontario (OPG)	Processing and/or storage of low level radioactive waste and storage of intermediate level radioactive waste, and processing and storage of spent nuclear fuel from the Bruce NGS	Operating
Pickering Waste Management Facility Pickering, Ontario (OPG)	Processing and storage of spent nuclear fuel from the Pickering NGS and storage of retube components from the Pickering NGS	Operating
Bruce Heavy Water Plant Tiverton, Ontario (OPG)	Decommissioning of the heavy water plant and remediation of the site	Decommissioning
Douglas Point Radioactive Waste Storage Facility Tiverton, Ontario (AECL)	Storage of solid waste from Douglas Point Generating Station, spent fuel storage, no new waste accepted	Storage with surveillance
Gentilly-1 Radioactive Waste Storage Facility Gentilly, Quebec (AECL)	Storage of solid waste from Gentilly-1 NGS, spent fuel storage. No new radioactive waste is accepted.	Storage with surveillance
Gentilly-2 Radioactive Waste Storage Facility Gentilly, Quebec (Hydro-Quebec)	Storage of solid waste and spent fuel storage from Gentilly-2 NGS	Operating
Point Lepreau Solid Radioactive WMF Point Lepreau, New Brunswick (NB Power Nuclear Corporation)	Storage of solid waste and spent fuel storage from Point Lepreau NGS	Operating
Darlington Waste Management Facility Bowmanville, Ontario (OPG)	Processing and storage of spent nuclear fuel from the Darlington NGS	Operating
University of Toronto WMF Toronto, Ontario (University of Toronto)	Storage, handling and compaction of waste from university	Operating
Central Maintenance and Laundry Facility Tiverton, Ontario (Bruce Power)	Managing waste (slightly radioactive clothing materials) from decontamination activities	Operating
Energy Solutions WMF Brampton, Ontario (Energy Solutions Canada)	Storage, handling and compaction of waste from Ontario and Quebec	Operating
Nuclear Power Demonstration WMF Rolphton, Ontario (AECL)	Storage of solid waste from the partial decommissioning of NPD NGS. No new waste accepted.	Storage with surveillance
Port Granby Long-term (LT) WMF Clarington, Ontario (AECL)	Storage of historic waste and chemical treatment of drainage and run-off. No new waste is accepted. Currently undergoing construction.	Storage with surveillance and remediation
Port Hope Long-term (LT) WMF Port Hope, Ontario (AECL)	Storage of historic waste and treatment of drainage and run-off. No new waste is accepted. Currently undergoing construction.	Storage with surveillance and remediation

**Waste Management Licences** *(continued)*

Facility	Activity	Status
Elliot Lake WMF Elliot Lake, Ontario (Rio Algom Ltd.)	Multiple tailings management site, chemical treatment of effluent. No new waste accepted.	Decommissioned
Port Hope PSE TSS Port Hope, Ontario (Low-Level Radioactive Waste Management Office)	Storage of historic waste	Operating
Port Hope WMF Port Hope, Ontario (Low-Level Radioactive Waste Management Office, Pine St. Extension Temporary Storage Site)	Storage of historic waste no new waste accepted	Storage with surveillance
Roving Locations (Low-Level Radioactive Waste Management Office, decontamination projects)	Possession of historic waste on an as requested basis	Operating
Agnew Lake Idle Mine Site Nairn Centre, Ontario (Ontario Ministry of Northern Development and Mines)	Above-ground tailings	Decommissioned
Dyno Idle Mine Site Bancroft, Ontario (EWL Management Ltd)	Above-ground tailings	Decommissioned
Rayrock Idle Mine Site Northwest Territories (Department of Indian Affairs and Northern Development)	Above-ground tailings	Decommissioned
Port Radium Idle Mine Site Northwest Territories (Department of Indian Affairs and Northern Development)	Above-ground tailings	Decommissioned
Madawaska Bancroft, Ontario (EWL Management Ltd.)	Above-ground tailings	Decommissioned
Bicroft Tailings Storage Facility Bancroft, Ontario (Barrick Gold Corporation)	Above-ground tailings	Decommissioned

**Particle Accelerator Licences**

Facility	Type	Status
Health PEI Charlottetown, Prince Edward Island	2 linacs	Operating
Region Health Authority B Saint John, New Brunswick	3 linacs	Operating
Centre de santé et de services sociaux de Chicoutimi Chicoutimi, Québec	3 linacs	Operating
Centre universitaire de santé McGill Montréal, Québec	3 linacs	Operating
Hospital Maisonneuve-Rosemont Montréal, Québec	6 linacs	Operating
The Board of Governors of the Kingston General Hospital, Kingston, Ontario	4 linacs	Operating
Thunder Bay Regional Health Sciences Centre Thunder Bay, Ontario	3 linacs	Operating
Windsor Regional Hospital Windsor, Ontario	3 linacs	Operating
Cancer Care Manitoba Winnipeg, Manitoba	7 linacs	Operating
Saskatchewan Cancer Agency Regina, Saskatchewan	3 linacs	Operating
Saskatchewan Cancer Agency Saskatoon, Saskatchewan	3 linacs	Operating
Alberta Health Services Calgary, Alberta	6 linacs	Operating
Alberta Health Services Edmonton, Alberta	5 linacs	Operating
Alerta Health Services Lethbridge, Alberta	2 linacs	Operating
Hôpital Général Juif Montréal, Québec	3 linacs	Operating



## Canada's Nuclear Facilities *continued from page 39*

### Particle Accelerator Licences *(continued)*

Facility	Type	Status
Cape Breton District Health Authority Sydney, Nova Scotia	2 linacs	Operating
Régie régionale de la santé (Beauséjour) Moncton, New Brunswick	3 linacs	Operating
British Columbia Cancer Agency Kelowna, British Columbia	3 linacs	Operating
British Columbia Cancer Agency Victoria, British Columbia	3 linacs	Operating
British Columbia Cancer Agency Prince George, British Columbia	2 linacs	Operating
British Columbia Cancer Agency Abbotsford, British Columbia	4 linacs	Operating
Cancer Care Ontario St. Catharines, Ontario	3 linacs	Operating
British Columbia Cancer Agency Vancouver, British Columbia	9 linacs	Operating
Eastern Regional Integrated Health Authority (Eastern Health) St. John's, Newfoundland	4 linacs	Operating
Centre hospitalier universitaire de Sherbrooke Sherbrooke, Québec	1 linac	Operating
Centre hospitalier universitaire de Sherbrooke Fleurimont, Québec	3 linacs	Operating
Centre hospitalier universitaire de Québec Québec, Québec	4 linacs	Operating
Capital District Health Authority Halifax, Nova Scotia	3 linacs	Operating
Hamilton Health Sciences Corporation Hamilton, Ontario	10 linacs	Operating
Centre hospitalier de l'Université de Montréal Montréal, Québec	7 linacs	Operating
Centre de sante et services sociaux Champlain-Charles-Le-Moyne Greenfield Park, Québec	4 linacs	Operating
Hôpital régional de Sudbury Sudbury, Ontario	6 linacs	Operating
The Ottawa Hospital Ottawa, Ontario	9 linacs	Operating
Sunnybrook Health Sciences Centre Toronto, Ontario	10 Cyclotron	Operating
Sunnybrook Health Sciences Centre Barrie, Ontario	3 linacs	Operating
Ciment Québec Inc. Saint-Basile, Québec	2 Neutron Generator	Operating
General Fusion Inc. Burnaby, British Columbia	1 Plasma Injector	Operating
Hilliburton Group Canada Inc. Nisku, Alberta	1 Neutron Generator	Operating
Hunter Well Science Ltd. Calgary, Alberta	1 Neutron Generator	Operating
Centre de sante et de services sociaux de Gatineau Gatineau, Québec	3 linacs	Operating
University Health Network Toronto, Ontario	20 linacs	Operating
Grand River Hospital Corporation Kitchener, Ontario	4 linacs	Operating
London Health Sciences Centre London, Ontario	8 linacs	Operating
McMaster University Hamilton, Ontario	1 tandetron accelerator	Operating

**Particle Accelerator Licences** *(continued)*

Facility	Type	Status
McMaster University Hamilton, Ontario	1 cyclotron	Operating
McMaster University Hamilton, Ontario	1 Van de Graaff	Operating
University of Guelph Guelph, Ontario	1 linac	Operating
University of Western Ontario London, Ontario	1 tandetron accelerator	Operating
Queen's University at Kingston Kingston, Ontario	2 Neutron Generator	Operating
Université de Montréal Montréal, Québec	1 Van de Graaff tandem accelerator	Operating
Centre de santé et services sociaux de Laval Laval, Québec	1 tandetron accelerator	Operating
National Research Council Canada Ottawa, Ontario	2 linacs	Operating
Schlumberger Canada Limited Calgary, Alberta	2 linacs	Operating
Scientific Drilling International (Canada) Calgary, Alberta	1 Neutron Generator	Operating
Hotwell Canada Ltd. Calgary, Alberta	1 Neutron Generator	Operating
Montreal Neurological Institute and Hospital Montreal, Quebec	1 Cyclotron	Operating
Centre for Addiction and Mental Health Toronto, Ontario	1 Cyclotron	Operating
Centre hospitalier universitaire de Sherbrooke Sherbrooke, Québec	1 Cyclotron	Operating
Hamilton Health Sciences Corporation Hamilton, Ontario	1 Cyclotron	Operating
University of Ottawa Heart Institute Ottawa, Ontario	1 Cyclotron	Operating
Mervex Corporation Stittsville, Ontario	1 linac	Operating
Lakeridge Health Oshawa, Ontario	6 linacs	Operating
PharamaLogic P.E.T. Services of Montreal Company Lachine, Québec	1 Cyclotron	Operating
Southlake Regional Health Centre Newmarket, Ontario	3 linacs	Operating
St. Joseph's Health Care London, Ontario	1 linac	Operating
Vancouver Cancer Centre Vancouver, British Columbia	1 Cyclotron	Operating
Weatherford Canada Ltd. Edmonton, Alberta	1 Neutron Generator	Operating
Winnipeg Regional Health Authority Winnipeg, Manitoba	1 Cyclotron	Operating

**Nuclear Substance Processing Facility Licences**

Facility	Type	Status
New Processing Facility Chalk River Laboratories Chalk River, Ontario	Production and processing	Operating
Nordion (Canada) Inc., Ottawa, Ontario	Production and processing	Operating
SRB Technologies, Pembroke, Ontario	Processing	Operating
Shield Source Inc., Peterborough, Ontario	Processing	Shutdown



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**AZZ Specialty Welding** (formerly WSI) is a leading global provider of technologically advanced maintenance, repair and overhaul services. With a long track record of enhancing safety, reducing risk and improving plant productivity and performance, AZZ Specialty Welding has delivered planned and emergency response solutions to a wide range of nuclear facilities around the world. With repairs successfully performed in more than 130 nuclear power plants around the world, whatever the location, material and size of the asset, AZZ Specialty Welding can offer a field upgrade to your component at the time that repairs are required, ensuring nuclear plants are working at their best. Reducing outages and increasing uptime for nuclear and industrial applications globally.

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# Nuclear Products, Materials and Services



# Nuclear Energy Services



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Tetra Tech supports the entire nuclear project life cycle, from mining through waste management.

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- Preliminary and detailed design
- Radioactive waste management

### Project and Construction Management

- Project management
- Work planning
- Procurement
- Field engineering and commissioning

### Asset Management and Equipment Reliability

- Plant programs (security, fire protection, and environmental qualification)
- Preventative maintenance optimization
- Condition assessments and aging management

Tetra Tech is a leading provider of consulting, engineering, and technical services, with more than 50 years of experience in the nuclear industry.



## A

### Air Headers

Promation Nuclear Ltd.

### Air Sampling Pumps

**Victoreen** ..... 35

### Airlocks, Reactor

#### RCM Technologies

**Canada Corp.**..... 16

**SNC-Lavalin Inc.** ..... 18

### Alarm Systems

**SNC-Lavalin Inc.** ..... 18

### Analyzers

NUVIA Dynamics Inc.

### Architects, Engineers

**SNC-Lavalin Inc.** ..... 18

**Tetra Tech Wei Inc.**..... 44

### Assay Equipment and Services, Uranium

McMaster Nuclear Reactor

### Automatic Radon Sample Counters

NUVIA Dynamics Inc.

## B

### Base Listing Fee

Canadian Nuclear

Workers' Council

### Bellows, Metal

Normac Adhesive Products Inc.

Promation Nuclear Ltd.

**Thorburn Flex Inc.** ..... 14, 60

### Boron, Neutron Shielding

NUVIA Dynamics Inc.

## C

### Cable Assemblies, Radiation Resistant

Kanata Electronic

Services Limited

**Mirion Technologies (IST Canada) Inc.** .....OBC

Promation Nuclear Ltd.

### Cable Harnesses

Promation Nuclear Ltd.

### Cable, Radiation Resistant

Promation Nuclear Ltd.

### Calandrias, Reactor

**Thorburn Flex Inc.** ..... 14, 60

### Calibration Services

**Victoreen** ..... 35

### Castings, Nuclear Quality

**MarShield Nuclear** ..... 52

Promation Nuclear Ltd.

### Chambers, Fission

Cameco Fuel Manufacturing

**LND Inc.** ..... 51

#### Mirion Technologies

**(IST Canada) Inc.** .....OBC

**SNC-Lavalin Inc.** ..... 18

### Chambers, Ionization

Cameco Fuel Manufacturing

**LND Inc.** ..... 51

#### Mirion Technologies

**(IST Canada) Inc.** .....OBC

**SNC-Lavalin Inc.** ..... 18

### Clothing, Protective

**UniTech Services Group** ... 22

### Commercial Grade Dedication

**AZZ Industrial** ..... 42

Canadian Power Utility Services

**Kinectrics Inc.** ..... 2

Promation Nuclear Ltd.

### Compressors, Gas

**Thorburn Flex Inc.** ..... 14, 60

### Computers, Reactor Control

RPC Radiy

**SNC-Lavalin Inc.** ..... 18

**Tetra Tech Wei Inc.**..... 44

### Configuration Management

Canadian Power Utility Services

#### RCM Technologies

**Canada Corp.**..... 16

**SNC-Lavalin Inc.** ..... 18

### Connectors, Electrical, Radiation Resistant

Kanata Electronic

Services Limited

### Construction Management

**Aecon Industrial,**

**a division of ACGI** ..... 20

**E.S. Fox Limited** ..... 17

### Construction, Modular

**Aecon Industrial,**

**a division of ACGI** ..... 20

**E.S. Fox Limited** ..... 17

### Consultant, Waste and Decommissioning Planning

Nuvia Canada

Promation Nuclear Ltd.

**SNC-Lavalin Inc.** ..... 18

**Tetra Tech Wei Inc.**..... 44

### Consultants, Design

**BWXT Canada Ltd.**..... IFC

Canadian Power Utility Services

#### RCM Technologies

**Canada Corp.**..... 16

**SNC-Lavalin Inc.** ..... 18

**Tetra Tech Wei Inc.**..... 44

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## Nuclear Products, Materials and Services *continued from page 45*

### Consultants, Engineering

BWXT Canada Ltd.....	IFC
Canadian Power Utility Services	
Nuvia Canada	
RCM Technologies	
Canada Corp.....	16
SNC-Lavalin Inc. ....	18
Tetra Tech Wei Inc.....	44

### Consultants, Environmental

EcoMetrix Incorporated	
SNC-Lavalin Inc. ....	18
Tetra Tech Wei Inc.....	44

### Consultants, Geotechnical

SNC-Lavalin Inc. ....	18
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### Consultants, Management

Canadian Power Utility Services	
RCM Technologies	
Canada Corp.....	16
Tetra Tech Wei Inc.....	44

### Consultants, Materials

RCM Technologies	
Canada Corp.....	16

### Consultants, Procurement

BWXT Canada Ltd.....	IFC
Canadian Power Utility Services	
RCM Technologies	
Canada Corp.....	16
SNC-Lavalin Inc. ....	18
Tetra Tech Wei Inc.....	44

### Consultants, Radiation and Health

EcoMetrix Incorporated	
MarShield Nuclear .....	52
Nuvia Canada	
Tetra Tech Wei Inc.....	44

### Consultants, Seismic

BWXT Canada Ltd.....	IFC
Canadian Power Utility Services	
RCM Technologies	
Canada Corp.....	16
SNC-Lavalin Inc. ....	18
Tetra Tech Wei Inc.....	44

### Consultants, Stress, Thermal, Vibration

BWXT Canada Ltd.....	IFC
Canadian Power Utility Services	
Kinectrics Inc.....	2
RCM Technologies	
Canada Corp.....	16
SNC-Lavalin Inc. ....	18
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### Containers, Radiation Shielding

Aecon Industrial, a division of ACGI .....	20
E.S. Fox Limited .....	17
MarShield Nuclear .....	52
Niagara Energy Products .....	62
Nuvia Canada	
Promation Nuclear Ltd.	
SNC-Lavalin Inc. ....	18

### Containers, Shipping

Aecon Industrial, a division of ACGI .....	20
E.S. Fox Limited .....	17
Promation Nuclear Ltd.	



**Containment Structures, Reactor**

**Aecon Industrial,**  
a division of ACGI ..... 20  
SNC-Lavalin Inc.  
**Tetra Tech Wei Inc.**..... 44  
**Thorburn Flex Inc.** ..... 14, 60

**Contract Staffing**

Canadian Power Utility Services

**Control and Absorber Rods**

Cameco Fuel Manufacturing

**Control Rod Drive Mechanisms**

Cameco Fuel Manufacturing  
Promation Nuclear Ltd.

**Control Rods**

Cameco Fuel Manufacturing

**Control Systems, Computerized**

Canadian Power Utility Services  
RPC Radiy  
**SNC-Lavalin Inc.** ..... 18  
**Tetra Tech Wei Inc.**..... 44

**Controllers, Programmable**

RPC Radiy  
**Tetra Tech Wei Inc.**..... 44

**Controls Modernization**

RPC Radiy

**Counter – Alpha/Beta, low level**

NUVIA Dynamics Inc.

**Cranes, Hoists and Material Handling Equipment**

Konecranes Nuclear Equipment and Services, LLC.  
Promation Nuclear Ltd.

**Custom Control Panels**

**AZZ Industrial** ..... 42  
**SNC-Lavalin Inc.** ..... 18  
**Tetra Tech Wei Inc.**..... 44

**D****Data Acquisition & Handling Systems**

**BWXT Canada Ltd.**..... IFC  
**Tetra Tech Wei Inc.**..... 44

**Decommissioning Services**

**Aecon Industrial,**  
a division of ACGI ..... 20  
EcoMetrix Incorporated  
Nuvia Canada  
Promation Nuclear Ltd.  
**SNC-Lavalin Inc.** ..... 18  
**Tetra Tech Wei Inc.**..... 44  
**UniTech Services Group** ... 22

**Decontamination Services:****PCB, Fire/Smoke**

**Aecon Industrial,**  
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**UniTech Services Group** ... 22

**Decontamination, Chemicals, Equipment and Processes**

**Aecon Industrial,**  
a division of ACGI ..... 20  
**Kinectrics Inc.**..... 2  
Nuvia Canada  
Promation Nuclear Ltd.  
**SNC-Lavalin Inc.** ..... 18

**Doors, Radiation Shielding**

**Aecon Industrial,**  
a division of ACGI ..... 20  
**E.S. Fox Limited** ..... 17  
**MarShield Nuclear** ..... 52  
Promation Nuclear Ltd.

**Dryers, Vapour Recovery**

Promation Nuclear Ltd.  
**Tetra Tech Wei Inc.**..... 44

**E****Education Courses, Nuclear**

Promation Nuclear Ltd.

**Educational Services, Industry**

**Kinectrics Inc.**..... 2



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## Upcoming public Commission hearings

The Canadian Nuclear Safety Commission (CNSC) will be holding public hearings to consider applications for 10-year operating licence renewals for the following facilities:

### **Bruce Nuclear Generating Stations A and B**

Date (Part 2): May 30–31, 2018

Place: TownePlace Suites Marriott, 19 Millenium Way, Kincardine, ON

### **Pickering Nuclear Generating Station**

Date (Part 2): June 26–28, 2018

Place: Hope Fellowship Church, 1685 Bloor Street, Courtice, ON

Find out more about the hearing process and future Commission proceedings at [nuclearsafety.gc.ca](http://nuclearsafety.gc.ca).

## Audiences publiques de la Commission à venir

La Commission canadienne de sûreté nucléaire (CCSN) tiendra des audiences publiques pour examiner des demandes de renouvellement du permis d'exploitation des installations suivantes pour une période de dix ans :

### **Centrales nucléaires de Bruce A et B**

Date (Partie 2) : Les 30 et 31 mai 2018

Lieu : Hôtel TownePlace Suites Marriott, 19 Millenium Way, Kincardine (Ontario)

### **Centrale nucléaire de Pickering**

Date (Partie 2) : Du 26 au 28 juin 2018

Lieu : Église Hope Fellowship, 1685, rue Bloor, Courtice (Ontario)

Pour en savoir plus sur le processus d'audience et les séances de la Commission à venir, visitez [suretenucleaire.gc.ca](http://suretenucleaire.gc.ca).

[nuclearsafety.gc.ca](http://nuclearsafety.gc.ca)  
[suretenucleaire.gc.ca](http://suretenucleaire.gc.ca)







## Electrical Distribution Equipment

**AZZ Industrial** ..... 42  
RPC Radiy

## Electrical Engineering

**Tetra Tech Wei Inc.**..... 44

## Electrical Motors

**AZZ Industrial** ..... 42

## Electronic Repair and Refurbishment

**AZZ Industrial** ..... 42  
Promation Nuclear Ltd.

## End Fittings

Laker Energy Products Ltd.  
Niagara Fasteners Inc.  
Promation Nuclear Ltd.  
**Thorburn Flex Inc.** ..... 14, 60

## Engineering Construction

**Aecon Industrial,**  
a division of ACGI ..... 20  
**RCM Technologies**  
**Canada Corp.**..... 16  
**SNC-Lavalin Inc.** ..... 18

## Engineering Tools (Design & Operation Support)

Promation Nuclear Ltd.  
**SNC-Lavalin Inc.** ..... 18

## Environmental Qualification

Canadian Power Utility Services  
**Kinectrics Inc.**..... 2  
**Tetra Tech Wei Inc.**..... 44

## F

### Fabrication, Pipe, Nuclear

**Aecon Industrial,**  
a division of ACGI ..... 20  
Normac Adhesive Products Inc.  
Promation Nuclear Ltd.  
**Thorburn Flex Inc.** ..... 14, 60

### Fabrication, Pipe, Nuclear

Canadian Power Utility Services  
**E.S. Fox Limited** ..... 17  
**Niagara Energy**  
**Products** ..... 62  
Promation Nuclear Ltd.  
**Thorburn Flex Inc.** ..... 14, 60

### Fasteners, Nuclear Quality

Howard Marten Company Ltd.  
Laker Energy Products Ltd.  
Niagara Fasteners Inc.

### Feeder Services

**BWXT Canada Ltd.**..... IFC

## Filter Baskets

Promation Nuclear Ltd.

## Filters, Water, Nuclear

Howard Marten Company Ltd.

## Fire Protection

Canadian Power Utility Services  
Nuvia Canada  
**SNC-Lavalin Inc.** ..... 18  
**Tetra Tech Wei Inc.**..... 44

## Flasks, Shielding

Cameco Fuel Manufacturing  
**E.S. Fox Limited** ..... 17  
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Promation Nuclear Ltd.  
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# Nuclear Products, Materials and Services *continued from page 49*

## Flow Meters

Advanced Measurement and Analysis Group Inc. (AMAG Inc.)

**AZZ Industrial** ..... 42  
Howard Marten Company Ltd.

## Flux Monitor Components

Cameco Fuel Manufacturing  
RPC Radiy

**SNC-Lavalin Inc.** ..... 18

## Forgings, Nuclear Quality Niagara Energy Products

..... 62  
Niagara Fasteners Inc.

## Fuel Channel Components

**BWXT Canada Ltd.**.....

Cameco Fuel Manufacturing  
Laker Energy Products Ltd.

Promation Nuclear Ltd.

**SNC-Lavalin Inc.** ..... 18

## Fuel Element Cladding

Cameco Fuel Manufacturing

## Fuel Fabrication

**BWXT Canada Ltd.**..... IFC

Cameco Fuel Manufacturing

## Fuel Handling Equipment

**BWXT Canada Ltd.**..... IFC

Konecranes Nuclear Equipment and Services, LLC.

Laker Energy Products Ltd.

Promation Nuclear Ltd.

**SNC-Lavalin Inc.** ..... 18

**Tetra Tech Wei Inc.**..... 44

**Thorburn Flex Inc.** ..... 14, 60

## Fuel Manufacture

**BWXT Canada Ltd.**..... IFC

Cameco Fuel Manufacturing

## Fuel Shuffling Bay Equipment

Konecranes Nuclear Equipment and Services, LLC.

Promation Nuclear Ltd.

## Fuel Support Assemblies

**BWXT Canada Ltd.**..... IFC

## Fuel, Power Reactors

Cameco Fuel Manufacturing

## Fuel, Research Reactors

Cameco Fuel Manufacturing

## Fuelling Machine Carriages

**BWXT Canada Ltd.**..... IFC

Konecranes Nuclear Equipment and Services, LLC.

Promation Nuclear Ltd.

## Fuelling Machine Heads

**BWXT Canada Ltd.**..... IFC

Laker Energy Products Ltd.

Promation Nuclear Ltd.

**SNC-Lavalin Inc.** ..... 18

**Thorburn Flex Inc.** ..... 14, 60

## Fusion Research & Development Services

**SNC-Lavalin Inc.** ..... 18

## Fusion System Design Services

**SNC-Lavalin Inc.** ..... 18

## Gamma Radiation Testing

**Victoreen** ..... 35

## Gamma Spectroscopy

Nuvia Canada

NUVIA Dynamics Inc.

## Gauges, Density, Nuclear

**LND Inc.** ..... 51

## Gauges, Level, Nuclear

**AZZ Industrial** ..... 42

## Glass, Radiation Shielding

**Marswell Metal**

**Industries Ltd.** ..... 52

## Glove Box Supplies

**UniTech Services Group**... 22

## Glove Boxes

**E.S. Fox Limited** ..... 17

Promation Nuclear Ltd.

## H

## Hand Held Real-Time Gamma and Neutron Monitors

NUVIA Dynamics Inc.

## Harsh Environment Qualification Testing

**AZZ Industrial** ..... 42

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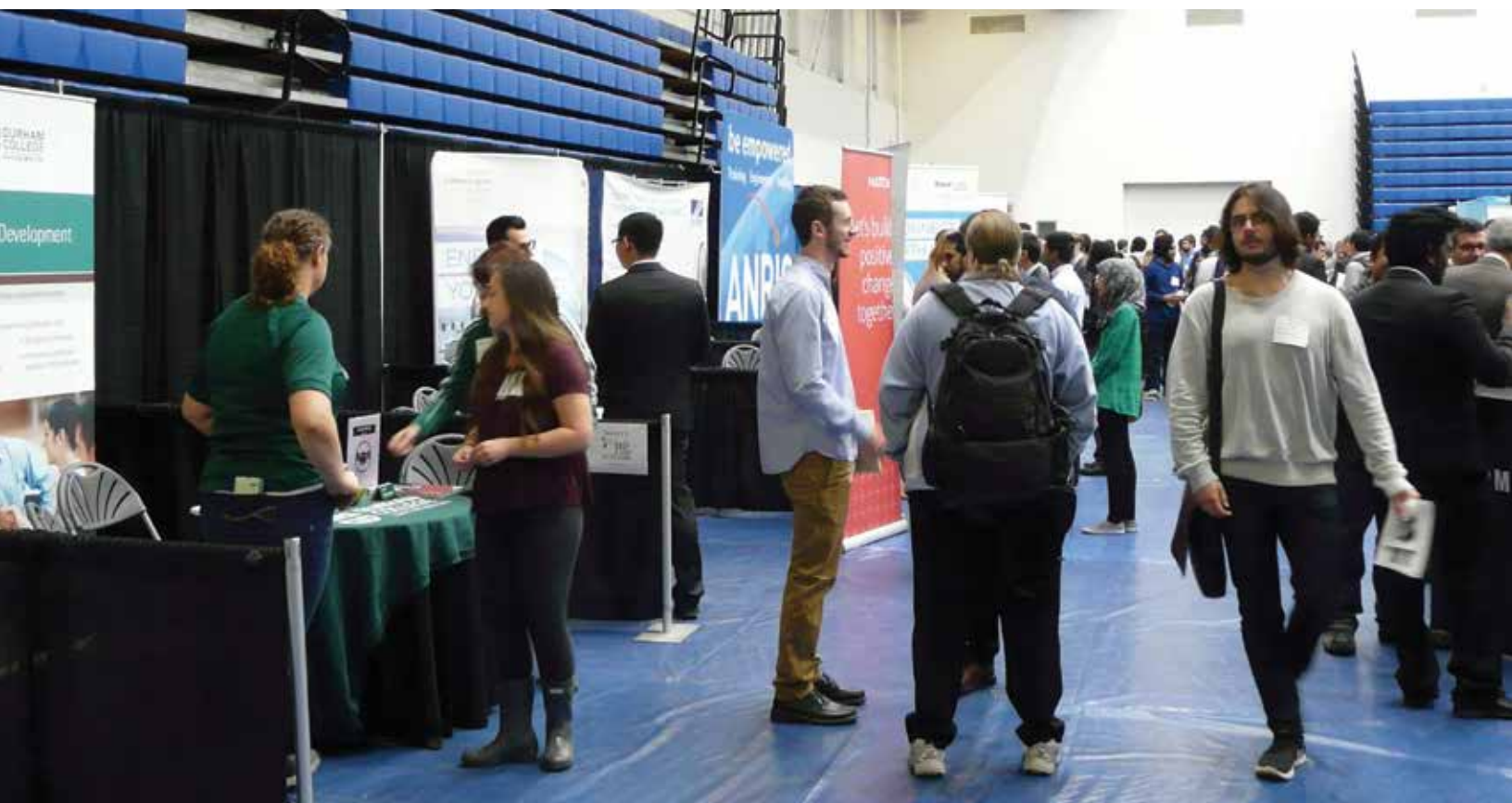
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Cameco Fuel Manufacturing  
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Scenes from the Job Fair.



# UNENE • REUGN

University Network of Excellence in Nuclear Engineering  
Réseau d'Excellence Universitaire en Génie Nucléaire

## What the UNENE Universities offer...

- Cutting-edge nuclear research giving real-world post-graduate training.
- Education: A Master's of Engineering Degree from one of the member universities.

- Courses tailored to individuals already working in the nuclear industry, and delivered on weekends in Whitby and via distance learning for all courses, so as not to conflict with core working hours.
- For the degree 10 courses, or 8 courses and an industrial research project, must be successfully completed over a period of 5 years.
- A nuclear engineering diploma\*. The diploma is a four-course subset of the M.Eng.
- A student can take just one or a few courses rather than the full program.
- Students must be registered as graduate students in one of the participating universities.
- The courses are also offered using Distance Education tools for sites remote from the GTA.

The courses comprise:

- ☐ Nuclear Plant Systems and Operations
- ☐ Reactor Physics
- ☐ Heat Transport System Design
- ☐ Nuclear Reactor Safety Design
- ☐ Nuclear Materials
- ☐ Control, Instrumentation and Electrical Systems in CANDU Power Plants
- ☐ Engineering Risk and Reliability
- ☐ Fuel Engineering
- ☐ Fuel Management
- ☐ Operational Health Physics
- ☐ Reactor Chemistry and Corrosion
- ☐ Project Management
- ☐ Operational Health Physics

**PLUS:** FREE refresher mini-courses prior to the core subjects.

\*Prospective students are advised that offers of admission to a new program may be made only after the university's own quality assurance processes have been completed and the Ontario Universities Council on Quality Assurance has approved the program.

## Who we are...

*The University Network of Excellence in Nuclear Engineering (UNENE) is an alliance of universities, nuclear power utilities, research and regulatory agencies for the support & development of nuclear education, research and development capability in Canadian universities.*

*UNENE's mission is to assure a sustainable supply of qualified nuclear engineers and scientists, and to build and apply university experience to meet the current and future needs of the Canadian nuclear industry.*

For more information, please:

- contact UNENE directly at [unene@mcmaster.ca](mailto:unene@mcmaster.ca)
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# UNENE • REUGN

University Network of Excellence in Nuclear Engineering  
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# Suppliers' Addresses and Contacts





# Serving CANDU Reactors Worldwide

## Thorburn Flex Inc

Flexible Piping Specialist

Since its conception over 50 years ago, Thorburn has become a world leader in the design and manufacture of precision machined hose assemblies, quick couplings, adapters & swivel joints. Operating under a strategy of global presence in the CANDU Nuclear Industry, Thorburn is structured to consistently meet and exceed customers expectations in quality, value and service.

### NGS Installations:

- OPG Pickering (8 Units)
- OPG Darlington (4 Units)
- OPG/BP Bruce (8 Units)
- HQ Gentilly (1 Unit)
- NB Power Point Lepreau (1 Unit)
- Cernavoda Romania (2 Units)
- Quinshan China (2 Units)
- Wolsong South Korea (4 Units)
- Embalse Argentina (1 Unit)

### Designers and OEM's:

- AECL
- GE Canada
- SNC-Nuclear
- CANDU Energy
- AREVA

### Products:

- D<sub>2</sub>O primary & auxiliary hose assemblies
- D<sub>2</sub>O drum adapter assemblies
- Metallic & rubber hose assemblies for F/M catenary systems
- F/M head fluid quick couplings
- Flexible piping assemblies for ion exchangers
- Water treatment flexible piping assemblies
- Metallic braided hose assemblies for steam service
- Flexible piping & quick couplings for cryogenic systems

### Registered Quality Systems:

- CSA N285.0, B51, CAN3 Z299.3
- ASME B31.1, B31.3
- ASME U Stamp
- ASME NCA4000 NQA-1 NPT Stamp (In Progress)
- ISO 9001:2008
- CRN for all Canadian Provinces

Quality Systems



## Thorburn Flex Inc

173 Oneida, Pointe-Claire, Quebec  
Canada, H9R 1A9



Tel: +1-514-695-8710

Fax: +1-514-695-1321

sales@thorburnflex.com



Thorburn hose assemblies on a  
CANDU catenary system

### Custom Metallic & Non-Metallic Hose Assemblies

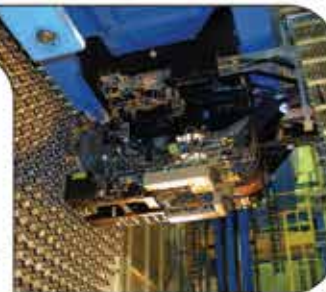
For catenary, fueling machine, D<sub>2</sub>O primary & auxiliary service. Registered & designed to ASME/N285.0 Classes 2, 3 & 6.



Thorburn quick couplings on a  
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### NT92 Valved Dry Break Quick Couplings

Designed to address the challenges associated with dry break disconnect for D<sub>2</sub>O & resin transfer.



Fueling machine with Thorburn quick  
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2500 psi steam piping system with  
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## Advanced Measurement and Analysis Group Inc. [AMAG Inc.]

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Fax: 905-877-0428  
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www.kesl.com

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www.kinectrics.com

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Mariana.Rogalo@lakerenergy.com

## NIAGARA ENERGY PRODUCTS

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Phone: 905-371-2500  
Email: info@niagaraenergyproducts.com  
Web: www.niagaraenergyproducts.com



Niagara Energy Products has been serving the Canadian nuclear market for over 25 years. We have supplied reactor headers to a number of Candu reactors including Bruce Power, Darlington, and Quinshan. In addition, we've also manufactured over 2,700 nuclear waste containers. Our design and fabrication capabilities offer our clients with turn-key solutions, satisfying their most challenging technical waste containment demands.

- Industry leader in nuclear waste container manufacturing.
- Onsite mechanical and welding engineering team ready to help clients optimize designs and weld development.
- Sole supplier of Guelph Engineering replacement parts.
- Our equipment:
  - CNC high density concrete plant with indoor aggregate storage
  - CNC steel plate rolling machine
  - CNC horizontal milling / boring machines
  - CNC MIG welding boom with pulse, CV+V, & laser seam tracking technology,
  - CNC SAW welding boom
  - 57 ton lifting capacity

#### Quality Assurance

- SAI Global Certified in accordance with CSA-Z299.2-1985 Quality Management System
- CWB Certified in accordance with CSA Standard W47.1 Division 2 for Fusion Welding of Steel
- TSSA Certified in accordance with CSA Standard N285.0 for the fabrication of Class 1, 2, 3 and 4 parts
- Destructive and Non-destructive Testing



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3230 Lawson Blvd.  
Oceanside, New York  
11572  
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Email: hci@direct.com  
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CNS President Dan Gammage (left), CNS Secretary Colin Hunt (right) man the CNS Booth at the CNS Job Fair.



## Suppliers' Addresses and Contacts *continued from page 63*

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