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CNS President's Report

By Jacques Plourde



Jacques Plourde

The past year has been both challenging and highly rewarding for the Canadian Nuclear Society. At the close of the year, the Society stands on the edge of important changes for the future.

Perhaps the first and most important change is the forthcoming departure of two colleagues who have long been an integral part of the Society. The first is the decision by Fred Boyd to end his role as Publisher of the CNS Bulletin after leading it for 25 years. The second is the decision by Denise Rouben to terminate her position as Office Manager. Both Fred and Denise have served the Society long and well, and we owe them grateful thanks for their superb work.

The CNS has been a large part of a new initiative within Canada's various nuclear organizations. The formation of the N6 group, sponsored by the Nuclear Leadership Forum, has been to co-ordinate the efforts in a number of areas which the organizations have common interests. The members are the CNS, CNA, OCI, WiN Canada, NA-YGN, COG, and UNENE. This cooperation has begun with the joint contributions of the CNS and OCI in the 2015 CNS Annual Conference, in the ongoing co-operation between CNA and CNS with the Nuclear Industry Honours and Awards Program and the Student Poster Conference, and with the work of WiN and NA-YGN in organizing exhibits.

At the same time, the CNS has been highly active with its own programs during the past year. We skipped the Annual

Conference in favour of hosting a highly successful Pacific Basin Nuclear Conference last August in Vancouver, and the CANDU Maintenance Conference in Toronto in May. We will have again a vigorous conference program in 2015. Our Branches have also remained highly active throughout the past year.

Turning to internal affairs, the CNS has a new team administering the Bulletin. Colin Hunt, publisher of this Yearbook, will also be assuming the publisher's responsibilities succeeding Fred Boyd. Ric Fluke is continuing as editor. At the time of writing, the CNS is engaged in the search for a new office administrator.


Also in 2014 the CNS achieved a budget surplus. This was possible because of enhanced revenues from conference activities and judicious reduction in costs. At the same time, the CNS continues to ensure that it has sufficient volunteer hours for its active members engaged in CNS activities. The CNS is deeply appreciative of the time that Canadian nuclear companies allow their employees to work on CNS activities and programs.

In closing, I would like to note the fine work of all of our volunteers for the CNS during

the past year. It is through their efforts that ours remains an active and vigorous society. The programs they help deliver provide vital services to our industry in ensuring the spread of important technical information and experience through our conferences and courses. And once again, thanks are due to the companies that make possible the activities of our volunteers.

I would give particular thanks to Frank Doyle and his team for their excellent work in organizing PBNC 2014. Thanks are due to the 2015 Annual Conference organizing committee for their work in making the Saint John conference a success. I also give thanks to all the members of Council, Branch, Division and Committee chairs for their strong efforts during the past year. I would also like to thank my predecessors Adriaan Buijs and John Roberts for developing the infrastructure and the team on which our efforts have been based.

I congratulate incoming CNS President Paul Thompson and wish him all the best and offer my continuing support throughout the coming year.

Enjoy the latest edition of Nuclear Canada Yearbook, and make the CNS a priority in 2015! 



The Bruce nuclear power station will have six of its reactors refurbished over the next decade.



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2014 Year in Review

By Colin Hunt, Publisher and Editor, Nuclear Canada Yearbook



Colin Hunt

Opening Remarks

2014 marked an important anniversary of nuclear science and technology. It was the 75th anniversary of the discovery of fission by Lise Meitner and Otto Hahn. It was Meitner who first described the physics of fission, and it was Hahn's experimental work which first indicated it.

The discovery is one of the most important in human history. For thousands of years, humans had been confined to burning carbon-based materials and harnessing natural sources such as the sun and the wind for doing useful work. Nuclear fission and the power of atomic forces were the first truly new source of energy that humans had developed since the Neolithic period of our history.

It took very little time indeed to put to productive use. In less than 60 years, nuclear power would grow from a theoretical concept to a fleet of reactors around the world supplying about 15 per cent of the world's electricity. In 1939, no one could have foreseen how important and valuable nuclear power would be in the provision of light, heat and motive power to the everyday lives of billions of people.

The value of nuclear-generated electricity was reinforced just in the past year when the Ontario government confirmed that it is planning on continued high reliance on nuclear power for the majority of the electricity supply for Canada's largest

CANDU 6 Reactor Performance – 2014

| Reactor | In Service | Capacity (MW) | Performance In 2014 (%) | Lifetime Performance (%) |
|---------------|------------|---------------|-------------------------|--------------------------|
| Point Lepreau | 1983 | 705 | 82.2 | 76.3 |
| Wolsong 1 | 1983 | 679 | 0 | 80.3 |
| Wolsong 2 | 1987 | 678 | 91.5 | 93.5 |
| Wolsong 3 | 1998 | 698 | 85.7 | 94.8 |
| Wolsong 4 | 1999 | 703 | 85.1 | 95.7 |
| Embalse | 1983 | 648 | 29.9 | 81.4 |
| Cernavoda 1 | 1996 | 707 | 91.1 | 90.4 |
| Cernavoda 2 | 2007 | 705 | 98.5 | 94.5 |
| Qinshan 4 | 2002 | 700 | 98.6 | 91.8 |
| Qinshan 5 | 2003 | 700 | 92 | 92.3 |
| Average | | | 75.46 | 89.1 |

COG CANDU/PHWR Performance Statistics 2014.

province and industrial heartland. As noted below, Ontario is about to embark on a very large nuclear construction program in the refurbishing of the ten nuclear reactors at the Bruce and Darlington nuclear generating stations. When complete, they will be providing electricity for Ontario well into the middle of the 21st century. It is a sign of the maturity and advanced development of Canada's nuclear technology that private capital is investing in Canadian nuclear technology as never before in the case of Bruce Power and its refurbishment plans.

More than nuclear power, the startup of new uranium mines in Saskatchewan promises that Canada will retain its position as one of the world's principal suppliers of uranium for decades to come. Canada is in fact one of the very few nations in the world with technology covering all areas of the nuclear fuel cycle: uranium supply, fuel manufacturing, indigenous reactor technology, advanced fuel cycles, and long-term waste management.

Other important steps for the future include the federal government's restructuring of Atomic Energy of Canada Limited (AECL) and its research facilities. During

2015, a new contractor will be selected to manage the new entity, Canadian Nuclear Laboratories (CNL). The government has already spun off its reactor development division, and in 2014 Candu Energy Inc. took important steps to secure the future of CANDU reactor technology with binding technology agreements with China, as outlined below.

The Nuclear Waste Management Organization (NWMO) also made strong progress during 2014. At the end of the year, 11 communities in Canada remained voluntarily within the NWMO's site selection program.

With important progress in every sector of Canadian nuclear expertise as shown in 2014, there is every reason to be optimistic about the future prospects of Canadian nuclear power, both in Canada and around the world.

Nuclear Power in Canada

2014 has marked one of the most important changes in the history of Canada's nuclear industry. On November 3, Atomic Energy of Canada Limited (AECL) launched Canadian Nuclear Laboratories (CNL) a wholly owned subsidiary. The new subsidiary employs approximately 3,400

people at 12 locations across Canada. CNL's corporate headquarters is located at Chalk River Laboratories.

This transfer of the assets and personnel of AECL to its new subsidiary CNL became necessary because of the restructuring of AECL by the federal government. In 2013, the federal government announced that it would adopt a new management model for AECL, one where AECL would be government owned and contractor operated (GoCo). Under the restructuring, CNL assumed full responsibility for the operation of all AECL sites and activities in November 2014, and AECL's scope reduced to that of a management company on behalf of the federal government (the bulk of AECL's workforce transferring to CNL). In the mid-2015, the federal government will award a contract to operate CNL by a new contractor. At such time, CNL will become a private sector entity. At the time of writing, the federal government has been considering a number of proposals from

various consortia of companies for the operation of CNL.

In addition to becoming a much smaller crown corporation with responsibility for oversight of the contractor operation contract, AECL will also retain ownership of the physical and intellectual property assets of CNL.

The mandate of CNL contains three principal elements: to manage Canada's radioactive waste and decommissioning responsibilities; to support the federal government in nuclear science and technology; and to provide to industry on a commercial basis its need for nuclear science and technology expertise.

The restructuring of AECL in 2014 is one in a series of policy decisions by the federal government over the past several years. In 2009, the federal government indicated its intent to restructure the company. In 2010, the government announced that Chalk

River Laboratories would cease production of the medical radioisotope Molybdenum 99 in October 2016, and that it would start a process to select a private sector operator for AECL's operations. This was followed by the sale of AECL's reactor development division to SNC Lavalin as the new entity Candu Energy Inc.

In February 2015, the federal government made two announcements with respect to the future assets of CNL. It indicated that the production of Mo-99 at Chalk River Laboratories would be extended to March 2018 to help ease any unexpected shortages in meeting global demand. It also indicated that after March 2018 CNL staff would begin the work of decommissioning the NRU reactor.

First starting operation in 1957, the NRU is one of the world's largest and most flexible research reactors. It has been one of the world's principal sources of medical radioisotopes such as Mo-99, producing up



The Darlington nuclear power station will commence its refurbishment program in 2016. (photo courtesy OPG)



to 30 per cent of total world supply (and occasionally, in times of need, almost all the world's supply). After 2018, its medical supply role will be assumed by a number of other companies across Canada and around the world.

NRU is not the only research reactor in Canada. The others are listed in this Yearbook in the section Canada's Nuclear Facilities.

Darlington Refurbishment

Ontario Power Generation (OPG) took a major step forward in its plans to refurbish the Darlington Nuclear Generating Station with its opening of a new training facility on October 14, 2014. The new facility features a life-sized model of a reactor face. It will be used to train workers in procedures for the future retubing and other construction activities at the Darlington station.

Refurbishment is scheduled to commence in the fall of 2016, with each of the four reactors being completed sequentially starting with Unit 2. As detailed in the 2014 edition of Nuclear Canada Yearbook, the project is expected to take approximately 10 years to complete work on all four reactors. Each of the reactors will be out of service for about three years each, and the total cost of the project is expected to be approximately \$10 billion.

The refurbishment project began about seven years ago with a comprehensive assessment by OPG of the current state of the station and its equipment. In 2010, OPG announced its intention to proceed with refurbishment. The project will include retubing of all four reactors, and renovation work to the steam generators and turbo-generator sets.

Completion of the training facility is vital to the success of the project. Building on previous experience with retubing of CANDU reactors, the work will be undertaken by skilled trades workers.

The training facility will provide the skills to allow them to work in the confines of the reactor vault and protective suits. Normally, OPG has about 2,600 staff working at the Darlington site. During refurbishment, Darlington will have up to 2,000 additional workers on site.

The importance of the Darlington refurbishment project cannot be understated. Its four reactors produce approximately 20 per cent of Ontario's total electricity supply, about 25-30 TWh annually. When completed, the Darlington reactors will be fit for an additional 30 years of service. As noted later on in this Yearbook, the Darlington reactors have run at consistently reliable performance since the startup of all reactors on the site in 1993.

During the refurbishment program, activity at Darlington will constitute one of the largest construction and infrastructure projects in Canada.

Pickering Extension

2014 also saw an important development for OPG's Pickering Nuclear Generating Station. In June, the Canadian Nuclear Safety Commission (CNSC) granted OPG permission to operate the Pickering reactors to a maximum of 247,000 hours full power equivalent. Up to that time, the limit to Pickering operation had been 210,000 hours.

Six reactors are in operation at Pickering, each of approximately 540 MW. Units 2 and 3 were shut down in the late 1990s along Units 1 and 4. In 2006, the decision was made not to refurbish Units 2 and 3, leaving six of the original eight reactors in service.

Pickering remains an important producer of electricity in Ontario, providing about 10 per cent of the province's total electricity supply.

Bruce Refurbishment

Discussions between Bruce Power and the Ontario government continued throughout 2014 regarding the future refurbishment of

the Bruce B nuclear reactors Units 5-8. The refurbishment of Bruce is one of the most important decisions confronting the nuclear industry in Canada at this time. With eight operating reactors, the Bruce Nuclear Generating Station provides approximately 30 per cent of Ontario's electricity.

Bruce Power has provided large capital investments to the station over the years. After leasing the station from then-Ontario Hydro in 2001, Bruce Power commenced a project to restart Units 3 and 4 which had been idled since 1998. With a \$725 million investment in capital, training and equipment upgrades, the two reactors were restarted in 2003 and 2004.

Bruce Power then commenced a full refurbishment project of Units 1 and 2 which had been shut down in 1998 and 1995, respectively. In 2005, an implementation agreement, with amendments, was reached with the Ontario government covering the refurbishment of the two reactors as well as the future refurbishment of Units 3 and 4. Units 1 and 2 returned to service in 2012. The total cost of the project was approximately \$4.8 billion.

Now attention has turned to the remaining six Bruce units. In the Ontario government's "Achieving the Balance of Power: Ontario's Long Term Energy Plan", the Ontario government has indicated its expectation that all Bruce Power reactors will continue in service. And the plan included prospective dates for when each unit would commence refurbishment.

| Unit | Expected Shutdown | Refurbishment Start |
|------|-------------------|---------------------|
| 3 | - | 2019 |
| 4 | - | 2016 |
| 5 | 2016 | 2022 |
| 6 | 2018 | 2024 |
| 7 | 2015 | 2026 |
| 8 | 2019 | 2028 |

"Expected shutdown" in the table above refers to the year in which the reactors

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- Cernavoda Romania (2 Units)
- Qinshan China (2 Units)
- Wolsong South Korea (4 Units)
- Embalse Argentina (1 Unit)

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The Bruce B nuclear power station, and just to the north, the Douglas Point prototype reactor. (photo courtesy Bruce Power)

would be expected to retire approximately 30 or more years after their original in service date in the 1980s if refurbishment is not undertaken. It is expected that each of the reactors would require approximately \$2 billion or about \$12 billion over the entire extent of the project. With refurbishment, the reactors can be expected to remain in service for approximately another 30 years.

As with Darlington's refurbishment, the future Bruce Power refurbishment is of great importance to Canada's nuclear industry. Carried out over at least 10 years, Bruce Power will again be the site of one of Canada's largest construction projects of any kind. It is also of international significance, as the Bruce Nuclear Power Station is the largest operating nuclear power facility in the world at this time.

As noted in the table above, Unit 4 is scheduled to be the next reactor at Bruce to undergo refurbishment.

Coal Shutdown in Ontario

The Province of Ontario burned its last tonne of coal in 2014, with the cessation of operations at its Thunder Bay and Nanticoke coal-fired stations. The end of the use of coal in Ontario fulfils a commitment made by the government of the province to end coal-fired electricity generation.

Ontario's use of coal to produce electricity commenced with the startup of the RL Hearn station in downtown Toronto in 1951. The station remained in service until 1983 when nuclear generation replaced coal-fired base load electricity. Its startup was followed by the Lakeview, Lambton, Thunder Bay, Atikokan and Nanticoke coal-fired stations, and the Lennox oil-fired stations. By 2014, only Nanticoke and Thunder Bay remained in service, and the RL Hearn station was now the site of the Portlands 550 MW gas-fired generator. Atikokan was converted to biomass in 2014, and is North America's largest such unit in service.

Coal use in Ontario commenced after World War 2 which had resulted in a large and accelerated growth in Ontario's industrial base and consequent electricity demand. The surge in Ontario electricity demand was further accelerated by system frequency conversion from 25 to 60 Hz starting in 1949.

The phaseout of coal in Ontario, commencing in the early 1980s with the closure of RL Hearn and completing in 2014 with the closures of Nanticoke and Thunder Bay, has been possible only because of the introduction of nuclear power starting with NPD (Nuclear Power Demonstration) in 1962. As a result of the 2014 closures, Ontario's electricity supply is now dramatically different from its mix in 1950.

| Source | % Fuel Type |
|---------|-------------|
| Nuclear | 62 |
| Hydro | 24 |
| Gas/Oil | 10 |
| Wind | 4 |

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Total energy consumption in Ontario in 2014 was approximately 140 TWh, down significantly from its peak of about 150 TWh in the mid-2000s.

Uranium Mining in Canada

A new uranium mine entered service in Canada in 2014, the long-awaited Cigar Lake uranium mine. Operated by Cameco Corporation and owned by a consortium of Cameco, AREVA Resources Canada, Idemitsu Canada Resources and TEPCO Resources, its ore was transported for the first time to AREVA Resources uranium mill at McClean Lake in northern Saskatchewan.

Mining began at Cigar Lake in March 2014, with a temporary suspension during July to allow more freezing of the ore body. Cigar Lake uses a jet-boring mining method. Cameco President and CEO Tim Gitzel noted that Cigar Lake is both one of the world's richest and most technically challenging of the world's uranium ore bodies. It is expected that Cigar Lake will produce approximately 18 million pounds of uranium concentrate annually by the time it achieves full production in 2018.

The project construction cost is about \$2.6 billion. Over 1000 were employed during construction, and more than 600 will be permanently employed during operation.

Also in the news for Cameco during the past year was the sale of its stake in Bruce Power L.P. for \$450 million. The sale was announced December 31, 2013 and closed in March 2014. The majority of Cameco's holdings were acquired by BPC Generation Infrastructure Trust, with smaller amounts being acquired by The Power Workers Union, and the Society of Energy Professionals.

AREVA Resources Inc. was also expanding its operations in Canada during 2014. It owns 69 per cent of the Midwest project in

Saskatchewan, and it will be the operator of the mine when it opens. At this time, full development of the Midwest Project has been deferred as a consequence of low uranium prices. Similarly deferred was Cameco's Millennium Project. Millennium was granted approval to proceed in 2014, but Cameco indicated in May that it was suspending the project for the time being.

AREVA also conducted exploration of the Shea Creek deposit in the western Athabasca basin in northern Saskatchewan. It has also conducted exploration at the Kiggavik deposit in Nunavut. In the case of Kiggavik, AREVA filed its environmental impact statement prior to the commencement of the environmental assessment process in 2014. The hearings were concluded on March 14, 2015 in Baker Lake.

New Global Prospects for CANDU

Candu Energy Inc. and the China National Nuclear Corporation (CNNC) signed a memorandum of understanding on November 8, 2014. The agreement forms a joint venture of the two companies to build Advanced Fuel Reactor Projects in China and to develop the technology for a global market. The new reactor will be a derivative of the existing CANDU 6 and Enhanced CANDU 6 reactor types. It will be capable of using recycled uranium or thorium fuel.

This was only the latest in a series of agreements with Chinese companies regarding development of new CANDU reactors. On July 24, Candu Energy Inc. signed an agreement with China Nuclear Power Engineering Company Ltd. (CNPEC) to build two new CANDU reactors in Romania. Romania is already home to two CANDU reactors, Cernavoda Units 1 and 2. Romania has been attempting to secure financing from European sources to build Units 3 and 4 for some years now without success. Instead, Chinese capital will be available to build the two reactors.

China now has considerable experience with CANDU, with more than a decade of operating experience from its two CANDU reactors, Qinshan 4 and 5. Romania also has extensive CANDU experience with its two reactors. All of these are among the world's best performing reactors. In fact CANDU 6 remains one of the best performing reactor technologies in the world as noted in the accompanying chart. Overall fleet lifetime performance is 82% capacity factor, while the four Romanian and Chinese CANDUs have lifetime capacity factors of more than 90%.

On July 25, the Presidents of China and Argentina signed an agreement for the provision of a new CANDU reactor in Argentina. This Argentina's fourth reactor will be third unit at its Atucha nuclear site. The agreement calls for Nucleoelectrica Argentina to be the designer, architect, builder and operator of the new Argentine reactor. Argentina holds intellectual property rights to CANDU.

International Developments

World nuclear reactor capacity rose again in 2014 with five new reactors entering service. The new reactors are Ningde 2, Fuqing 1 and Fangjiashan 1 in China, Atucha 2 in Argentina, and Rostov 3 in Russia. These new reactors generate a combined total of 4,763 MW. One reactor was permanently shut down during the year, Vermont Yankee in the United States. The 604 MW Vermont Yankee had been in service for 42 years. The US Nuclear Regulatory Commission (NRC) had previously granted permission for it to operate to 2032. But its owner, Entergy decided to close it for economic reasons.

Also during 2014, three new reactors commenced construction: Ostrovets 2 in Belarus; Barakah 3 in the United Arab Emirates; and Argentina's prototype CAREM-25, a domestically designed and developed small reactor.



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Also in 2014, Units 5 and 6 of the Japanese Fukushima Daiichi nuclear plant were officially classed as being decommissioned.

An overview of world nuclear reactor capacity and future construction can be found elsewhere in this Yearbook under World Reactor Capacity.

Another nation may be joining those with nuclear power generation. Turkey's Environment Minister granted approval of the proposed four-reactor project at Akkuyu in southern Turkey. The approval was granted in November, and construction is expected to begin in April 2015 once all construction licences have been granted. The first unit is expected to be in service in 2021.

Nuclear power policy was in a state of flux in France during 2014. The current government headed by President François Hollande had been elected in 2012 with a pledge to limit nuclear power to 50% of France's electricity generation by 2025. It had indicated that it would close France's oldest operating nuclear plant, the two-reactor station of Fessenheim on the Rhine River by the end of 2016.

However, no sooner had the French parliament voted to support the President's policy than the parliamentary Committee of Finance submitted its report indicating that there were no technical reasons to order the closure of Fessenheim. The closure would immediately cost approximately 5 billion Euros, including compensation paid to Electricite de France. It would also cost another 4.7 billion Euros in lost revenue if the plant were to continue to operate as permitted until 2040. The plant generates approximately 200 million Euros profit annually.

As a result, France's new energy policy no longer calls for the closure of any specific nuclear power station.

In other news in France during 2014, Areva announced total losses during the year of 4.8 billion Euros. The losses were attributed to delays to its nuclear and renewable energy projects, primarily Olkiluoto 3 in Finland. This EPR type reactor started construction in 2005, and it is not expected to commence operation until 2018.

Areva's woes were not limited to Finland. Also last year, Areva announced that its Flamanville reactor would be delayed until 2017 for its completion and startup. Construction work began in 2007. The most recent technical problem is the failure of the pressure vessel to meet specifications. Primarily, the steel has too high a carbon content.

Areva has two principle areas of commercial interest at this time, the United Kingdom and China. In the case of Britain, Areva is to be the architect for Britain's next nuclear power reactors, Hinkley Point C and Sizewell C. In partnership with EDF Energy, forgings have already been cast for Hinkley Point C. During the year, the British government and EDF were engaged in negotiations for the price Britain would pay for electricity from the new reactor.

In Closing


In the future, 2014 might be seen as a moment of calm in the development of Canada's nuclear industry. The large refurbishment projects of the past decade have been completed, and the refurbished reactors have been in service for a few years in some cases. What is to come is at least a decade of extensive construction work in the refurbishment of the Bruce and Darlington nuclear power stations. Collectively, these projects will employ thousands of additional workers for at least a decade. Their completion will ensure that nuclear remains the dominant producer of electricity in Ontario to at least the middle of this century. It will also ensure that CANDU remains an important power reactor technology and that Canadian

nuclear businesses will have considerable work for years to come.

The agreement with CNPEC ensures that CANDU will continue to be a strong prospect for export sales and development. It will also ensure that CANDU remains at the forefront of new nuclear fuel cycles. The importance of CANDU to China is perhaps reflected in the fact that the Canadian Nuclear Society (CNS) hosted one of the most successful of all Pacific Basin Nuclear Conferences (PBNC) in August in Vancouver. Attendance at the conference was particularly strong from a large number of Chinese companies.

Of great importance for Canada's nuclear future was the startup of the Cigar Lake uranium mine during the past year. In recent years, as noted in the world uranium mining table elsewhere in this Yearbook, Canada's role as the world's largest uranium supplier had been supplanted by in situ leach projects in Kazakhstan. Cigar Lake uranium will be the first new uranium project in Canada since the start of the McArthur River project nearly a decade ago.

Finally it should be noted that world reactor capacity continues to grow all around the world despite anxieties created by the Fukushima accident in 2011. And it continues to grow in nearly all continents around the globe with new projects being undertaken in South America, Europe, the Middle East and particularly Asia. All of this growth contains opportunities for Canadian goods and services in the nuclear sector.

Also of great importance is the restructuring of AECL in 2014. It is to be hoped that new management and strategic direction for Canada's nuclear research facilities will bring new vision and new discipline, sustaining and reinforcing Canada's eminence in all areas of nuclear science, engineering, fuel, waste management, and services. 

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2014 – Program Committee Chair Report

By Tracy Lapping, Chair Program Committee



In 2014, the CNS continued to successfully organize conferences and courses. The following highlights the events held during the past year:

2014 Canada-China Conference on Advanced Reactor Development

The 2014 Canada-China Conference on Advanced Reactor Development was held on April 27-30, 2014, at the Niagara Falls Marriott Fallsview Hotel & Spa. CCCARD-2014 was organized by Laurence Leung from Canadian Nuclear Laboratories.

Canada and China are pursuing advanced nuclear reactor designs with enhanced safety and improved performance. The majority of design work focuses on the Gen-III (or Gen-III+) type of nuclear reactor, but an increasing effort has been invested in the new Gen-IV concepts and small reactors. Canada and China have been collaborating in nuclear research and development (R&D) to advance technologies such as advanced fuel cycle, fuel development, materials, thermalhydraulics, and reactor safety. The 2014 Canada-China Conference on Advanced Reactor Development (CCCARD-2014) was aimed at providing a forum for discussion of advances and issues, sharing information and technology transfer, and establishing future collaborations on advanced nuclear R&D between Canada and Chinese research organizations.

Nuclear-101

Nuclear-101 was offered twice, once in 2014 and once in 2015: May 4-6, 2014 at the Sheraton Hotel in Hamilton and March 30-31, 2015 at the Courtyard by Marriott in Ottawa. These were the fifth and sixth offerings of this two-day course. Nuclear 101 is specifically designed for those working in the nuclear industry (with or without a technical background), who are interacting with the public. The course provides a good understanding of nuclear fundamentals, helps the participants understand how the industry works, and

provides the tools to explain to others in simple, factual terms how nuclear science and technology works.

The course includes three half-day modules, together with a workshop session which also incorporates demonstrations, and where available, tours. The modules discuss the Nuclear Fuel Cycle, the History of Canadian Nuclear Science, including a discussion of Nuclear Myths and Reality, and a module on Radiation and Risk.

10th International Conference on CANDU Maintenance (CMC 2014)

The 10th International Conference on CANDU Maintenance – “Revamping the Technical Strength of Our Industry” was organized by the Canadian Nuclear Society. This Conference was held at the Metro Toronto Convention Centre on May 25-27, 2014, and was chaired by Vinod Chugh from AMEC NSS Ltd.

19th Pacific Basin Nuclear Conference and the 38th Annual CNS-CNA Student Conference

The 19th Pacific Basin Nuclear Conference (PBNC 2014), “Fulfilling the Promise of Nuclear Technology Around the Pacific Basin in the 21st Century” was organized by the Canadian Nuclear Society. This Conference was held in Vancouver, August 24-28, 2014, and was chaired by Mr. Frank Doyle. Other key members of the large organizing team were: Mr. Tim Gitzel, Honorary Chair; Dr. Ben Rouben, Organization and Executive Administration; Dr. Bill Kupferschmidt, International Technical Program; Dr. Ron Oberth and Mr. Daniel Brady, Plenary and Keynote Speaker Program; Mr. Doug Burton, Sponsors and Exhibitors Program; Professor Emily Corcoran and Ms. Ruxandra Dranga, Student Conference; Dr. Krish Krishnan, Honours and Awards; Ms. Tracy Pearce, Guest Program; Dr. Jeremy Whitlock, Communications, and

Mr. Ken Smith, Finance. The conference included 46 senior-level presentations, 300 technical papers from countries around the Pacific rim and others and overall there were 600 people in attendance.

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 and Wine-&-Cheese Reception. There were 53 posters on display.

CANDU Fuel Technology Course

This course was held at the Best Western Plus Durham Hotel in Oshawa on Oct 6- 7, 2014. The course provided an overview of the CANDU fuel design, performance and operation, with a special emphasis on the systems that interface with it. Fuel, more than any other reactor components, interfaces with many different systems. This course is designed to enlighten those involved in fuel design and performance of the interfaces; and vice versa. The course described the design of the bundle, the detailed nuclear physics of its operation, the thermal-hydraulic performance, the fuel handling, fuel and physics of the reactor, the discharge and storage of the fuel.

3rd International Technical Meeting on Small Reactors

Atomic Energy of Canada Limited (AECL), now known as Canadian Nuclear Laboratories (CNL) and Canadian Nuclear Society (CNS) had hosted the 3rd International Technical Meeting on Small Reactors at the Marriott Hotel in Ottawa on November 5-7, 2014. Following the success of the 2nd Technical Meeting in November 2012, which captured the achievements, capabilities, and future prospects of small reactors, the 3rd Technical Meeting was dedicated to the applications of research reactors and small modulator reactors. The meeting covered topics of

continued on page 17...

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2014 – Education and Communications Committee Report

By Ruxandra Dranga, Chair Education and Communications Committee



In 2014, 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.

Ionizing Radiation Workshops and Geiger Kits to High Schools

In 2014, the Geiger Program, which is one of the main activities overseen by the ECC, was able to place 14 full Geiger kits in high schools throughout Canada, thanks to the sponsorship provided by Canadian Nuclear Laboratories (a wholly owned subsidiary of Atomic Energy of Canada Limited). The kits included a high quality Geiger detector and computer interface, teaching material, and Naturally Occurring Radioactive Materials (NORM) for measurement and demonstration. All 14 kits were assembled and tested by Acision Industries. From 2015 onward, the Geiger Program will be placed in "maintenance" mode, where the CNS will continue to provide support for the currently distributed Geiger kits, while looking for additional sponsorships for future ones. More than 100 schools have currently requested a kit and are on the waiting list.

An additional important component of the Geiger Program is the Ionising Radiation Workshop offered to teachers, to demonstrate the use of the detector in a classroom setting. In the past, CNS members attended a number of teacher conferences (e.g., Association of Science Teachers Conference in Halifax, Science Teacher's Association of Ontario Conference in Toronto, etc.). In 2014, to add to the training component of the Geiger Program, the ECC started the recording of a series of YouTube videos on various Geiger demonstrations. Two videos – Part 8A introducing the "Hot Balloon Experiment" and Part 8B exploring the physics behind the "Hot Balloon Experiment", have been posted online and are available for open access on the CNS website!

"Nuclear 101" Course


2014-2015 was once again a very successful year for the "Nuclear 101" course, with two organized courses, one offered in Hamilton in May 2014 and one offered in Ottawa in March 2015. The "Nuclear 101" course was 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, titled "Nuclear for Everyone" has been introduced in 2014, 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. The seminar was first introduced to an insurance group which insures the nuclear industry. A second instance of this course is planned to take place during the 2015 CNS Annual Conference in New Brunswick. The ECC would like to extend a special thank you to Ron Matthews for his dedication and effort put into successfully chairing the "Nuclear 101" Committee for the past 3 years. We would also like to welcome the new Nuclear 101 Committee Chair, Matthew Dalzell – Communications Officer at the Sylvia Fedoruk Canadian Centre for Nuclear Innovation in Saskatoon, SK.

Public Advocacy

In 2014 the CNS did not officially participate in any public licensing hearings. However, in 2015, it will participate in the Bruce and Darlington relicensing hearings.

Further Information

For further information on the CNS' activities in Education and Communication, contact Ruxandra Dranga (Chair, CNS Education and Communication Committee) at ECC@cns-snc.ca. 

...2014 – Program Committee Chair Report *continued from page 15*


interest to designers, operators, researchers and analysts involved in the design, development and deployment of small reactors for research and power generation.

CNS CANDU Reactor Technology and Safety Course

Safety is a primary consideration in the design and operation of nuclear reactors. The CNS takes an active role in promoting

the outstanding safety features of CANDU reactors. To address the safety-training needs of the Canadian nuclear industry, the CNS offered the CANDU Reactor Safety Course on March 9-11 at the Courtyard by Marriott Downtown Toronto.

The CANDU Reactor Safety Course is one of the most popular courses organized by the CNS. It has been offered at least once

a year (and sometimes twice a year) since 1996. The course addresses a broad set of topics on reactor safety, and attendees always find that this allows them to get a better understanding of the way in which different disciplines impact reactor safety. The offering of this course in March 2014 received very positive feedback, as usual. 






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Canadian Nuclear Association (CNA) President's Report

By John Barrett, PhD



The nuclear industry profiled in this Yearbook faces a promising future. Consider the many opportunities – the renewal of Ontario's reactor fleet, the potential to introduce nuclear energy to some 45 countries, the ongoing expansion of nuclear applications, and the persistent advance of nuclear science.

The Canadian nuclear industry approaches these opportunities with formidable capabilities, developed through decades of experience in all aspects of nuclear technology. Only a few countries match our world-leading profile – a country that mines uranium, fabricates fuel, designs and maintains reactors, generates carbon-free electricity, advances nuclear medicine and innovative manufacturing, improves nutrition through irradiation, and shares its scientific and technological expertise with the world.

These capabilities have unquestionably improved how we live – a quality-of-life dividend to reward investments made by forward-thinking governments. This dividend also flows from the strong regulatory model established by government – an investment that has enabled the industry to deliver maximum benefit while protecting human health and the environment.

Such accomplishments should not leave us complacent about our future. We face many challenges – many of them created by our success. Having shown the world that nuclear energy can produce carbon-free electricity, the world is coming to understand that nuclear energy can stave off climate change – and now some 45 countries are evaluating whether to join the nuclear club. Similarly in medicine, demand continues to rise steadily for nuclear diagnostics and therapies.

Canadians look to our future with optimism. Our public opinion research regularly finds that Canadians, even those who recognize our record of

accomplishments, perceive that nuclear innovation promises to deliver many more benefits well into the future. In many ways, our best days lie ahead of us.


Certainly there are opportunities. In reactor construction alone, some 65 projects are underway – more than a third of them in China. The World Nuclear Association counts 165 reactors either on order or planned, and proposals for a further 331 reactors. With our track record of success, why would we not want to participate in this global nuclear expansion?

Our proven ability to innovate affords us advantages in the growing world market for nuclear energy. Small modular reactors may replace fossil-fuelled generators in smaller communities and remote locations, further multiplying our environmental advantage. Canadian scientists and engineers can excel in this application, just as they did in bringing large-scale nuclear generation to three provinces.

Refurbishment also commands our attention, with ten Ontario reactors due for mid-life extensions. Economists tell us that this vital infrastructure project will put more than \$20 billion into the industry, greatly expanding employment for skilled workers. We should be encouraged by the approach taken by Ontario's nuclear utilities – a determination to apply the lessons learned through previous refurbishments in

order to meet budgets and schedules.

We see today a Canadian nuclear industry that has matured, taken stock of its capabilities, sized up the global competition, and charted a course into the future. The vision set forth by the industry's leading executives, through the Nuclear Leadership Forum, compels us to excel in delivering the Ontario refurbishment project as promised, winning international business, advancing Canadian nuclear science and innovation, improving the supply of highly skilled workers, and developing an integrated waste-management approach.

Success in each of these areas will demonstrate conclusively that the Canadian nuclear industry is aligned, integrated, trusted, and working collaboratively to deliver innovative, life-enhancing solutions for Canada and the world. 

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- New reactors to replace the 3,000 megawatt Pickering Nuclear Station, scheduled to close in 2020;
- Canada's ability to compete in the trillion dollar global nuclear marketplace;
- Powering "Made-in-Ontario" zero-emission vehicles with GHG emission-free electricity; and
- Exporting low-carbon electricity to our fossil fuel dependent neighbours.

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FROM THE PEOPLE WHO HELP KEEP THE LIGHTS ON.



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

By Ron Oberth, President & CEO, Organization of Canadian Nuclear Industries (OCI)



OCI is an industry association that has grown over the last year to represent more than 185 leading suppliers to the nuclear industries in Canada and offshore. OCI member companies employ collectively more than 12,000 highly skilled and specialized individuals dedicated to manufacturing equipment and components and providing engineering services and support to the 19 operating CANDU nuclear power plants in Canada as well as to CANDU and LWR reactors in offshore markets.

OCI offers a variety of services and support to its member companies to help them become the suppliers of choice in the domestic nuclear market and to bring them opportunities in offshore CANDU markets and targeted LWR markets by organizing supply chain workshops, market specific seminars and high profile international trade missions in partnership with senior government ministers.

In the last year OCI organized five very successful "Suppliers' Days" events at Bruce Power, Ontario Power Generation, Canadian Nuclear Laboratories, SNC-Lavalin/Candu Energy, and Westinghouse in Cranberry Pennsylvania.

These focused trade shows attract 60 to 80 OCI member companies who showcase their products and services to engineers and procurement specialists in our key customer organizations. Our Supplier Days also create networking opportunities among member companies often leading to collaboration on specific projects.

OCI hosted workshops on Fusion Developments and on prospects for Canadian nuclear suppliers in South Korea and the UK. We also organized a private screening of the acclaimed documentary film: "Rickover-The Birth of Nuclear Power" for OCI member companies and associates.

OCI continues take advantage of the Government of Canada's "Global Opportunities for Associations (GOA)" program. In 2014/15 OCI received almost \$90,000 in co-funding for the period April 1, 2014 to March 31, 2015 that supported South Korea and UK nuclear market studies and trade missions to the USA and South Africa. We recently learned that OCI has been awarded \$129,225 in co-funding for 2015/2016 which will support the April 2015 OCI Nuclear Trade

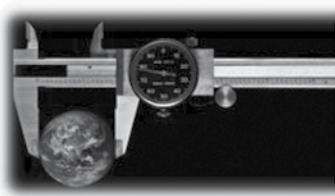
Mission to South Korea including Ontario's Minister of Research in Innovation, Dr. Reza Moridi, along with 10 company CEO's and association presidents.

As part of its increasing efforts to assist member companies in international markets OCI signed MOU's with the Haiyan Nuclear Power-related Industrial Alliance in China in April and with the Korea Atomic Industrial Forum (KAIF) in Vancouver in late August during a reception at the Pacific Basin Nuclear Conference (PBNC) hosted by OCI. President Dr. Ron Oberth was proud to serve as Conference Emcee and Plenary Program Co-chair for this important international conference that was held in Canada for the first time in 16 years.

Finally in partnership with the Power Workers' Union, the Society of Energy Professionals and the Building Trades Council OCI organized and hosted a very successful reception at Queens Park in October to meet with MPP's and their staff to discuss the important contribution of nuclear energy to Ontario's economy and clean air. 🍁

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Women in Nuclear (WiN) Canada President's Report

By Colleen Sidford, President, WiN-Canada



At its inception in 2004, Women in Nuclear (WiN) Canada had 12 members. By 2014, we have more than 1,400 members and six Chapters across the country. Our success is demonstrated in our growth over the last ten years. Today, WiN-Canada is the premier networking organization for women working in all aspects of nuclear energy, science, trades and technology. As a result of its efforts to promote the careers of women, WiN-Canada has become a strong, credible voice in the nuclear industry.

WiN-Canada continues to be proud of the many accomplishments achieved through the dedication of our members and the support of our many industry sponsors. This report highlights how our WiNners achieved many of WiN-Canada's goals through a wide variety of activities.

Promoting the Industry and Women in Nuclear-Related Occupations

Continuing in our tradition of connecting with women in the industry across Canada and around the globe, WiN-Canada attended the US-WiN national conference in Boston, MA at the end of July. We have always enjoyed an excellent working relationship with our neighbours and we continued to share ideas and best practices during a meeting with the US-WiN Leadership Team.

We also continue to be contributors to the WiN-Global newsletters and often find our social media notices acknowledged by WiN chapters around the world.

Closer to home, WiN contributed to a number of industry initiatives and committees including the Canadian Nuclear Leadership Forum, the CNA Communications Working Group, the CNS Nuclear Committee, the CNS Education and Communications Committee and

participated in the innovative Industry Leaders strategic initiative.

In 2014, our first visit to the East Coast, we welcomed 120 delegates at the WiN annual national conference, hosted by WiN-New Brunswick chapter in Saint John, NB.

Six WiN-Canada chapters organize quarterly meetings over the year providing opportunities for professional development and networking of members. Other opportunities to connect with a number of WiNners and recruit new members were at WiN booths at CNA, CNS, PBNC and OCI conferences and events.

WiN's Role in Increasing Public Awareness

WiN Leadership and members continue to participate and represent WiN at industry events, public forums, hearings and government panels, as well as related and relevant conferences and local community platforms.

Adding our voice to the public hearing process, WiN-Canada was given opportunity to speak at the CNSC follow-up hearings regarding DGR last year in Kincardine, ON. WiN representatives read a presentation prepared with input from NWMO and OPG. The presentation was well received.

WiN will also be presenting at the Bruce Power licence renewal public hearing in April 2015, and has also been awarded CNSC Participant Funding to complete a study regarding a number of items to be presented at the Darlington NGS licence renewal in the fall of 2015.

Promoting Nuclear Careers for Women and Young People

The continued success of WiN is reflected by the dedication and commitment shown

by our members and Chapter leaders across Canada.

WiN has done extremely well in volunteering and running science camps for youth, both independently and in conjunction with other sponsored organizations in order to foster an interest in Skilled Trades and the STEM (Science, Technology, Engineering and Mathematics) subjects.

In 2014, WiN chapters participated in a number of activities mentoring young people:

- Skills Work! For Women Networking dinners
- Skills Canada-Ontario Young Women's Conference
- Skills Canada-Ontario Technological Skills competition
- GIRLS Science Club (summer camps, March break program and PD Days)

While it is always interesting to look back on the many WiN-Canada accomplishments over the past year, it is more exciting to look forward to a successful future.

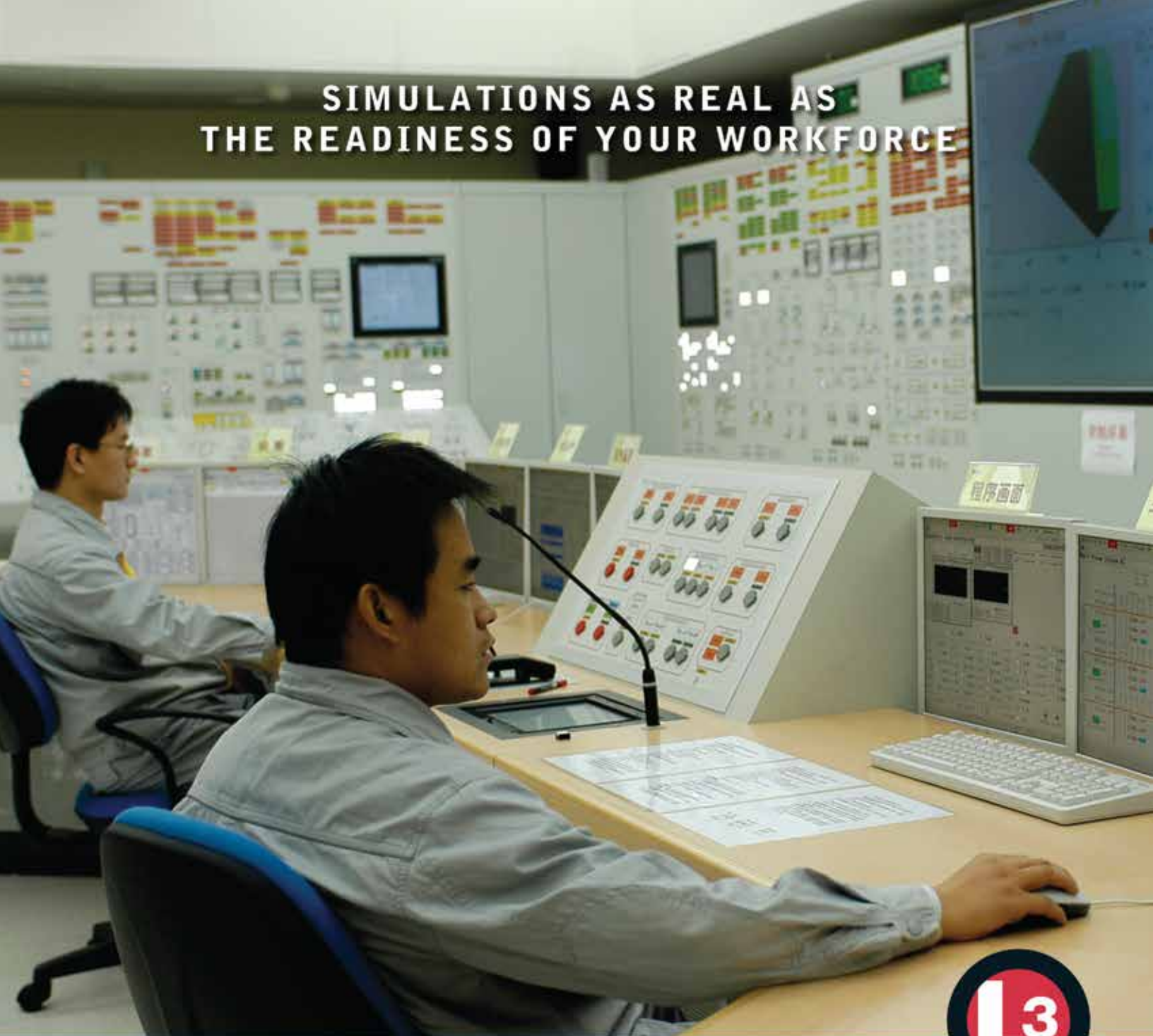
During 2014, the WiN-Canada Board of Directors held a strategy session to review the fundamental goals and objectives that were adopted in 2004 for relevance for the WiN-Canada organization today. As a result, the Board proposed updated Vision, Mission and Strategy statements and launched WiN-Canada's new 5 year Strategic Plan in 2015 and posted it on the WiN Canada website.

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Canadian Nuclear Workers Council (CNWC)

By David Shier, President & CEO, Canadian Nuclear Workers Council (CNWC)



The Canadian Nuclear Workers Council (CNWC) is an umbrella organization of Unions representing workers in all sectors of the Canadian nuclear industry. Founded in 1993, it represents sectors including electric power utilities, uranium mining and processing, radioisotope production for medical and industrial purposes, and nuclear research.

CNWC activities are focused on the following objectives:

- Ensure that the interests and perspectives of nuclear workers are heard by decision-makers;
- Strengthen the collective role of nuclear workers as a partner in their industry;
- Enhance public knowledge and understanding of nuclear issues by providing factual information, and;
- Build support for the nuclear industry and its future potential.

During 2014, several presentations and briefs were made on behalf of the membership. The CNWC made a presentation supporting OPG's Deep Geological Repository project on September 18th in Kincardine to the Joint Review Panel's environmental hearings. The CNWC was also represented at the October 1st and 2nd meetings for the review of the CNSC Staff Report on the Performance of Uranium and Nuclear Substance Processing Facilities and Uranium Mine and Mill Facilities. In addition, the CNWC monitored other relevant CNSC hearings and meetings and regulatory documents that will affect workers. The CNWC organized the Annual Meeting of the Nuclear Power Plant representatives held at the Ottawa CNSC offices on November 21st.

The CNWC's 2014 education and outreach activities included: attendance (with our display booth) at the Canadian Nuclear Association's 2014 Annual Conference and during the year conducted tours at

the Bruce and Darlington sites for labour leaders. The Council was represented at two events in September, the United Steelworkers USA Nuclear Council in Washington and at the Trade Unions for Safe Nuclear Energy's annual meeting in the UK.

Public communications included four newsletters issued each quarter during the year. The CNWC's website was also updated.


The CNWC's Annual Convention was held on October 18th to the 21st in Winnipeg, Manitoba. Delegates reviewed the CNWC's Constitution, Executive Board structure and strategy. Agreement was reached to restructure the executive board and to expand the membership to include the supply chain and construction sectors.

In 2015, CNWC education and outreach activities will focus on: expansion of the membership from nuclear supply chain companies, construction union, and local labour councils (International Union of Operating Engineers joined Oct. 2014); support for the renewal of Bruce Power's license application, OPG's Darlington license, Bruce Power's and OPG's refurbishment projects, OPG's DGR facility, Nuclear Waste Management Organizations process and the continuing restructuring of the Canadian Nuclear Laboratories (formally AECL's Chalk River Laboratories); continued participation in the Nuclear Leadership Forum; and the hosting of more nuclear facility tours for labour leaders. Leadership changes in these groups create the need for the new leadership to be updated about current and emerging nuclear industry issues and opportunities.

The CNWC will publish four editions of the Nuclear Worker, develop a new information booklet, update the website and continue with its display booth activities in 2015. The CNWC will

represent its membership at several upcoming conventions/conferences – the Canadian Labour Congress Convention, Provincial Federation of Labour Conventions, and the Annual INWUN 2015 meeting etc. As well, the CNWC will participate along with member Unions in the annual meeting with the CNSC. The CNWC's annual meeting is planned for September 12th to the 15th in Saskatoon.

CNWC Member Unions:

- Canadian Union of Public Employees (Locals 1500, 2200, & 267)
- District Labour Councils (Grey/Bruce, Durham, Northumberland)
- International Association of Firefighters
- International Federation of Professional & Technical Engineers (160 & 164)
- International Association of Machinists & Aerospace Workers (608)
- International Brotherhood of Electrical Workers (37)
- International Union of Operating Engineers (772)
- Construction & Building Trades Council of Ontario
- Power Workers' Union
- Hydro Quebec Professional Engineers Union
- Professional Institute of the Public Service of Canada (PIPS)
- CRPEG, WRPEG, & WTPEG
- Society of Energy Professionals Union
- UNIFOR (The Union for Canada) (254, 48S, 252, 524)
- United Steel Workers (14193, 13173, 8562, 8914, 7806, 4096, 1568) 

2015 Conference Schedule

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

2015 May 25 – May 27

4th Climate Change Technology Conference (CCTC-2015)

Hotel Omni Mont-Royal, Montréal, QC

Organized by EIC

Website: www.cctc2015.ca

2015 May 31 – June 3

35th Annual CNS Conference,
39th CNS-CNA Student Conference,
and OCI-NB Power Supplier Event
Hilton Saint John & Saint John Trade and
Convention Centre, Saint John, NB
Organized by CNS

Contact: Canadian Nuclear Society Office

E-mail: cns-snc@on.aibn.com

2015 June 17 – June 19

1st International Technical Meeting
on Fire Safety and Emergency
Preparedness for the Nuclear Industry

Hilton Mississauga/Meadowvale,
Mississauga, ON

Organized by CNS

Contact: Tracy Lapping

E-mail: tracy.lapping@cnl.ca

2015 August 9 – August 13

17th International Conference on
Environmental Degradation of
Materials in Nuclear Power Systems –
Water Reactors

Fairmont Château Laurier, Ottawa, ON

Organized by CNS

Contact: Canadian Nuclear Society Office

E-mail: cns-snc@on.aibn.com

2015 August 9 – August 13

17th International Conference on
Environmental Degradation of
Materials in Nuclear Power Systems
Ottawa, ON

Organized by CNS E&WM Division

Contact: Canadian Nuclear Society Office

Tel: 416-977-7620

E-mail: cns-snc@on.aibn.com

Website: www.cns-snc.ca

2015 August 30 – September 4

Nuclear Reactor Thermal Hydraulics
(NURETH-16)

Hyatt Regency Chicago

Organized by ANS

Website: <http://nureth16.anl.gov>

2015 Fall

CNS CANDU Reactor Physics Course

Contact: Canadian Nuclear Society Office

Tel: 416-977-7620

E-mail: cns-snc@on.aibn.com

Website: www.cns-snc.ca

2015 October 5 – October 6

CANDU Fuel Technology Course

Hilton Garden Inn, Ajax, ON

Contact: Canadian Nuclear Society Office

E-mail: cns-snc@on.aibn.com

2015 October 18 – October 21

7th International Conference on
Modelling and Simulation in Nuclear
Science and Engineering

Ottawa Marriott Hotel, Ottawa, ON

Contact: Canadian Nuclear Society Office

E-mail: cns-snc@on.aibn.com

2015 November 1 – November 4

International Nuclear Components
Conference

Hilton Mississauga/Meadowvale,
Mississauga, ON

Contact: Canadian Nuclear Society Office

E-mail: cns-snc@on.aibn.com

2015 November 1 – November 4

Delta Meadowvale Hotel, Mississauga, ON
8th International Steam Generators,
Heat Exchanger, and Reactor
Components Conference (ENCC-2015)

Organized by: CNS DM Division

Contact: Canadian Nuclear Society Office

Tel: 416-977-7620

E-mail: cns-snc@on.aibn.com

Website: www.cns-snc.ca

The Top 25



World Reactor Performance

Top 25 units for 2014 by capacity factor, December 31, 2014

| Rank | Country | Plant | Type | Capacity (MW) | Capacity (%) |
|-----------|----------------|--------------------|-------------|---------------|--------------|
| 1 | US | Quad Cities 1 | BWR | 866 | 107.67 |
| 2 | US | South Texas 2 | PWR | 1312 | 106.1 |
| 3 | US | Surry 1 | PWR | 861 | 105.27 |
| 4 | Korea | Hanbit 1 | PWR | 1000 | 103.38 |
| 5 | India | Rajasthan 4 | PHWR | 220 | 102 |
| 6 | Taiwan | Kuosheng 1 | BWR | 985 | 101.5 |
| 7 | US | River Bend | BWR | 992 | 101.39 |
| 8 | US | Farley 1 | PWR | 890 | 101.31 |
| 9 | US | Sequoyah 1 | PWR | 1186 | 101.02 |
| 10 | US | Robinson 2 | PWR | 820 | 101.02 |
| 11 | US | Nine Mile Point 1 | BWR | 640 | 100.56 |
| 12 | US | Peach Bottom 3 | BWR | 1032 | 100.39 |
| 13 | US | Calvert Cliffs 2 | PWR | 880 | 100.38 |
| 14 | China | Daya Bay 1 | PWR | 980 | 100.02 |
| 15 | Slovenia | Krsko | PWR | 727 | 100.02 |
| 16 | Finland | Olkiluoto 2 | BWR | 890 | 99.62 |
| 17 | South Africa | Koeberg 1 | PWR | 970 | 99.61 |
| 18 | US | North Anna 1 | PWR | 1023 | 99.58 |
| 19 | US | Hatch 2 | BWR | 921 | 99.31 |
| 20 | India | Kakrapar 1 | PHWR | 220 | 99.25 |
| 21 | Korea | Shin Wolsong 1 | PWR | 1045 | 99.17 |
| 22 | Spain | Cofrentes | BWR | 1092 | 98.98 |
| 23 | US | Dresden 3 | BWR | 920 | 98.09 |
| 24 | US | Dresden 2 | BWR | 925 | 97.85 |
| 25 | Romania | Cernavoda 2 | PHWR | 706 | 97.84 |

All figures taken from Nucleonics Week, 02/12/15. All numbers have been rounded
 No monthly results reported from Great Britain, Ukraine, Slovakia, Bruce Power-Canada
 No annual performance results reported from Ukraine



The Darlington nuclear power station produces about 20% of Ontario's electricity. (photo courtesy OPG)

CANDU Nuclear Reactor Performance and World Uranium Production

CANDU Nuclear Reactor Performance – 2014

| December 2014 Reactor | In Service | Capacity (MW) | Performance In 2014 (%) | Lifetime Performance (%) |
|--------------------------|------------|---------------|-------------------------|-----------------------------|
| Point Lepreau | 1983 | 705 | 82.2 | 76.3 |
| Wolsong 1* | 1983 | 679 | 0 | 80.3 |
| Wolsong 2 | 1987 | 678 | 91.5 | 93.5 |
| Wolsong 3 | 1998 | 698 | 85.7 | 94.8 |
| Wolsong 4 | 1999 | 703 | 85.1 | 95.7 |
| Embalse | 1983 | 648 | 29.9 | 81.4 |
| Cernavoda 1 | 1996 | 707 | 91.1 | 90.4 |
| Cernavoda 2 | 2007 | 705 | 98.5 | 94.5 |
| Qinshan 4 | 2002 | 700 | 98.6 | 91.8 |
| Qinshan 5 | 2003 | 700 | 92.0 | 92.3 |
| Pickering 1 | 1971 | 542 | 86.0 | 64.3 |
| Pickering 4 | 1973 | 542 | 63.3 | 66.2 |
| Pickering 5 | 1983 | 540 | 95.0 | 74.2 |
| Pickering 6 | 1984 | 540 | 88.9 | 78.5 |
| Pickering 7 | 1985 | 540 | 62.0 | 77.9 |
| Pickering 8 | 1986 | 540 | 53.8 | 76.0 |
| Bruce 1 | 1977 | 825 | 87.3 | 84.5 |
| Bruce 2 | 1978 | 825 | 76.8 | 82.4 |
| Bruce 3 | 1978 | 825 | 64.5 | 64.6 |
| Bruce 4 | 1979 | 825 | 94.3 | 65.2 |
| Bruce 5 | 1985 | 872 | 81.6 | 85.2 |
| Bruce 6 | 1984 | 872 | 94.6 | 79.5 |
| Bruce 7 | 1986 | 872 | 76.4 | 84.7 |
| Bruce 8 | 1987 | 872 | 96.0 | 83.0 |
| Darlington 1 | 1992 | 934 | 75.8 | 85.2 |
| Darlington 2 | 1990 | 934 | 96.6 | 79.5 |
| Darlington 3 | 1993 | 934 | 97.8 | 87.5 |
| Darlington 4 | 1993 | 934 | 95.3 | 86.4 |
| Total/Average | | 20 691 | 80.0 | 82.0 |

COG CANDU/PHWR Performance Statistics, 2014

*These reactors were under reconstruction during part or all of 2014

World Uranium Production – 2013

| Country or area | Production (tU) | | | |
|-----------------|-----------------|---------------|---------------|---------------|
| | 2010 | 2011 | 2012 | 2013 |
| Australia | 5 900 | 5 983 | 6991 | 5000 |
| Brazil | 148 | 265 | 231 | 198 |
| Canada | 9 783 | 9 145 | 8999 | 9331 |
| China* | 827 | 1599 | 1500 | 1500 |
| Czech Rep | 254 | 229 | 228 | 215 |
| France | 7 | 6 | 3 | 5 |
| Germany | - | 52 | 50 | 27 |
| India* | 400 | 400 | 385 | 385 |
| Kazakhstan | 17 803 | 19 451 | 21 317 | 22 451 |
| Malawi | 670 | 846 | 1101 | 1132 |
| Namibia | 4 496 | 3 259 | 4495 | 4323 |
| Niger* | 4 198 | 4 351 | 4667 | 4518 |
| Pakistan* | 45 | 45 | 45 | 45 |
| Romania* | 77 | 77 | 90 | 90 |
| Russia | 3 562 | 2 993 | 2872 | 3135 |
| South Africa | 583 | 582 | 465 | 531 |
| Ukraine* | 850 | 890 | 960 | 922 |
| USA | 1 660 | 1 537 | 1596 | 1792 |
| Uzbekistan* | 2 400 | 3000 | 2400 | 2400 |
| Total | 53 671 | 53 493 | 58 394 | 59 370 |

* UI estimate

All figures taken from the World Nuclear Association

World Reactor Capacity



World Reactor Capacity

February 2015
Country

| | Operating | | Planned or Under Construction | | Electricity Generation (2014) | |
|--------------|------------|---------------|-------------------------------|----------------|-------------------------------|---------------|
| | No | MW | No | MW | % | TWh |
| Argentina | 3 | 1627 | 4 | 1627 | 4.4 | 5.7 |
| Armenia | 1 | 376 | 1 | 1060 | 29.2 | 2.2 |
| Bangladesh | | | 2 | 2400 | | |
| Belarus | | | 4 | 4800 | | |
| Belgium | 7 | 5943 | | | 52 | 40.6 |
| Brazil | 2 | 1901 | 5 | 5405 | 2.8 | 13.8 |
| Bulgaria | 2 | 1905 | 1 | 950 | 30.7 | 13.3 |
| Canada | 19 | 13553 | | | 16 | 94.3 |
| Chile | | | 4 | 4400 | | |
| China | 23 | 20115 | 213 | 225181 | 2.1 | 104.8 |
| Czech Rep. | 6 | 3766 | 3 | 3600 | 35.9 | 29 |
| Egypt | | | 4 | 4800 | | |
| Finland | 4 | 2741 | 3 | 4400 | 33.3 | 22.7 |
| France | 58 | 63130 | 3 | 5530 | 73.3 | 405.9 |
| Germany | 9 | 12003 | | | 15.4 | 92.1 |
| Hungary | 4 | 1889 | 2 | 2400 | 50.7 | 14.5 |
| India | 21 | 5302 | 63 | 64400 | 3.4 | 30 |
| Indonesia | | | 5 | 4030 | | |
| Iran | 1 | 915 | 9 | 8300 | 1.5 | 3.9 |
| Israel | | | 1 | 1200 | | |
| Japan | 48 | 42569 | 15 | 20128 | 1.7 | 13.9 |
| Jordan | | | 2 | 2000 | | |
| Kazakhstan | | | 4 | 1200 | | |
| Korea (N) | | | 1 | 950 | | |
| Korea (S) | 23 | 20697 | 13 | 18200 | 27.6 | 132.5 |
| Lithuania | | | 1 | 1350 | | |
| Malaysia | | | 2 | 2000 | | |
| Mexico | 2 | 1600 | 2 | 2000 | 4.6 | 11.8 |
| Netherlands | 1 | 485 | 1 | 1000 | 2.8 | 2.7 |
| Pakistan | 3 | 725 | 4 | 2680 | 5.3 | 5.3 |
| Poland | | | 6 | 6000 | | |
| Romania | 2 | 1310 | 3 | 1965 | 19.8 | 10.7 |
| Russia | 34 | 25264 | 58 | 56748 | 17.5 | 161.8 |
| Saudi Arabia | | | 16 | 17000 | | |
| Slovakia | 4 | 1816 | 3 | 2142 | 51.7 | 14.6 |
| Slovenia | 1 | 696 | 1 | 1000 | 33.6 | 5 |
| South Africa | 2 | 1830 | 8 | 9600 | 5.7 | 13.6 |
| Spain | 7 | 7002 | | | 19.7 | 54.3 |
| Sweden | 10 | 9487 | | | 42.7 | 63.7 |
| Switzerland | 5 | 3333 | 3 | 4000 | 36.4 | 25 |
| Taiwan | 6 | 4927 | 2 | 2700 | na | na |
| Thailand | | | 5 | 5000 | | |
| Turkey | | | 8 | 9300 | | |
| Ukraine | 15 | 13168 | 13 | 13900 | 43.6 | 78.2 |
| UAE | | | 14 | 20000 | | |
| UK | 16 | 10038 | 11 | 1515600 | 18.3 | 64.1 |
| USA | 99 | 98756 | 27 | 39081 | 19.4 | 790.2 |
| Vietnam | | | 10 | 10700 | | |
| World | 438 | 378869 | 560 | 2110727 | | 2319.3 |

Notes

All figures taken from the World Nuclear Association

CNS Council and Staff

CNS Executive



Jacques Plourde
President



Paul Thompson
1st Vice-President



Peter Ozemoyah
2nd Vice-President



Adriaan Buijs
Past President



Mohamed Younis
Treasurer



Colin Hunt
Secretary



Benjamin Rouben
Executive Director



Ken Smith
Financial
Administrator



Jeremy Whitlock
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 in order 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. A group photo of Council Members at a recent meeting is provided on the next page. The elected Council consists of six Executive Officers plus up to nineteen Members-at-Large – all volunteers. Various members of Council are appointed to Chair Committees that look after specific issues. A list of Committee Chairs appears on the next page. The Council is supported by a full time Office Manager, and by other part-time specialists.

Elected Executive for June 2014 to June 2015:

Jacques Plourde
President

Paul Thompson
1st V-P

Peter Ozemoyah
2nd V-P

Colin Hunt
Secretary

Mohamed Younis
Treasurer

John Roberts
Past President

Part-time Specialists and Office Staff:

Ben Rouben
Executive
Director

Ken Smith
Financial
Administrator

Brian Blosser
Accountant

Amanda Blosser
Bookkeeper

Denise Rouben
Office Manager

Bob O'Sullivan
Office Assistant

Jeremy Whitlock
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.

The Chairs of the various Branches and Division 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 Members at Large



Parva Alavi



John Barrett
President and
CEO, CNA



Fred Boyd



Emily Corcoran



Rudy Cronk



Ruxandra Dranga



Dan Gammage



Mohinder Grover



Tracy Lapping



Kris Mohan



E.M (Dorin) Nichita



Jad Popovic



John Roberts



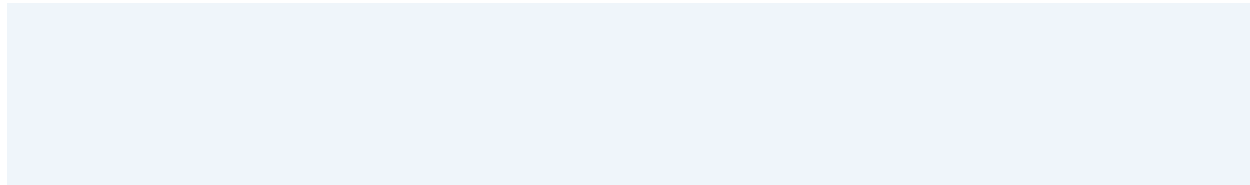
Nick Sion



Aman Usmani



Syed Zaidi



CNS Staff



Denise Rouben
CNS Office Manager



Colin Hunt
Publisher
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Ric Fluke, Editor
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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

International Nuclear Organizations *continued from page 33*

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
Allhegonavägen 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

Guide to Nuclear-Related Organizations



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 35*

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

**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)

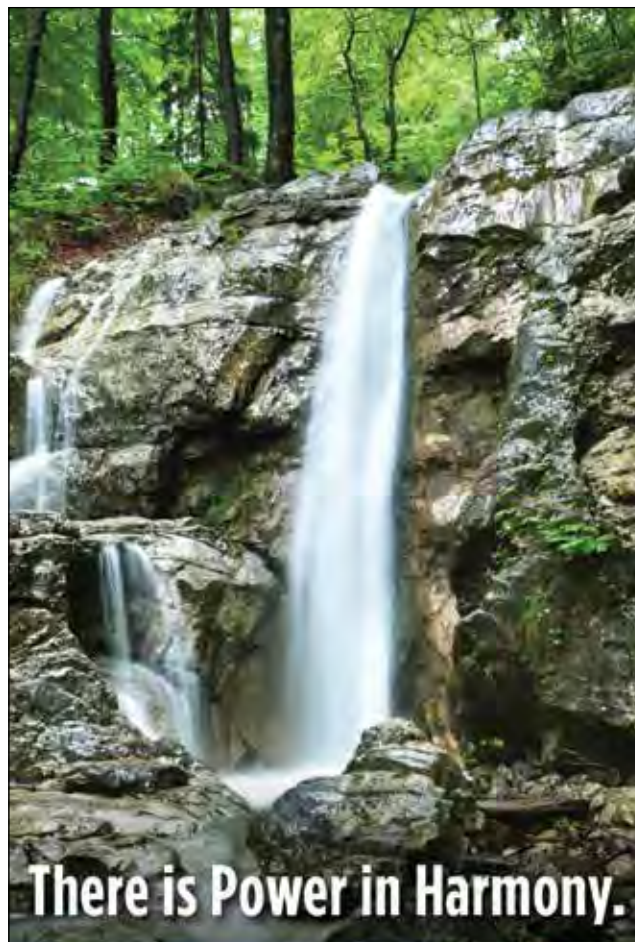
5th Floor, Regency House
1-4 Warwick St.
London, United Kingdom
SW1B 5LT
Tel: +44 20 7734 5996
Fax: +44 20 7734 5926

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



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www.hitachi.ca

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 |
|--|--|-----------------------------|
| Chalk River Laboratories (AECL) | | |
| NRX Reactor | 42 MW(t) | Decommissioning |
| NRU Reactor | 135 MW(t) | Operating |
| 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 (cont'd)

| 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 |
| Whiteshell Laboratories (AECL) | | |
| 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 | Operating |
| 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 39*

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 ₂ | Operating |
| Blind River Uranium Refinery, Blind River, Ontario (Cameco) | 24,000 tonnes of uranium as UO ₃ | 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 ₂ 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 (cont'd)

| 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 41*

| Particle Accelerator Licences (cont'd) | | |
|--|-------------------------|-----------|
| 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 (cont'd)

| 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 |

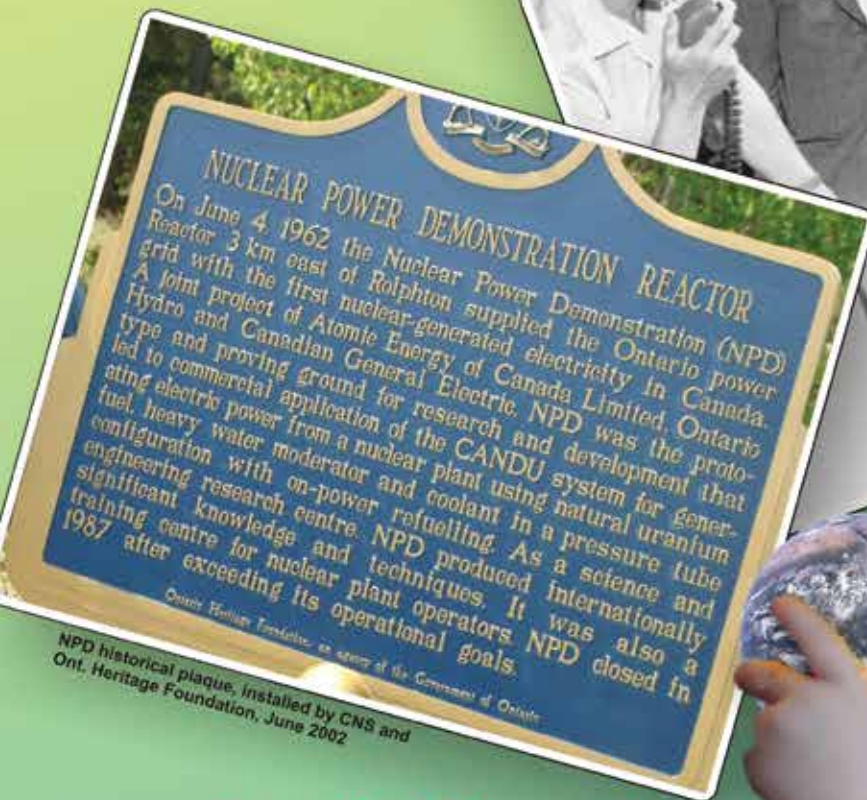
Nuclear Substance Processing Facility Licences

| 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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Nuclear Products, Materials and Services



A

Air Filtration Systems

CCI Thermal Technologies Inc. 65

Air Headers

Special Electronics and Designs Inc.

Airlocks, Reactor

RCM Technologies Canada Corp. 22
SNC-Lavalin OBC

Alarm Systems

SNC-Lavalin OBC

Alpha Spectroscopy

Canberra Co.
Radiation Safety Institute of Canada

Analyzers

Avensys Solutions

Architects, Engineers

SNC-Lavalin OBC
Tetra Tech Wei Inc. 50
Worley Parsons

Assay Equipment and Services, Uranium

McMaster Nuclear Reactor

B

Base Listing Fee

Canadian Nuclear Workers' Council
Power Workers' Union 20

Bellows, Metal

Thorburn Flex Inc. 8, 60

C

Cable Assemblies, Radiation Resistant

Kanata Electronic Services Limited
Mirion Technologies (IST Canada) Inc. 46
Promation Nuclear Ltd.

Calandrias, Reactor

Thorburn Flex Inc. 8, 60

Calibration Services

Marsh Instrumentation Ltd. 19
Radiation Safety Institute of Canada

Castings, Nuclear Quality

ATI
Nuclear Logistics, Inc. 14

Chambers, Fission

Cameco Fuel Manufacturing 16
LND Inc. 52, 63
Mirion Technologies (IST Canada) Inc. 46
SNC-Lavalin OBC

Chambers, Ionization

Cameco Fuel Manufacturing 16
LND Inc. 52, 63
Mirion Technologies (IST Canada) Inc. 46
SNC-Lavalin OBC

Clothing, Protective

Unitech Services Group 18

Coatings, Containment Quality

Nova Machine Products INC

Commercial Grade Dedication

ATC Nuclear
Canadian Power Utility Services Limited
Kinectrics Inc. 2
Nuclear Logistics, Inc. 14

Communications Equipment

Special Electronics and Designs Inc.

Compactors, Box and Drum

Container Products Corporation

Compressors, Gas

SIHI Pumps Limited
Thorburn Flex Inc. 8, 60

Compressors, Nuclear

SIHI Pumps Limited

Computer Software Development & Maintenance

Hitachi Canada 37
SWI Systemware

Computers, Reactor Control

Hitachi Canada 37
SNC-Lavalin OBC
Tetra Tech Wei Inc. 50

Configuration Management

Babcock & Wilcox
Canadian Power Utility Services Limited
GE Hitachi Nuclear Energy Canada Inc. IFC
Hatch Ltd.
RCM Technologies Canada Corp. 22
SNC-Lavalin OBC
SWI Systemware

Confined Space Communications

Special Electronics and Designs Inc.

Connectors, Electrical, Radiation Resistant

Henry Controls Inc.
Kanata Electronic Services Limited

Construction Management

Babcock & Wilcox
E.S. Fox Limited 4
Hatch Ltd.
Worley Parsons

Construction, Modular

Babcock & Wilcox
E.S. Fox Limited 4
Hitachi Canada 37

Consultant, Waste and Decommissioning Planning

Candesco 2
Nuvia Canada
SENES Consultants Inc.
Tetra Tech Wei Inc. 50

Consultants, Design

Babcock & Wilcox
Canadian Power Utility Services Limited
Hatch Ltd.
RCM Technologies Canada Corp. 22
SNC-Lavalin OBC
SWI Systemware
Tetra Tech Wei Inc. 50
Worley Parsons

Consultants, Economic

Hatch Ltd.
Strategic Insights Inc.

Consultants, Engineering

Babcock & Wilcox
Canadian Power Utility Services Limited
Cuttler & Associates Inc.
NA Engineering Associates Inc.
RCM Technologies Canada Corp. 22
Rolls-Royce Civil Nuclear Canada Ltd.
SNC-Lavalin OBC
Structural Integrity Associates Inc
Tetra Tech Wei Inc. 50
Worley Parsons

Consultants, Environmental

EcoMetrix Incorporated
SENES Consultants Inc.
SNC-Lavalin OBC
Tetra Tech Wei Inc. 50
Worley Parsons

Consultants, Geotechnical

SNC-Lavalin OBC

Consultants, Management

Canadian Power Utility Services Limited
Candesco 2
Hatch Ltd.
RCM Technologies Canada Corp. 22
Strategic Insights Inc.
SWI Systemware
Tetra Tech Wei Inc. 50
Worley Parsons

Nuclear Products, Materials and Services *continued from page 47*

Consultants, Materials

**RCM Technologies
Canada Corp.**..... 22

Consultants, Procurement

Canadian Power Utility
Services Limited
Hatch Ltd.
Nova Machine Products INC
**RCM Technologies
Canada Corp.**..... 22
SNC-Lavalin.....OBC
Tetra Tech Wei Inc...... 50
Worley Parsons

Consultants, Radiation and Health

Candesco..... 2
EcoMetrix Incorporated
Nuvia Canada
Physics Solutions Inc.
Radiation Safety Institute
of Canada
SENES Consultants Inc.
Tetra Tech Wei Inc...... 50
Worley Parsons

Consultants, Seismic

Canadian Power Utility
Services Limited
Hatch Ltd.
**RCM Technologies
Canada Corp.**..... 22
SNC-Lavalin.....OBC
Structural Integrity Associates Inc
Tetra Tech Wei Inc...... 50
Worley Parsons

Consultants, Stress, Thermal, Vibration

Babcock & Wilcox
Canadian Power Utility
Services Limited
Hatch Ltd.
Kinectrics Inc...... 2
**RCM Technologies
Canada Corp.**..... 22
SNC-Lavalin.....OBC
Structural Integrity Associates Inc
Tetra Tech Wei Inc...... 50
Worley Parsons

Containers, Radiation Shielding

Container Products Corporation
E.S. Fox Limited..... 4
EnergySolutions Canada
**Niagara Energy
Products**..... 54
Nuvia Canada
Rolls-Royce Civil Nuclear
Canada Ltd.
SNC-Lavalin.....OBC

Containers, Shipping

Container Products Corporation
E.S. Fox Limited..... 4
Promation Nuclear Ltd.

Containment Structures, Reactor

SNC-Lavalin.....OBC
Tetra Tech Wei Inc...... 50
Thorburn Flex Inc......8, 60

Contract Staffing

Canadian Power Utility
Services Limited
CTS North America
SWI Systemware

Control and Absorber Rods

**Cameco Fuel
Manufacturing**..... 16

Control Rod Drive Mechanisms

**Cameco Fuel
Manufacturing**..... 16

Control Rods

**Cameco Fuel
Manufacturing**..... 16

Control Systems, Computerized

Canadian Power Utility
Services Limited
Eaton Industries (Canada)
Company
Hitachi Canada..... 37
Lakeside Process Controls Ltd.
RPC Radiy
SNC-Lavalin.....OBC
SWI Systemware
Tetra Tech Wei Inc...... 50

Controllers, Programmable

ATC Nuclear
Eaton Industries (Canada)
Company
Hitachi Canada..... 37
**Marsh
Instrumentation Ltd.**..... 19
RPC Radiy
Tetra Tech Wei Inc...... 50

Controls Modernization

Eaton Industries (Canada)
Company
Hitachi Canada..... 37
RPC Radiy

Coolers, Containment

Nuclear Logistics, Inc...... 14

Counter – Alpha/Beta, low level

Canberra Co.

Custom Control Panels

Avensys Solutions
**CCI Thermal
Technologies Inc.**..... 65
Eaton Industries (Canada)
Company
Nuclear Logistics, Inc...... 14
SNC-Lavalin.....OBC
Tetra Tech Wei Inc...... 50

D

Data Acquisition & Handling Systems

Eaton Industries (Canada)
Company
Tetra Tech Wei Inc...... 50

Decommissioning Services

Candesco..... 2
EcoMetrix Incorporated
Nuvia Canada
SNC-Lavalin.....OBC
Tetra Tech Wei Inc...... 50
Unitech Services Group.... 18
Worley Parsons

Decontamination Services: PCB, Fire/Smoke

Kinectrics Inc...... 2
Unitech Services Group.... 18
Worley Parsons

Decontamination, Chemicals, Equipment and Processe

Container Products Corporation
EnergySolutions Canada
Kinectrics Inc...... 2
Nuvia Canada
SNC-Lavalin.....OBC

Display Systems

Eaton Industries (Canada)
Company

Doors, Radiation Shielding

E.S. Fox Limited..... 4
Promation Nuclear Ltd.

Dosimeters, Radiation

Canberra Co.
Radiation Safety Institute
of Canada

Dryers, Vapour Recovery

**CCI Thermal
Technologies Inc.**..... 65
**GE Hitachi Nuclear
Energy Canada Inc.**..... IFC
Tetra Tech Wei Inc...... 50

E

Education Courses, Nuclear Canadian Nuclear

Society..... 44
Radiation Safety Institute
of Canada
SNC-Lavalin.....OBC
Worley Parsons

Educational Services, Industry

Kinectrics Inc...... 2
Radiation Safety Institute
of Canada
Worley Parsons

Educational Services, Public Canadian Nuclear

Society..... 44
Radiation Safety Institute
of Canada



Electrical Distribution Equipment

Eaton Industries (Canada) Company
Nuclear Logistics, Inc. 14
 RPC Radiy

Electrical Engineering

RCM Technologies Canada Corp...... 22
Tetra Tech Wei Inc...... 50

Electrical Motors

Hitachi Canada 37

Electronic Repair and Refurbishment

ATC Nuclear
 Henry Controls Inc.
Marsh Instrumentation Ltd...... 19

End Fittings

GE Hitachi Nuclear Energy Canada Inc. IFC
 Laker Energy Products Ltd.
 Niagara Fasteners Inc.
Thorburn Flex Inc.8, 60

Engineering Construction

NA Engineering Associates Inc.
RCM Technologies Canada Corp...... 22
SNC-LavalinOBC
 Worley Parsons

Engineering Tools (Design & Operation Support)

SNC-LavalinOBC

Environmental Qualification

Canadian Power Utility Services Limited
Kinectrics Inc...... 2
Marsh Instrumentation Ltd...... 19
RCM Technologies Canada Corp...... 22
Tetra Tech Wei Inc...... 50

Export, Marketing Services

Strategic Insights Inc.

F

Fabrication, Pipe, Nuclear

Babcock & Wilcox
CCI Thermal Technologies Inc. 65
GE Hitachi Nuclear Energy Canada Inc. IFC
 Promation Nuclear Ltd.
Thorburn Flex Inc.8, 60

Fabrication, Pipe, Nuclear

Canadian Power Utility Services Limited
E.S. Fox Limited 4
Niagara Energy Products 54
Thorburn Flex Inc.8, 60

Fasteners, Nuclear Quality

Laker Energy Products Ltd.
 Niagara Fasteners Inc.
 Nova Machine Products INC

Filter Baskets

CCI Thermal Technologies Inc. 65

Filters, Air

CCI Thermal Technologies Inc. 65

Filters, Gland Injection and Monitor

CCI Thermal Technologies Inc. 65

Filters, Water, Nuclear

CCI Thermal Technologies Inc. 65

Fire Protection

Canadian Power Utility Services Limited
 Hatch Ltd.
 Nuvia Canada
SNC-LavalinOBC
Tetra Tech Wei Inc...... 50

Flasks, Shielding

Cameco Fuel Manufacturing 16
E.S. Fox Limited 4
 Promation Nuclear Ltd.

Flasks, Shielding

GE Hitachi Nuclear Energy Canada Inc. IFC

Flow Meters

Avensys Solutions
Hitachi Canada 37
 Lakeside Process Controls Ltd.
Nuclear Logistics, Inc. 14

Flow Switches

Avensys Solutions
Marsh Instrumentation Ltd...... 19
Nuclear Logistics, Inc. 14

Flux Monitor Components

Cameco Fuel Manufacturing 16
 RPC Radiy
SNC-LavalinOBC

Forgings, Nuclear Quality

ATI
Niagara Energy Products 54
 Niagara Fasteners Inc.

Fuel Channel Components

ATI
Cameco Fuel Manufacturing 16
GE Hitachi Nuclear Energy Canada Inc. IFC
 Laker Energy Products Ltd.
 Promation Nuclear Ltd.
SNC-LavalinOBC

Fuel Element Cladding

Cameco Fuel Manufacturing 16

Fuel Fabrication

Cameco Fuel Manufacturing 16
SNC-LavalinOBC

Fuel Handling Equipment

Laker Energy Products Ltd.
 Promation Nuclear Ltd.
 RPC Radiy
SNC-LavalinOBC
Stern Laboratories Inc...... 57
Tetra Tech Wei Inc...... 50

Fuel Manufacture

Cameco Fuel Manufacturing 16
GE Hitachi Nuclear Energy Canada Inc. IFC

Fuel Shuffling Bay Equipment

GE Hitachi Nuclear Energy Canada Inc. IFC
 Promation Nuclear Ltd.

Fuel Simulators, Electrical

Stern Laboratories Inc...... 57

Fuel, Power Reactors

Cameco Fuel Manufacturing 16

Fuel, Research Reactors

Cameco Fuel Manufacturing 16

Fuelling Machine Heads

Laker Energy Products Ltd.
SNC-LavalinOBC

Fusion Research & Development Services

SNC-LavalinOBC

Fusion System Design Services

SNC-LavalinOBC

G

Gamma Detectors

Canberra Co.
LND Inc.52, 63
Mirion Technologies (IST Canada) Inc. 46
 Physics Solutions Inc.

Gamma Flux Mapping Systems

Mirion Technologies (IST Canada) Inc. 46

Gamma Spectroscopy

Canberra Co.
 Nuvia Canada

Gauges, Density, Nuclear

LND Inc.52, 63



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- Combined Construction & Operating License Applications

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- Field Engineering
- Commissioning

WASTE MANAGEMENT & DECOMMISSIONING

- Spent Fuel Management
- Dry Storage Facilities

MODIFICATIONS

- Conceptual Studies & Design Requirements
- Preliminary & Detailed Design
- Multidisciplinary Engineering

ASSET MANAGEMENT & EQUIPMENT RELIABILITY

- Plant Programs (Security, Fire Protection & Environmental Qualification)
- Preventative Maintenance Optimization
- Condition Assessments

Nuclear Products, Materials and Services *continued from page 49*



Gauges, Level, Nuclear
Nuclear Logistics, Inc. 14

Geological Services
Worley Parsons

Glove Box Supplies
Unitech Services Group.... 18

Glove Boxes
E.S. Fox Limited 4
GE Hitachi Nuclear
Energy Canada Inc. IFC
Promation Nuclear Ltd.

H

Hafnium
ATI

Hand Held Real-Time
Gamma and Neutron
Monitors
Canberra Co.

Harsh Environment
Qualification Testing
ATC Nuclear
Kinectrics Inc..... 2
Nuclear Logistics, Inc. 14

Headers, Reactor
Niagara Energy
Products 54

Headsets
Special Electronics and
Designs Inc.

Health Physics
Canadian Power Utility
Services Limited
Candesco..... 2
Nuvia Canada
Worley Parsons

Health Physics
SENE Consultants Inc.
Unitech Services Group.... 18

Heat Exchanger Tubes
Canadian Power Utility
Services Limited

Heat Exchangers
Babcock & Wilcox
Canadian Power Utility
Services Limited
CCI Thermal
Technologies Inc. 65

Heat Exchangers, Nuclear
Babcock & Wilcox
Canadian Power Utility
Services Limited
CCI Thermal
Technologies Inc. 65
Nuclear Logistics, Inc. 14
Rolls-Royce Civil Nuclear
Canada Ltd.

Heat Flux Measurement
RdF Corporation

Heat Treatment
Babcock & Wilcox
Cameco Fuel
Manufacturing 16
Team Industrial
Services 10

Heater Controls SCR Power
Ametek HDR Power Systems
Henry Controls Inc.

Heaters, Immersion,
Flanged, Electrical
CCI Thermal
Technologies Inc. 65
Stern Laboratories Inc..... 57

Heating, Ventilating, Air
Conditioning Systems
E.S. Fox Limited 4
Nuclear Logistics, Inc. 14

Heavy Water Plants
SNC-Lavalin OBC

Heavy Water Recovery,
(Vapour)
GE Hitachi Nuclear
Energy Canada Inc. IFC

Hot Cells and Hot Labs,
Equipment & Services
SNC-Lavalin OBC
Tetra Tech Wei Inc..... 50

Human Factors
Candesco..... 2
RCM Technologies
Canada Corp..... 22

Hydraulic Nuts & Bolts
Nova Machine Products INC
Thorburn Flex Inc. 8, 60

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Ice Plugs Control and
Monitoring Systems
Marsh
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Import & Export
Investment
Marubeni Canada Ltd.

Inspection Devices,
Remote
Babcock & Wilcox
Kinectrics Inc..... 2
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Promation Nuclear Ltd.
Rolls-Royce Civil Nuclear
Canada Ltd.
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Inspection Services
Babcock & Wilcox
Kinectrics Inc..... 2
SNC-Lavalin OBC
Structural Integrity Associates Inc
Team Industrial
Services 10

Instrumentation Seismic
Nuclear Logistics, Inc. 14
RPC Radiy
SNC-Lavalin OBC

Instrumentation,
Specialized
Avensys Solutions
Haskin Scientific Ltd.
Hitachi Canada 37
Marsh
Instrumentation Ltd..... 19
Nuclear Logistics, Inc. 14
RPC Radiy
Stern Laboratories Inc..... 57

Insurance, Nuclear
Nuclear Insurance Association
of Canada

Ion Exchangers
Babcock & Wilcox
CCI Thermal
Technologies Inc. 65
GE Hitachi Nuclear
Energy Canada Inc. IFC

Irradiation Services
McMaster Nuclear Reactor
SNC-Lavalin OBC

L

Laboratories, Analytical
ATI
Kinectrics Inc..... 2
Radiation Safety Institute
of Canada

Laboratories, Chemical
ATI

Laboratories, Critical
Heat Flux
Stern Laboratories Inc..... 57

Laboratories, Heat
Transfer
Stern Laboratories Inc..... 57

Laboratories, Hydraulic
Stern Laboratories Inc..... 57

Laboratories, Testing
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Marsh
Instrumentation Ltd..... 19
Nuclear Logistics, Inc. 14
SNC-Lavalin OBC

Laundry, Contaminated
Clothing
Unitech Services Group.... 18

Leak Detectors
Marsh
Instrumentation Ltd..... 19

Leak Testing, Sealed Sources

Radiation Safety Institute of Canada

Level Controllers, Nuclear Quality Marsh

Instrumentation Ltd...... 19
Nuclear Logistics, Inc. 14

Licensing Support

Canadian Power Utility Services Limited

Candesco..... 2
SENES Consultants Inc.
SNC-Lavalin.....OBC
Tetra Tech Wei Inc...... 50

Liquid Zone Controls

Cameco Fuel Manufacturing 16

Loss of Coolant Accident Testing

Kinectrics Inc...... 2
Nuclear Logistics, Inc. 14

M

Machining, Nuclear Quality

B.C. Instruments
Babcock & Wilcox
E.S. Fox Limited 4
Kinectrics Inc...... 2
Laker Energy Products Ltd.
Niagara Energy Products 54
Niagara Fasteners Inc.
Promation Nuclear Ltd.
Rolls-Royce Civil Nuclear Canada Ltd.
Strite Precision Machining
Thorburn Flex Inc.8, 60

Main Seam Line Break Testing

Kinectrics Inc...... 2
Nuclear Logistics, Inc. 14

Maintenance Communications

Special Electronics and Designs Inc.

Maintenance Equipment

Promation Nuclear Ltd.
SNC-LavalinOBC

Maintenance Management

Canadian Power Utility Services Limited
Eaton Industries (Canada) Company
Tetra Tech Wei Inc...... 50

Maintenance Services

Babcock & Wilcox
E.S. Fox Limited 4
SNC-LavalinOBC

Maintenance, Contract

Marsh Instrumentation Ltd...... 19

Manipulators, Remote

Babcock & Wilcox
Promation Nuclear Ltd.

Manpower Supply, Engineers and Technicians

Canadian Power Utility Services Limited
Marsh Instrumentation Ltd...... 19

Materials Handling Equipment

Promation Nuclear Ltd.
Rolls-Royce Civil Nuclear Canada Ltd.

Materials Management Services

Canadian Power Utility Services Limited
Worley Parsons

Metal Fabrications, Nuclear

Cameco Fuel Manufacturing 16
E.S. Fox Limited 4
Niagara Energy Products 54
Promation Nuclear Ltd.
Rolls-Royce Civil Nuclear Canada Ltd.
Thorburn Flex Inc.8, 60

Metal Hose Assemblies

Swagelok Central Ontario
Thorburn Flex Inc.8, 60

Metrology Calibration Test & Measurement

Kinectrics Inc...... 2
Marsh Instrumentation Ltd...... 19
SNC-LavalinOBC

Modification Installation Services

E.S. Fox Limited 4

Monitoring Systems, On-Line

Canberra Co.
Eaton Industries (Canada) Company
RPC Radiy
SNC-LavalinOBC
SWI Systemware

Monitors, Area, Gamma

Canberra Co.
LND Inc.52, 63
Physics Solutions Inc.

Monitors, Containment

SNC-LavalinOBC

Monitors, Effluent

Canberra Co.

Monitors, Radiation, General

Canberra Co.
LND Inc.52, 63
Nuvia Canada
Physics Solutions Inc.

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LND, INC. HAS THE WORLD'S LARGEST SELECTION OF STANDARD RADIATION DETECTORS

- ✓ For Specific Data Check Our Web Site
- ✓ Not On Our Website, Call or Fax
- ✓ Not A Standard, Utilize Our **35 Years Of Experience** To Assist You In The Design And Manufacture Of A Detector To Your Specifications

- GM Counters
- BF₃ Neutron Counters
- He³ Proportional Counters
- X-ray Proportional Counters
- Fission Chambers
- Neutron Beam Monitors
- Ionization Chambers
- Proton Recoil Counters
- Gas Sampling Detectors
- Position Sensitive Detectors
- Large Area α β γ Detectors

LND, INC.

3230 Lawson Blvd. • Oceanside, NY 11572
TEL: 516-678-6141 • FAX: 516-678-6704
E-mail: info@lndinc.com • Web site: www.lndinc.com



Monitors, Radiation, Portal

Canberra Co.

LND Inc.52, 63
Physics Solutions Inc.

Monitors, Radon

Physics Solutions Inc.
Radiation Safety Institute
of Canada

Monitors, Tritium

Canberra Co.
Physics Solutions Inc.

Monitors, Vibration

Tetra Tech Wei Inc...... 50

Motor Control Centres

Eaton Industries (Canada)
Company

Nuclear Logistics, Inc. 14

N

Neutron Activation Analysis Services

McMaster Nuclear Reactor

Neutron Detectors

Canberra Co.

LND Inc.52, 63

Mirion Technologies

(IST Canada) Inc. 46

Physics Solutions Inc.

SNC-LavalinOBC

Neutron Flux Mapping Systems

Mirion Technologies

(IST Canada) Inc. 46

SNC-LavalinOBC

Neutron Radiography

McMaster Nuclear Reactor

Niobium

ATI

Non-Destructive Examination

Babcock & Wilcox

Kinectrics Inc...... 2

Structural Integrity Associates Inc

Team Industrial

Services 10

Non-Destructive Testing

ATI

Babcock & Wilcox

Eclipse Scientific

Kinectrics Inc...... 2

LND Inc.52, 63

SNC-LavalinOBC

Structural Integrity Associates Inc

Team Industrial

Services 10

Non-Destructive Testing Equipment

Babcock & Wilcox

Nuclear Instrumentation Systems

Canadian Power Utility

Services Limited

Canberra Co.

Marsh

Instrumentation Ltd...... 19

RPC Radiy

Tetra Tech Wei Inc...... 50

Worley Parsons

Nuclear Medicine Equipment

B.C. Instruments

Hitachi Canada 37

Nuclear Qualified Heat Shrink Sleeving

Kanata Electronic Services
Limited

O

Oil Water Separators

CCI Thermal

Technologies Inc. 65

Operators, Nuclear Valves

Canadian Power Utility

Services Limited

Nuclear Logistics, Inc. 14

Outage Support

E.S. Fox Limited 4

Kinectrics Inc...... 2

Marsh

Instrumentation Ltd...... 19

Promation Nuclear Ltd.

SNC-LavalinOBC

Tetra Tech Wei Inc...... 50

Outsource Solutions

SWI Systemware

P

Penetrations, Containment, Electrical

GE Hitachi Nuclear

Energy Canada Inc. IFC

Mirion Technologies

(IST Canada) Inc. 46

Rolls-Royce Civil Nuclear

Canada Ltd.

SNC-LavalinOBC

Penetrations, Containment, Mechanical

Thorburn Flex Inc.8, 60

Physics Support Services

Candesco..... 2

Pipe Fittings, Nuclear Grade

Canadian Power Utility

Services Limited

EzeFlow Inc.

Laker Energy Products Ltd.

Niagara Energy

Products 54

Nuclear Logistics, Inc. 14

Promation Nuclear Ltd.

Thorburn Flex Inc.8, 60

Piping Analysis

Babcock & Wilcox

Canadian Power Utility

Services Limited

RCM Technologies

Canada Corp...... 22

SNC-LavalinOBC

Tetra Tech Wei Inc...... 50

Thorburn Flex Inc.8, 60

Worley Parsons

Piping Supports

Laker Energy Products Ltd.

Rolls-Royce Civil Nuclear

Canada Ltd.

Piping, Nuclear Grade

Babcock & Wilcox

Canadian Power Utility

Services Limited

Laker Energy Products Ltd.

Thorburn Flex Inc.8, 60

Plant Life Management Services

Canadian Power Utility Services
Limited

SNC-LavalinOBC

Tetra Tech Wei Inc...... 50

Plant Upgrades and Upgrades

Hitachi Canada 37

RCM Technologies

Canada Corp...... 22

RPC Radiy

SNC-LavalinOBC

Pneumatic Control Systems

IMI NH/CCI – IMI Critical

Engineering

Marsh

Instrumentation Ltd...... 19

Post-Accident Radiation Monitoring Systems

Mirion Technologies

(IST Canada) Inc. 46

Nuvia Canada

Power Plants, Nuclear

Hitachi Canada 37

SNC-LavalinOBC

Tetra Tech Wei Inc...... 50

Power Plants, Nuclear, Construction

E.S. Fox Limited 4

Hitachi Canada 37

SNC-LavalinOBC

Power Plants, Nuclear, Experience Information Serv

Worley Parsons

Pressurizers, Reactor

Babcock & Wilcox

Procurement Services

Canadian Power Utility Services
Limited

RCM Technologies

Canada Corp...... 22

SNC-LavalinOBC

Product Qualification & Testing

Marsh

Instrumentation Ltd...... 19

Nuclear Logistics, Inc. 14

SWI Systemware

Thorburn Flex Inc.8, 60

Project Management Services

Canadian Power Utility Services Limited

RCM Technologies

Canada Corp...... 22

SNC-LavalinOBC

SWI Systemware

Tetra Tech Wei Inc...... 50

Worley Parsons

Publications, Periodicals, Nuclear

Canadian Nuclear

Society 44

Nuclear Canada Yearbook

Pumps, Nuclear

Canadian Power Utility

Services Limited

Chempump Division of

Teikoku USA

Nuclear Logistics, Inc. 14

SIHI Pumps Limited

SNC-LavalinOBC

Pumps, Sealess

SIHI Pumps Limited

Q

Quality Assurance and Surveillance

Canadian Power Utility Services Limited

Nuclear Logistics, Inc. 14

RCM Technologies

Canada Corp...... 22

SNC-LavalinOBC

SWI Systemware

Tetra Tech Wei Inc...... 50

Worley Parsons

R

Radiation Counters

Canberra Co.

LND Inc.52, 63

Radiation Counters, Hand-held

Canberra Co.

Radiation Counting Systems

Canberra Co.

LND Inc.52, 63

Mirion Technologies

(IST Canada) Inc. 46

Radiation Detectors

Canberra Co.

LND Inc.52, 63

Mirion Technologies

(IST Canada) Inc. 46

Nuvia Canada

Physics Solutions Inc.

Radiation Health Analysis

Worley Parsons

Radioactive Sources, Calibration/Check

Canberra Co.

Radioactive Waste Management Equipment

Canberra Co.

Nuvia Canada

Rolls-Royce Civil Nuclear

Canada Ltd.

SNC-LavalinOBC

Radioactive Waste Management Services

EnergySolutions Canada

Kinectrics Inc...... 2

Nuvia Canada

SENEC Consultants Inc.

SNC-LavalinOBC

Unitech Services Group.... 18

Worley Parsons

Radioisotope Tracing Services

Worley Parsons

Radioisotopes

McMaster Nuclear Reactor

Reactor Safety Analysis

Candesco..... 2

SNC-LavalinOBC

Tetra Tech Wei Inc...... 50

Worley Parsons

Reactor Vessel Inspection

SNC-LavalinOBC

Worley Parsons

Reactor, Pressure Vessel Replacements

Babcock & Wilcox

Reactors, Power

SNC-LavalinOBC

Reactors, Research

SNC-LavalinOBC

Worley Parsons

Recombiners and Flame Arrestors

Rolls-Royce Civil Nuclear

Canada Ltd.

SNC-LavalinOBC

Recorders

Nuclear Logistics, Inc. 14

Recruitment and Placement Services

Canadian Power Utility

Services Limited

Refuelling Equipment, Reactor

SNC-LavalinOBC

Reliability And Maintainability Analysis

Babcock & Wilcox

Canadian Power Utility

Services Limited

Candesco..... 2

Kinectrics Inc...... 2

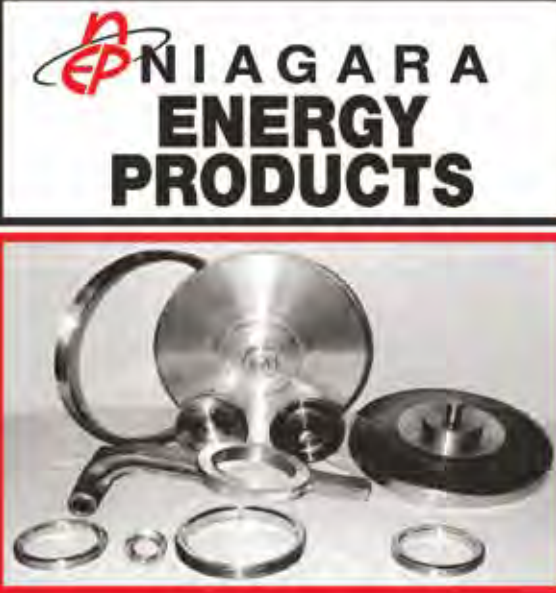
Lakeside Process Controls Ltd.

RCM Technologies

Canada Corp...... 22

SNC-LavalinOBC

Tetra Tech Wei Inc...... 50



NIAGARA ENERGY PRODUCTS

Niagara Energy Products is the official global manufacturer of all Guelph Engineering Nuclear Certified and Non-Nuclear Parts.



Remote Handling

Promation Nuclear Ltd.
Rolls-Royce Civil Nuclear
Canada Ltd.

SNC-LavalinOBC
Tetra Tech Wei Inc...... 50

Research and Development

Babcock & Wilcox

SNC-LavalinOBC
Stern Laboratories Inc...... 57
Tetra Tech Wei Inc...... 50

Resistance Temperature Detectors

Henry Controls Inc.

Nuclear Logistics, Inc. 14
RdF Corporation

Respiratory Equipment

Unitech Services Group.... 18

Restraints, Seismic

Nuclear Logistics, Inc. 14

Risk Analysis

Candesco..... 2
EcoMetrix Incorporated
Kinectrics Inc...... 2
SENES Consultants Inc.
SNC-LavalinOBC
Structural Integrity Associates Inc
Tetra Tech Wei Inc...... 50
Worley Parsons

Risk Management

Candesco..... 2
SNC-LavalinOBC
Tetra Tech Wei Inc...... 50
Worley Parsons

Robotics, Remote Handling

Babcock & Wilcox
Promation Nuclear Ltd.

SNC-LavalinOBC
Stern Laboratories Inc...... 57

S

Safety Analysis, Reactor

Canadian Power Utility
Services Limited

Candesco..... 2
RCM Technologies C
anada Corp...... 22
SNC-LavalinOBC
Tetra Tech Wei Inc...... 50

Seals, Nuclear Quality

Kanata Electronic Services
Limited

SNC-LavalinOBC

Security Systems

Canadian Power Utility
Services Limited

Tetra Tech Wei Inc...... 50

Seismic Analysis & Testing

Kinectrics Inc...... 2
Nuclear Logistics, Inc. 14
Worley Parsons

Self-Powered Nuclear Flux Detectors (Hilborn Detectors)

Mirion Technologies
(IST Canada) Inc...... 46

Sensors, Radiation Resistant

LND Inc.52, 63

Shot Peening

Metal Improvement Company
LLC, a business unit of Curtiss-
Wright Surface Technologies

Shutdown and Safety Control Systems

Marsh
Instrumentation Ltd...... 19
Mirion Technologies
(IST Canada) Inc...... 46
RPC Radiy
SWI Systemware
Tetra Tech Wei Inc...... 50

Signs, Radiation Warning

Unitech Services Group.... 18

Simulators, Training

Promation Nuclear Ltd.
Special Electronics and
Designs Inc.
SWI Systemware

Siting Analysis

SENES Consultants Inc.

Tetra Tech Wei Inc...... 50
Worley Parsons

Spare Parts Supply

GE Hitachi Nuclear
Energy Canada Inc. IFC
Hitachi Canada 37
Nova Machine Products INC
Promation Nuclear Ltd.
RCM Technologies
Canada Corp...... 22
Rolls-Royce Civil Nuclear
Canada Ltd.
SNC-LavalinOBC

Spent Fuel Baskets

E.S. Fox Limited 4
Promation Nuclear Ltd.

Spent Fuel Dry Storage Design

GE Hitachi Nuclear
Energy Canada Inc. IFC
SNC-LavalinOBC
Tetra Tech Wei Inc...... 50
Worley Parsons

Spent Fuel Services

Promation Nuclear Ltd.
SNC-LavalinOBC
Stern Laboratories Inc...... 57
Worley Parsons

Spent Fuel Shipping Containers

Babcock & Wilcox
E.S. Fox Limited 4
Niagara Energy
Products 54
Promation Nuclear Ltd.
Rolls-Royce Civil Nuclear
Canada Ltd.

Springs, Garter

Cameco Fuel
Manufacturing 16

Staffing Services

Adventis Nuclear Personnel Inc.
Canadian Power Utility
Services Limited
CTS North America

Standards, Nuclear

SWI Systemware

Start-up Services

Marsh
Instrumentation Ltd...... 19

Steam Generator Replacement

Babcock & Wilcox

SNC-LavalinOBC

Steam Generator Services

Babcock & Wilcox
Kinectrics Inc...... 2
Promation Nuclear Ltd.
SNC-LavalinOBC
Structural Integrity Associates Inc

Steam Generators, Nuclear

Babcock & Wilcox
Canadian Power Utility
Services Limited
Tetra Tech Wei Inc...... 50

Steel, Nuclear Quality

Canadian Power Utility
Services Limited
Ellwood Quality Steels Company
Laker Energy Products Ltd.
Niagara Fasteners Inc.
Nuclear Logistics, Inc. 14

Strainers, ECI Recovery

Cameco Fuel
Manufacturing 16
CCI Thermal
Technologies Inc. 65
SNC-LavalinOBC

Strainers, Heavy Water

Cameco Fuel
Manufacturing 16
CCI Thermal
Technologies Inc. 65

Strainers, Nuclear Quality

Cameco Fuel Manufacturing 16
CCI Thermal Technologies Inc. 65
Nuclear Logistics, Inc. 14
 Rolls-Royce Civil Nuclear Canada Ltd.
SNC-Lavalin OBC

Structural Analysis

Kinectrics Inc. 2
 Structural Integrity Associates Inc
Tetra Tech Wei Inc. 50
 Worley Parsons

Structural Steel, Nuclear

Laker Energy Products Ltd.
Niagara Energy Products 54

Suit Communications

Special Electronics and Designs Inc.

Support Systems, Assessment

Tetra Tech Wei Inc. 50

Surveys – Background Radiation

Nuvia Canada
 Physics Solutions Inc.
 Worley Parsons

Switches, Limit

Eaton Industries (Canada) Company
Nuclear Logistics, Inc. 14

Switches, Pressure

Nuclear Logistics, Inc. 14

Switches, Temperature

Nuclear Logistics, Inc. 14

System Integration

Marsh Instrumentation Ltd. 19
 SWI Systemware
 Worley Parsons

T

Tanks, Active Liquid Waste

E.S. Fox Limited 4

Television Systems, Nuclear Application

Mirion Technologies (IST Canada) Inc. 46

Temperature Alarm Logic Controllers

Marsh Instrumentation Ltd. 19

Tensioners, Stud & Bolt

Nova Machine Products INC

Thermal Aging

Babcock & Wilcox
Kinectrics Inc. 2
Marsh Instrumentation Ltd. 19
Nuclear Logistics, Inc. 14

Thermocouples

Henry Controls Inc.
Mirion Technologies (IST Canada) Inc. 46
 RdF Corporation

Third Party Qualifications

ATC Nuclear
 Canadian Power Utility Services Limited
Kinectrics Inc. 2
Nuclear Logistics, Inc. 14

Thorium

SNC-Lavalin OBC

Titanium

ATI

Tooling, Fuel Inspection

Stern Laboratories Inc. 57

Tooling, Rolled Joints

Promation Nuclear Ltd.

Transducers, Pressure

Avensys Solutions
Nuclear Logistics, Inc. 14

Transmitters, Nuclear

DRS Consolidated Controls Inc.
 Henry Controls Inc.
 Lakeside Process Controls Ltd.
Nuclear Logistics, Inc. 14

Transport Containers

EnergySolutions Canada

Transportation, Radioactive Materials

EnergySolutions Canada

Tritium Cartridges

Unitech Services Group 18

Tritium Extraction Equipment

SNC-Lavalin OBC
Tetra Tech Wei Inc. 50

Tritium Handling

Kinectrics Inc. 2
 Rolls-Royce Civil Nuclear Canada Ltd.
SNC-Lavalin OBC

Tritium Measuring

SNC-Lavalin OBC

Tritium Processing

Kinectrics Inc. 2
SNC-Lavalin OBC

Tube Fittings

Thorburn Flex Inc. 8, 60

Tubes, Calandria

Cameco Fuel Manufacturing 16
GE Hitachi Nuclear Energy Canada Inc. IFC
Thorburn Flex Inc. 8, 60

Tubes, Pressure

GE Hitachi Nuclear Energy Canada Inc. IFC
Thorburn Flex Inc. 8, 60

Tubes, Testing

Babcock & Wilcox
Kinectrics Inc. 2

Tubing, Condenser

Canadian Power Utility Services Limited

Tubing, Hafnium, Reactor Grade

ATI

Tubing, Heat Exchangers

ATI
 Canadian Power Utility Services Limited

Tubing, Nuclear Instrumentation

Canadian Power Utility Services Limited
 Laker Energy Products Ltd.
 Swagelok Central Ontario

Tubing, Steam Generators

Canadian Power Utility Services Limited
Thorburn Flex Inc. 8, 60

Tubing, Zircaloy, Reactor Grade

ATI
Cameco Fuel Manufacturing 16
GE Hitachi Nuclear Energy Canada Inc. IFC

Turbine/Generators

Canadian Power Utility Services Limited
Hitachi Canada 37
Thorburn Flex Inc. 8, 60

Turbines

Canadian Power Utility Services Limited
Thorburn Flex Inc. 8, 60

Type A" Containers"

Promation Nuclear Ltd.

U

Underground Engineering Services

Tetra Tech Wei Inc. 50
 Worley Parsons

Uninterruptible Power Supply Systems

Ametek Solidstate Controls Inc.
 Henry Controls Inc.



Uranium Mining & Milling

EcoMetrix Incorporated
SENES Consultants Inc.
Tetra Tech Wei Inc...... 50

Uranium, Conversion Services

Tetra Tech Wei Inc...... 50

Uranium, Exploration

Physics Solutions Inc.

UT Software

SWI Systemware

Valve Operators

Canadian Power Utility Services Limited

Nuclear Logistics, Inc. 14

V

Valve, Engineering and Testing

Babcock & Wilcox
Flowserve Flow Control
IMI NH/CCI – IMI Critical Engineering

RCM Technologies

Canada Corp...... 22
SNC-Lavalin.....OBC
Tetra Tech Wei Inc...... 50
Worley Parsons

Valves (Nuclear Quality) & Valve Repair

Armour Valve Ltd.
Babcock & Wilcox
Canadian Power Utility Services Limited
Flowserve Flow Control
IMI NH/CCI – IMI Critical Engineering
Laker Energy Products Ltd.
Lakeside Process Controls Ltd.

Niagara Energy Products 54
Nuclear Logistics, Inc. 14
SNC-Lavalin.....OBC
Swagelok Central Ontario
Team Industrial Services 10

Valves, Non-Nuclear

Armour Valve Ltd.
Canadian Power Utility Services Limited
Flowserve Flow Control
Lakeside Process Controls Ltd.
Nuclear Logistics, Inc. 14
Swagelok Central Ontario

Valves, Nuclear Quality, Solenoid

Automatic Valve
Canadian Power Utility Services Limited
Henry Controls Inc.
Lakeside Process Controls Ltd.

Vanadium

ATI
SNC-LavalinOBC

Vanadium FNX Detectors

SNC-LavalinOBC

Vessels, Pressure

Babcock & Wilcox
Canadian Power Utility Services Limited
CCI Thermal Technologies Inc. 65
E.S. Fox Limited 4
Nuclear Logistics, Inc. 14
Promation Nuclear Ltd.
RCM Technologies Canada Corp...... 22
Rolls-Royce Civil Nuclear Canada Ltd.
Thorburn Flex Inc.8, 60

Vibration

Thorburn Flex Inc.8, 60

W

Waste Handling Services

EnergySolutions Canada
SNC-LavalinOBC
Worley Parsons

Waste Management Equipment

Container Products Corporation
E.S. Fox Limited 4
EnergySolutions Canada
Promation Nuclear Ltd.
Rolls-Royce Civil Nuclear Canada Ltd.

Waste Repository Engineering

SNC-LavalinOBC
Tetra Tech Wei Inc...... 50

Water Treatment

Tetra Tech Wei Inc...... 50

Welding Services

Babcock & Wilcox
Cameco Fuel Manufacturing 16
Thorburn Flex Inc.8, 60

Welding, Automatic Tube & Pipe

Cameco Fuel Manufacturing 16
Swagelok Central Ontario
Thorburn Flex Inc.8, 60

Whole Body Contamination Monitors

Canberra Co.

Whole Body Counters

Canberra Co.

Z

Zircaloy

ATI
Cameco Fuel Manufacturing 16
SNC-LavalinOBC

Zirconium

ATI
Kinectrics Inc...... 2

We are an independent R&D Laboratory that conducts heat transfer, reliability and safety experiments for Pressurized Water Reactor (PWR), Small Modular Reactor (SMR), Boiling Water Reactor (BWR) and CANDU applications.

We perform Critical Heat Flux experiments for 5x5 and 6x6 PWR and SMR applications, full-scale 10x10 BWR applications and full-scale 28-element, 37-element and 43-element CANDU applications.

We also design, develop and manufacture specialized tools and devices for remote inspection and handling of spent nuclear fuel, including hand tools, underwater camera systems, "Chopper Tool" for removal of flux detectors.

U N E N E • R E U G N

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

What the UNENE Universities offer...

- A Master's of Engineering Degree from one of the five member universities (McMaster University, Queen's University, University of Waterloo, University of Western Ontario, and University of Ontario Institute of Technology).
- Courses are tailored to individuals already working in the nuclear industry, and are delivered on weekends in Whitby, 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 (in final approval)*. 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.

The purpose of UNENE is to assure a sustainable supply of qualified nuclear engineers and scientists to meet the current and future needs of the Canadian nuclear industry.

For more information, please:

- visit our website www.unene.ca
- email our President, Basma Shalaby
basma.shalaby@rogers.com
- email our Programme Director, Victor Snell
snellv@mcmaster.ca



U N E N E • R E U G N

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

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 custom engineered precision bellows, metallic and non-metallic expansion joints. Operating under a strategy of global presence in the Power Generating & CANDU Nuclear Industries, 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)
- Qinshan 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:

- Annulus seal bellows for calandria fuel channel
- Bellows for snout indexing mechanism & loop liner tube
- F/M head separator & linear potentiometer assemblies
- Reactivity mechanism expansion joints
- Main steam penetration & dousing expansion joints
- Containment passage expansion joints
- Pressure balanced crossover expansion joints
- Metallic & rubber expansion joints for RSW, CWC and CWS

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



Multi-Ply Bellows
made with
Inconel 625LCF

Annulus seal bellows for calandria fuel channel



Fueling machine head
separator assemblies



Bellows for snout indexing
mechanism



Miniature bellows for fuel rod flask
limit switch & rod cup seal



Loop liner tube bellows
assemblies



Pressure balanced crossover
expansion joints



Containment passage rectangular
expansion joints



Main steam penetration gimbal
expansion joints



In-line pressure balanced rubber
expansion joints

Suppliers' Addresses and Contacts



Adventis Nuclear Personnel Inc.

200 North Service Road West
Suite 309
Oakville, Ontario
L6M 2Y1
Canada
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Paul Schell
Vice President
Tel: 905-844-3001 ext. 227
Fax: 1-877-641-6295
Email: pauls@adventis.ca

Ametek HDR Power Systems

3563 Interchange Road
Columbus, Ohio
43204-1400
USA
Contact:
Carl Fabian
Tel: 614-308-5500
Fax: 614-308-5506
Email: carl.fabian@ametek.com
www.hdrpower.com
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President
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Canada
Tel: 905-871-8786
Fax: 905-877-0428
416-931-6108
Email: hci@idirect.com
www.henrycontrols.com

Ametek Solidstate Controls Inc.

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USA
Contact:
Jim Amicon
Tel: 614-846-7500
Fax: 614-885-3990
Email: jim.amicon@ametek.com
www.solidstatecontrols.com
www.nuclearups.com
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President
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L7G 4J4
Canada
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Fax: 905-877-0428
416-931-6108
Email: hci@idirect.com
www.henrycontrols.com

Armour Valve Ltd.

126 Milner Ave.
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M1S 3R2
Canada
Contact:
Jennifer Jones
Tel: 416-299-0780, ext. 126
Fax: 416-299-0394
Email: sales@armourvalve.com

ATC Nuclear

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12305
USA
Contact:
Brendan Kelly
Tel: 518-612-8945
Fax: 518-382-0283
Email: bkelly@argoturbo.com
www.argoturbo.com
Representative(s):
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President
Henry Controls Inc.
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L7G 4J4
Canada
Tel: 905-877-8786
Fax: 905-877-0428
416-931-6108
Email: hci@idirect.com

ATI

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USA
Contact:
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Tel: 1-877-777-5140
Fax: 541-967-6977
Email: nuclearenergyinquiries@atimetals.com

Automatic Valve

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48375-1922
USA
Contact:
Todd Hutchins
Tel: 248-474-6700
Fax: 248-474-6732
Email: toddh@automaticvalve.com
www.automaticvalve.com
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The Bruce A nuclear power station (photo courtesy Bruce Power)

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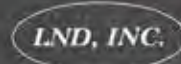


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