2018 ROMA Minister's Submission

Town of Deep River

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January 2018

IMAGE COURTESY OF BILL SEDDON

THE NEW DEEP RIVER

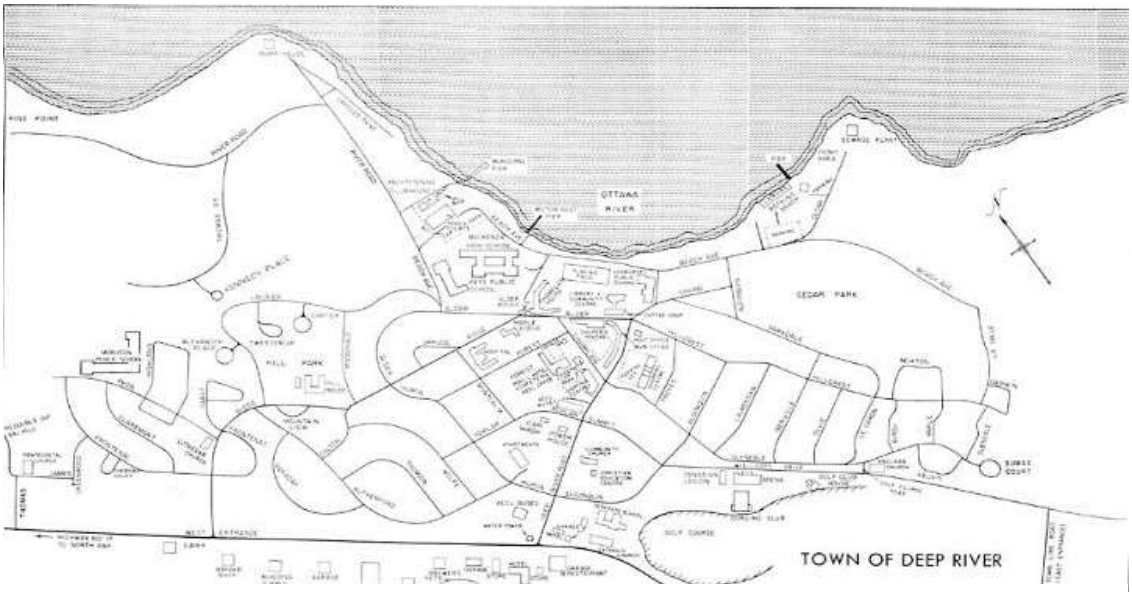
BRIEFING REPORT

History

The Town of Deep River is a lower-tier municipality in Renfrew County, located approximately midway between North Bay and Ottawa along Highway 17. It was a planned community built between 1944 and 1945 to accommodate the newly established Chalk River Nuclear Laboratories (now known as Canadian Nuclear Laboratories). The site was selected from two others for its convenient location and natural assets. Deep River was aptly named for its location next to the deepest point of the Ottawa River.

AERIAL VIEW OF THE TOWN IN 1950

The Town itself was designed by John Bland, a professor of architecture at McGill University, with the existing topography in mind. The curvilinear street layout served to discourage non-local traffic in residential areas. The Town's design maintained the area's idyllic natural beauty – a value that has been continually embraced over the years. In its early years, houses sprung up quickly



THE TOWN EXPERIENCED SIGNIFICANT GROWTH INTO THE 1970'S

and new residents poured in from across the country. Wartime houses constructed by Defense Industries Limited were transported to Deep River to accommodate its early housing needs, with more constructed over the next decade. Many staff hotels constructed by CNL have been converted into office spaces in use today.

Canadian Nuclear Laboratories

Chalk River Nuclear Laboratories were founded towards the end of World War II as an offshoot of the Manhattan Project, which produced the atomic bomb. CRL's pilot reactor, known as ZEEP, went critical in September 1945, just as the war was ending. Shortly thereafter, Atomic Energy of Canada, Limited (AECL) was formed as a Crown Corporation with the directive of continuing research and peaceful innovation in nuclear science.

In 1947, the National Research Experimental (NRE) was built. At the time, it was the world's most powerful nuclear research reactor and operated until its decommissioning in 1992. The NRE was followed by the National Research Universal (NRU) reactor, which continues to provide 60% of the world's medical radioisotopes – technology pioneered by AECL.

By the 1970's, the company's CANDU design had propagated reactors across Canada. Today these types of reactors supply 50% of Ontario's electricity and 16% of Canada's in total. CANDU reactors have also been established in India, Pakistan, Argentina, South Korea, Romania and China. In a move towards privatization, the CANDU division was sold to SNC-Lavalin in 2011. Over the years, CNL has made countless contributions to fields including healthcare, biology, chemistry, environmental science, electronics, condensed matter physics, nuclear design, safety, and waste management, and even space exploration.

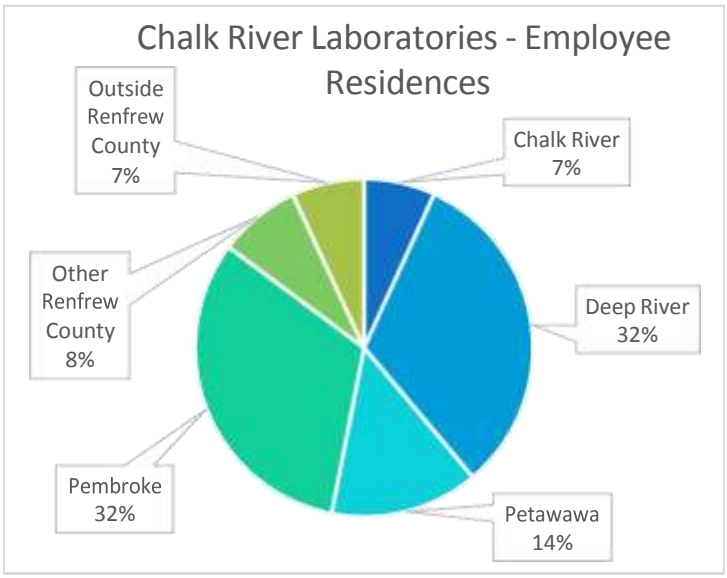
Current Picture

The Town of Deep River is dedicated to a vibrant and prosperous Canadian Nuclear Laboratories supported by Deep River and Renfrew County. CNL employs 3,200 people, with 2,900 in this area. Another 2,090 jobs may be attributed to the company's presence. Of course, the effects are much further reaching: CNL is supplied by 260 companies spanning multiple sectors, and is involved with 170 others in the nuclear industry. The facility has strengthened Canada's global competitiveness in numerous other sectors through technology, innovation, and training and development of highly skilled professionals.

As CNL transitions towards a "GoCo" (Government owned, contractor operated) model, which has led to considerable growth in similar circumstances in the UK and US, providing amenities to its employees will continue to be of utmost importance to the Town of Deep River.

In addition, the nearby Garrison Petawawa has grown substantially over the past decade. While the Town of Petawawa has prepared for this growth accordingly, Deep River's population, currently 4100, has declined slightly – a decrease of 0.5% in contrast to Petawawa's 9.1% growth! This is part of a larger trend; during the nineties, the population dropped 8% and recovered only 2% between 2001 and 2006.

Presently, a substantial number of CNL employees commute to the neighboring Pembroke and Petawawa or further for work each day, as demonstrated by the figure to the left. A general lack of development in Deep River in recent years could be to blame for this disappointing statistic.



Fortunately, the Town has much to offer in terms of existing amenities for families, as well as room for growth.

Existing Amenities

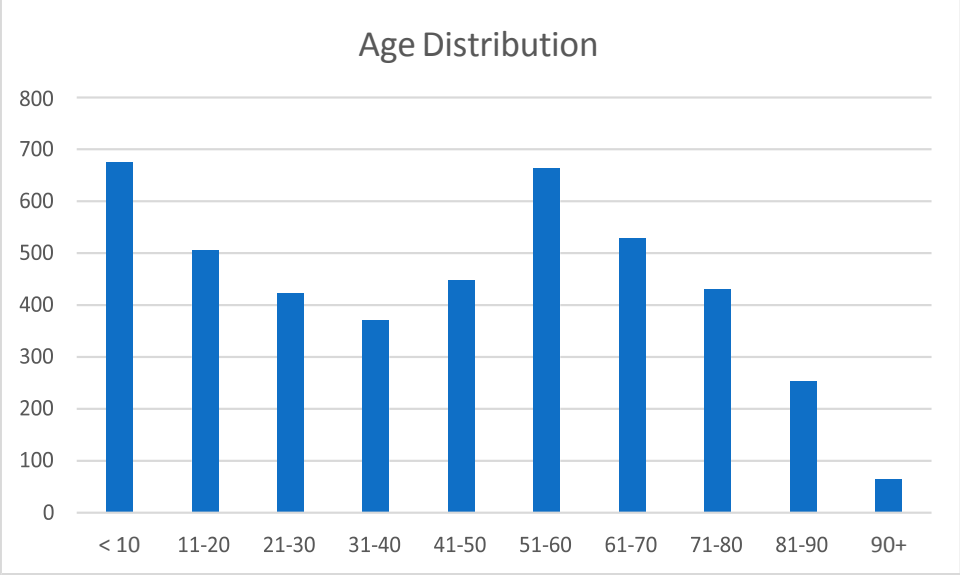
For a small community, Deep River is home to an impressive selection of independently run clubs – over 100 - including minor and adult sports teams, other athletic and outdoor activities, arts and crafts instruction, and social groups. It also boasts numerous recreational facilities, including an arena and outdoor skating rinks, a community pool, a ski hill along with miles of trails, a tennis court, marina and two beaches to complement its famous waterfront. Deep River also exhibits a low crime rate and its Mackenzie Community School is known across the province for its quality of education.

Deep River is in a strong position due to its highly educated population. A third of residents have attained a university certificate, with another 25% having a college diploma. Average family income is 18% higher than the provincial average.

Room for Growth

While Deep River has experienced a strong housing market over the past decade, at the time of this report 98 houses are on the market. This could be due to a number of factors, including uncertainty surrounding the GoCo transition, and because housing prices have been high. At the same time, staff receives numerous inquiries regarding real estate and rentals. Website traffic indicates sustained interest in this area as well.

A lack of variety has been identified as a key issue with Deep River's housing. Many of Deep River's houses were constructed when Deep River was first established, with some new development but few vacant lots to offer choice in construction. Council has also identified a need for higher-density residential development, as apartments and condominiums are in short supply. This lower-maintenance type of residence will be especially important as Deep River's population ages.



Deep River has considerable unused land between its town limits for expansion. It occupies approximately 51 square kilometers, much of which is undeveloped. This opens up the possibility of designating new residential zones without affecting Deep River's existing park and woodland spaces.

Business expansion will also be a factor in improving Deep River's attractiveness moving forward. Council has expressed an interest in diversifying Deep River's economic base by promoting tourism and encouraging industrial and commercial development. One key issue in attracting new residents is the lack of employment opportunities for spouses and teenagers.

Is Canada backing away from the Science and Technology Economy?

January 2018

The National Research Universal Reactor (NRU) and the Canadian Neutron Beam Centre at the Canadian Nuclear Laboratories (CNL) in Chalk River, Ontario are scheduled to close permanently on March 31, 2018. Following that date, Canada will become the only country among 30 countries with nuclear power reactors that does not have a supporting research reactor. With a Nobel Prize, CANDU support, and the production of medical isotopes, all directly attributed to NRU, the question begs to be asked…"What will replace NRU and how can a national laboratory continue groundbreaking research without a multi-purpose research reactor?

National Research Universal Reactor

The plain truth is, there is no technical reason for closing NRU and the Canadian Neutron Beam Centre on March 31st Atomic Energy of Canada Limited (AECL) is confident that NRU is reliable, safe and licensable until at least 2021, 47 years after replacement of the reactor vessel in 1974. A stroke of the pen could rescind the imminent shutdown and allow plenty of time to seriously consider replacing the reactor vessel for another 25 years or longer. It's been done before, and there is no insurmountable barrier to doing it again. The 15 month repair to the vessel from May 2009 to August 2010 was an incredible technical achievement, and proves beyond doubt that Chalk River's dedicated staff can rise to the occasion when required.

The reality is someone or something has been trying to shut NRU down since the year 2010. This agenda appears to be deeply rooted within both of the major political parties. When you bump up against an illogical agenda such as this, you can't help but ask….. is it simply a matter of risk aversion and loss of confidence in AECL following a litany of financial losses and other problems: the MAPLE reactor fiasco and resulting dispute with Nordion, the 15 month shutdown of NRU and costly repair, overspent budgets, a long history of subsidizing the isotope business and decades accumulation of liquid HEU/fission-product waste, or is this an exercise similar to the eradication of the Canadian Aerospace industry in the 1950's, when the AVRO Arrow project was arbitrarily eliminated overnight? It appears the only difference is the slow and painful closure of NUR, and the decommissioning agenda underway at the Chalk River Laboratories. While those in favour of eliminating NRU will tell you that there are alternatives to the NRU, the truth is this is the beginning of Canada backing away from the nuclear economy and all of the technological breakthroughs that will be discovered in the future.

AVRO Arrow in Barry's Bay, ON

For example the Government awarded $60 million to several Canadian universities to develop a new method of producing the medical isotope Tc99m directly, without Mo/Tc generators. Using medical cyclotrons the goal was to build enough cyclotrons to supply Canada only; and following prototype development, private investors would finance commercial production facilities. However, because of the Tc-99m six hour half-life, distribution would be limited to large regional hospitals, while the rural population and northern indigenous people would continue to depend on costly imported M0-99 generators. It's a minimal, band-aid solution - technically feasible, but many years away from large-scale commercial deployment. In contrast, one 250 kW NRU Mo-99 target rod per day or one 250 kW CANDU target bundle per day from an industrial radiopharmacy at either reactor site could supply more than three times the anticipated global demand for Mo/Tc generators in the year 2021.

Canada consumes approximately 4% of the global demand for Tc-99m; and to supply Canada's nuclear medicine hospitals would require at least 20 cyclotrons. The expected global demand in 2021 is 40 million unit doses per year, which would supply only 15% of the world population.

With more than 111,000 jobs in Canada attributed to the nuclear economy, there could well be job loss and an economic downturn in this industry. Canada is at a crossroads and needs a visionary leader to step in and reverse the decision to close NRU prematurely. The only person that can reverse this decision at this point is Prime Minister Justin Trudeau! Standing up for Canada and Canadian innovation and job growth will extend the life of NRU and institute a sustainable plan to ensure that Canada has a multi-purpose national research reactor at the Chalk River Laboratories to maintain and grow new jobs in the science and research knowledge based economy. It is never too late for the Prime Minister to exercise his executive authority unless Canada truly is backing away from the science and technology economy.

Harriet Brooks material science laboratory

At the ceremonial opening of the Harriet Brooks material science laboratory in October 2016, the Ottawa Citizen quoted Natural Resources Minister Jim Carr: "**This is more than science for science's sake",** followed by the headline: '**Chalk River opens new nuclear lab with focus on practical applications'.** The Ottawa Citizen article noted that the new laboratory won't do research in the fundamental file d of nuclear physics known as "basic" research. Again quoting the Minister: "**Your efforts have practical applications, real value, and enduring benefits".** In response, one of the last scientists to do basic research at Chalk River took issue with the Minister's remarks. John Hardy, whose group was shut down in 1997, now leads a research group at Texas A&M University that does basic research with a superconducting cyclotron.

“Good science is never for ‘science’s sake’; its goal is to increase human understanding of how the world works. All the practical applications that governments love couldn’t exist without the basic discoveries that are required first,” he said in an email.. “I find it ironic that Harriet Brooks, for whom the new building has been named, was herself a basic researcher in nuclear physics, who was active 100 years ago, long before anyone imagined that there could be applications for something as esoteric as the atomic nucleus.

And finally, Nobel Prizes matter. At Bell Labs, between 1937 and 2009, no less than eight Nobel Prizes in basic physics and chemistry were awarded to that remarkable group of scientific pioneers. Their achievements in basic research launched the electronic revolution – the transistor in 1947, the first computer utilizing transistors in 1954, the first solar battery in 1956, the laser in 1958, the communications satellite in 1966, digital photography in 1974 and many more.

March 31 will come quickly, so act quickly Canada, or look back at the demise of NRU as one of Canada’s greatest political failures. Don’t relinquish our world standing as leader in the nuclear research and innovation sector. Provide the neutrons, and Chalk River’s outstanding scientists, engineers and tradesmen will deliver the neutronic revolution. A ten-year moratorium would be a tragic and unnecessary mistake.

John Hilborn
Physicist
AECL retired

National Research Universal

One of the largest and most versatile research reactors in the world

This reactor was a landmark achievement in Canadian science and technology when it went into service on November 3, 1957. Five decades later, NRU continues to play a key role in advancing the quality of life of Canadians and people around the world.

The NRU reactor was built for three purposes: to be a supplier of industrial and medical radioisotopes used for the diagnosis and treatment of life-threatening diseases; to be a major Canadian facility for neutron physics research, and to provide engineering research and development support for CANDU® power reactors.

NRU also houses the centre for neutron beam research in Canada and is one of the few research reactors in the world available for commercial use. Neutrons produced by the NRU for CNL's Canadian Neutron Beam Centre, are used to investigate and non-destructively study all types of industrial and biological materials. More than 200 professors, students and industrial researchers come to NRU every year to make use of this national resource. By using neutrons to probe materials, in-depth research can be performed on metals, alloys, polymers, biomaterials, glass, ceramics, thin films, cement and minerals. This work leads to advances in medical, industrial and scientific fields that benefit all Canadians.

NRU has the honour of being the workplace of Canadian physicist Dr. Bertram Brockhouse, who won the Nobel Prize in Physics in 1994. Using neutron scattering to explore materials, he invented a new, highly sophisticated neutron instrument known as a triple axis spectrometer. These are now standard instruments at every neutron laboratory throughout the world.

As one of the world's most versatile research reactors, NRU also produced the fundamental knowledge required to develop, maintain and evolve Canada's fleet of CANDU power stations. While NRU doesn't produce electricity, it is Canada's only major materials and fuel testing reactor used to support and advance the CANDU design.

NRU contains testing equipment that allows scientists and engineers to replicate a power reactor's working conditions. This allows them to apply that knowledge to building safer and more efficient CANDU technology for use in Canada and abroad.

As a unique and powerful world class facility, NRU serves as a cornerstone of the Canadian nuclear industry, producing the fundamental knowledge required to develop, maintain and evolve Canada's fleet of CANDU power stations. The work done at NRU is leading to advances in medical, industrial and scientific fields to the benefit of all Canadians.

Technical Overview

The NRU reactor operates at power levels up to 135 megawatts (thermal). It operates consistently at an annual capacity factor of 80 per cent.

The reactor is re-fuelled at power. The core is contained in an aluminum cylindrical tank approximately 3.7 metres (12.1 feet) high and 3.5 metres (11.5 feet) in diameter. It is made up of 227 vertical lattice sites arranged in a hexagonal array with a pitch of 19.7 centimetres (7.75 inches). Control rods and enriched uranium fuel rods occupy about half of the lattice sites; the remaining sites are for low temperature/low-pressure experiments and irradiations. Two high-pressure/high-temperature experimental loops and six beam tube facilities are also available.

Source: http://www.cnl.ca/en/home/facilities-and-expertise/nru/default.aspx

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THE NUCLEAR SECTOR AT A CROSSROADS: FOSTERING INNOVATION AND ENERGY SECURITY FOR CANADA AND THE WORLD

Report of the Standing Committee on Natural Resources

James Maloney
Chair

JUNE 2017

42nd PARLIAMENT, 1st SESSION

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THE STANDING COMMITTEE ON NATURAL RESOURCES

has the honour to present its

FIFTH REPORT

Pursuant to its mandate under Standing Order 108(2), the Committee has studied The Future of Canada's Oil and Gas, Mining and Nuclear Sectors: Innovation, Sustainable Solutions and Economic Opportunities and has agreed to report the following:

THE NUCLEAR SECTOR AT A CROSSROADS: FOSTERING INNOVATION AND ENERGY SECURITY FOR CANADA AND THE WORLD

INTRODUCTION

Canadian leadership in the nuclear sector dates back to the Second World War. Canada's Nobel-Prize winning Chalk River laboratories have been at the forefront of nuclear research and development (R&D) and innovation for over 60 years. The first sustained criticality outside of the United States occurred at Chalk River in 1945. Moreover, the laboratories are the birthplace of the world-renowned Candu reactor, and the site of Canada's leading research reactor, the National Research Universal (NRU), which has been used for a wide range of research, medical and industrial applications since 1957. Chalk River also provided the research and facilities for breakthroughs in the application of medical isotopes, including cobalt-60, used for cancer therapy.[1]

Canada's nuclear industry contributes more than $6 billion every year to the national gross domestic product (GDP), and employs 30,000 Canadians directly and another 30,000 indirectly. It covers the full range of nuclear expertise, from R&D to uranium mining and fuel fabrication, reactor design, plant construction, maintenance, waste management and decommissioning. In addition to the Chalk River laboratories, there are several research reactors and facilities across Canada, contributing to advancements in energy, physics, engineering, medicine, chemistry and biology, among other fields. Canada is also the world's second largest uranium producer, with one of the world's richest uranium ores located in Saskatchewan. Canadian reactors rely exclusively on domestic uranium mined in northern Saskatchewan and processed in Ontario, and 95% of Saskatchewan's uranium is exported to support nuclear power generation in other countries. Finally, Canada's Candu reactor technology and expertise are deployed worldwide, including 19 operating Candu reactors at home (accounting for approximately 16% of the national electricity mix) and 30 operating reactors in other countries.[2]

The Canadian nuclear sector has undergone several major changes over the past few years, namely the restructuring of Atomic Energy of Canada Limited, including the sale of the corporation's Candu division and the creation of the Canadian National Laboratories; the decision to permanently shut down the NRU by 2018; and the initiation of a number of plans and proposals with implications for Canada's economy, energy security, environment, public health, international leadership and exports. In light of these changes – and as part of its broader study entitled *The Future of Canada's Oil and Gas,*

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1 Standing Committee on Natural Resources (RNNR), *Evidence*, 1st Session, 42nd Parliament, 17 November 2016 (Richard Sexton, Acting Chief Transition Officer, Atomic Energy of Canada Limited); *Evidence*, 1st Session, 42nd Parliament, 22 November 2016 (Jerry Hopwood, President, University Network of Excellence in Nuclear Engineering)

2 RNNR, *Evidence*, 1st Session, 42nd Parliament, 15 November 2016 (Niall O'Dea, Director General, Electricity Resources Branch, Energy Sector, Natural Resources Canada); *Evidence* (Sexton, AECL).

Mining and Nuclear Sectors: Innovation, Sustainable Solutions and Economic Opportunities – the Standing Committee on Natural Resources ("the Committee") invited a wide range of experts from government, industry and civil society in order to investigate the overall state of the Canadian nuclear industry.

In this report, the Committee's findings are organized according to four themes: 1) considerations regarding the governance, safety and waste management of nuclear material and/or facilities in Canada; 2) the state of the nuclear energy industry in Canada and abroad; 3) the future of Canadian nuclear R&D; and 4) recommendations to the Government of Canada. The Committee is pleased to present its report, which concludes its study on the nuclear sector.

GOVERNANCE, SAFETY AND WASTE MANAGEMENT

The regulation of nuclear material and activities falls under the jurisdiction of the federal government, while the decision to invest in nuclear power generation is determined by the provinces.[3] The following two organizations report to the Parliament of Canada through the Minister of Natural Resources:

- The Canadian Nuclear Safety Commission (CNSC): Established under the *Nuclear Safety and Control Act*, the CNSC is an independent, quasi-judicial administrative tribunal that regulates all nuclear products and activities in Canada, including uranium mining, fuel fabrication, power generation, the production and use of medical isotopes, site decommissioning and remediation, and nuclear waste management. As an agent of the Crown, the Commission also has a responsibility to meet the duty to consult, and where appropriate, accommodate Indigenous peoples.[4]

- Atomic Energy of Canada Limited (AECL): Established in 1952, AECL is a federal Crown corporation with a twofold mandate: 1) enabling nuclear science and technology to support the federal government and industry; and 2) managing Canada's radioactive waste and decommissioning liabilities.[5]

The following sections discuss three topics related to governance and safety in Canada's nuclear sector, based on evidence from the witnesses: 1) the recent restructuring of AECL; 2) the Environment Commissioner's 2016 audit of the CNSC; and 3) the main plans and proposals addressing nuclear waste management and site decommissioning in Canada.

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3 RNNR, *Evidence* (O'Dea, NRCan).

4 RNNR, *Evidence*, 1st Session, 42nd Parliament, 17 November 2016 (Michael M. Binder, President and Chief Executive Officer, Canadian Nuclear Safety Commission).

5 RNNR, *Evidence* (Sexton, AECL).

In their discussion of the sector's new governance structure, some witnesses offered suggestions on how the CNL's new GoCo model can be improved. For example, the Committee heard that the nuclear industry, especially small companies, would benefit from more affordable access to the CNL's equipment and services. According to John Robinson of Tyne Engineering, "CNL now is being forced to lend out its services almost as a private industry." He told the Committee that the organization has equipment and expertise that most small companies could not develop on their own, adding that his company "can't pay CNL prices that are four and five times the prices that [they] use in [their] own offices." Mr. Robinson recommended that the CNL work more collaboratively with small nuclear companies, instead of competing with them.[11]

Moreover, Steven Schumann of the International Union of Operating Engineers criticized the GoCo labour agreement for not allowing employees to continue their participation in the public service pension plan (PSPP). He stated that CNL workers "will no longer be considered government employees, although the facility remains owned by the Government of Canada." Mr. Schumann explained that all employees will be moved to a new pension plan that is currently under negotiation; if an agreement is not made by September 2018, they will have to subscribe to a previously-set "defined contribution pension plan," as opposed to the "defined benefit plan" under the PSPP.[12]

B. The Environment Commissioner's 2016 Audit of the Canadian Nuclear Safety Commission

In 2016, the Commissioner of the Environment and Sustainable Development (CESD) conducted an audit of select CNSC site inspections of nuclear power plants. Environment Commissioner Julie Gelfand summarized the outcome of the audit as follows:

> In our audit, we found that the Commission conducted 226 site inspections of nuclear power plants that it had planned over the two-year period that we looked at. [...] We then looked very closely at 42 site inspections and found that the majority of them had non-compliances, so when the inspections were done, non-compliances were found. However, we found that the commission followed up with the licensees, the operators, 100% of the time. Every time there was a non-compliance, the Commission was on it. The commission therefore ensured that all the issues were being addressed, so that was a tick on the good side for the Commission. However, we found that it was unclear whether the Canadian Nuclear Safety Commission was conducting the appropriate number and type of inspections, because its planning process was not very well documented. The Commission could not show that planning was rigorous, systematic, and risk-based to verify that nuclear facilities were complying with all regulations [...]
>
> Overall, our audit concluded that the Commission could not show that it adequately managed its site inspections of nuclear power plants. We did make a number of recommendations to the commission, including to implement a well-documented, systematic, and risk-based planning process, a five-year plan with a minimum number of inspections – not a potential list of inspections – that followed their own procedures,

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11 RNNR, *Evidence*, 1st Session, 42nd Parliament, 1 December 2016 (John Robinson, Chief Executive Officer, Tyne Engineering).

12 RNNR, *Evidence*, 1st Session, 42nd Parliament, 8 December 2016 (Steven Schumann, Canadian Government Affairs Director, International Union of Operating Engineers).

> meaning with approved inspection guides for every inspection. The Commission agreed with our recommendations, and its responses are published in our audit report. I also understand and have seen that the Commission has posted an action plan on its website, indicating that it has already started to address our recommendations.[13]

Michael Binder of the CNSC confirmed that the Commission "accepted the findings of the audit and took immediate corrective action."[14] Furthermore, Mr. O'Dea told the Committee that three of the five concerns that the CESD raised have already been addressed.[15]

C. Waste Management and Decommissioning

Canada is signatory to the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*, which stipulates that radioactive waste should be recognized as the "ultimate responsibility of the state" and should be disposed of in the state in which it was generated.[16] In 2002, the Nuclear Waste Management Organization (NWMO) was established as a requirement of the federal *Nuclear Fuel Waste Act* with a mandate to design and implement a long-term management plan for used nuclear fuel in Canada. In 2005, the NWMO proposed the "adaptive phased management" (APM) approach, which includes the development of a deep geological repository (DGR) for the long-term isolation of Canada's used fuel in "an informed and willing host community." Optimized for used Candu fuel, the DGR can be manufactured domestically and can be used by companies seeking to export Canadian expertise and materials to manage Candu fuel waste in other countries. The APM was formally selected by the Government of Canada in June 2007.[17]

In May 2010, the NWMO initiated the site selection process for the proposed DGR. By the end of 2016, nine Ontario communities were being considered as potential hosts for the project.[18] According to a NWMO document submitted to the Committee on 30 November 2016:

> The NWMO has a multi-year, multi-phased assessment process that is aimed at selecting a single site that will meet or exceed regulatory requirements for safety. There must also be a compelling demonstration that the community is informed and willing to host the project. The NWMO has committed that the project will only proceed with the involvement of the interested community, First Nation and Métis communities in the area, and surrounding communities, working in partnership to implement it.[19]

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13 RNNR, *Evidence*, 1st Session, 42nd Parliament, 24 November 2016 (Julie Gelfand, Commissioner of the Environment and Sustainable Development, Office of the Auditor General of Canada).

14 RNNR, *Evidence* (Binder, CNSC).

15 RNNR, *Evidence* (O'Dea, NRCan).

16 RNNR, *Evidence*, 1st Session, 42nd Parliament, 1 December 2016 (Richard Wiens, Director, Strategic Supply, Gamma Technologies, Nordion).

17 RNNR, *Evidence*, 1st Session, 42nd Parliament, 24 November 2016 (Laurie Swami, President and Chief Executive Officer, Nuclear Waste Management Organization).

18 RNNR, *Evidence* (Swami, NWMO); *Evidence* (O'Dea, NRCan).

19 NWMO, Submission (30 November 2016).

From 2002 to 2015, the NWMO spent $329,576,062 on advancing Canada's long-term nuclear used fuel management plan.[20] The $22-billion DGR project is expected to be in service between 2040 and 2045.[21]

The Committee heard that there is international consensus that DGRs are the best and safest mechanism for the long-term management of spent nuclear fuel.[22] Richard Wiens of Nordion urged the government to consider including other types of waste in the APM plan, namely the spent sources of cobalt-60 used in Nordion's facility (a total volume of approximately 15 cubic metres). The NWMO's current mandate restricts the plan to spent fuel only.[23]

Ontario Power Generation (OPG) is also proposing the construction of a DGR at Bruce County, for the storage of low- and intermediate-level nuclear waste from their province. According to Glen Jager of OPG, the project and site have been subjected to "a rigorous environmental and approvals process for nearly 16 years, [...and] nearly a decade of scrutiny, public hearings, and input from local residents." He told the Committee that various independent assessments concluded that the proposed facility and management plan would be safe, adding that "every study or review has concluded that DGR would not cause any adverse effects to the environment or Lake Huron." Furthermore, Mr. Jager stated that over 70% of residents in the communities that were considered for the project were in favour of OPG's waste plan, "specifically the DGR."[24] A joint review panel, established in 2012 by the Ontario Minister of the Environment and the president of the CNSC to study the proposal, recommended that the project proceed.[25]

OPG's proposed DGR site is part of the traditional territory of the Saugeen Ojibway Nation (SON). Mr. Jager told the Committee that the ongoing discussions with the SON have been progressing well, and that OPG has committed that the project would not proceed without the First Nation's concurrence: "Notwithstanding that, they absolutely have a veto."[26] Meanwhile, OPG continues to seek environmental assessment (EA) approval for the project.[27]

The witnesses discussed other waste management and decommissioning plans in the sector, including the CNL's plans to decommission over 120 structures at Chalk River in order to make way for new capital projects needed to revitalize the laboratories;[28] CNL's proposal to construct a near surface disposal facility at Chalk River for operation

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20 *Ibid.*

21 RNNR, *Evidence* (Swami, NWMO); *Evidence* (O'Dea, NRCan).

22 RNNR, *Evidence* (Binder, CNSC); *Evidence* (Swami, NWMO); *Evidence*, 1st Session, 42nd Parliament, 24 November 2016 (Glenn Jager, President and Chief Nuclear Officer, Ontario Power Generation Inc.).

23 RNNR, *Evidence* (Wiens, Nordion).

24 RNNR, *Evidence* (Jager, OPG).

25 RNNR, *Evidence* (O'Dea, NRCan).

26 RNNR, *Evidence* (Jager, OPG).

27 RNNR, *Evidence* (O'Dea, NRCan).

28 RNNR, *Evidence* (Lesinski, CNL).

by 2020;[29] AECL's estimated $8 billion in federal liability for the Chalk River and Whiteshell sites, which contain some buildings that were internally contaminated over the course of 60 years of research;[30] as well as plans to decommission retired reactors, including the Douglas Point reactor in Ontario and the Gentilly-1 reactor in Quebec.[31] The Committee heard that Canada has an opportunity to develop decommissioning expertise and technologies for future domestic and international applications, by using some of its retired reactors as "test beds" to gain experience in the field.[32] Mr. Robinson pointed out that Canada is currently decommissioning some of the oldest reactors in the world, a situation that will eventually appear in other countries. He stated that "[developing] decommissioning technologies now [will] reap economic benefits in the future."[33]

AN ENERGY INDUSTRY FOR CANADA AND THE WORLD

The following sections discuss three aspects of Canada's nuclear energy sector, based on evidence from the witnesses: 1) nuclear power generation and reactor refurbishment plans in Canada, 2) the state of the Candu industry, and 3) Canada's potential role in developing next-generation nuclear technologies, namely advanced reactors (ARs).

A. Nuclear Power Generation in Canada

Nuclear energy constitutes approximately 16% of Canada's electricity mix, including over 50% and about 30% of the electricity supply in Ontario and New Brunswick respectively.[34] As a non-emitting source of steady, baseload power, it has been recognized by G7 leaders as a key contributor to greenhouse gas (GHG) emission reduction and climate change mitigation.[35] In Ontario, the fleet of six nuclear reactors has enabled the province to phase out coal power, nearly eliminating GHG emission from its electricity sector.[36] Several witnesses highlighted the role of nuclear energy in helping Canada meet its climate change commitments and baseload demand for electricity.[37]

There are currently 19 operating nuclear reactors in 4 power facilities in Canada: Bruce Power (8 units), Pickering (6 units) and Darlington (4 units) in Ontario, and the Point

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29 RNNR, *Evidence* (O'Dea, NRCan).

30 RNNR, *Evidence* (Sexton, AECL).

31 RNNR, *Evidence*, 1st Session, 42nd Parliament, 8 December 2016 (Gordon Edwards, President, Canadian Coalition for Nuclear Responsibility).

32 RNNR, *Evidence* (Edwards, CCNR).

33 RNNR, *Evidence*, 1st Session, 42nd Parliament, 1 December 2016 (Vince Robinson, Tyne Engineering).

34 RNNR, *Evidence* (O'Dea, NRCan).

35 *Ibid.*

36 RNNR, *Evidence* (Jager, OPG); *Evidence*, 1st Session, 42nd Parliament, 15 November 2016 (Colin Hunt, Secretary, Canadian Nuclear Society).

37 RNNR, *Evidence*, 1st Session, 42nd Parliament, 13 December 2016 (Brett Plummer, Chief Nuclear Officer and Vice-President Nuclear, New Brunswick Power Corporation); *Evidence*, 1st Session, 42nd Parliament, 1 December 2016 (Justin Hannah, Director, Marketing, Strategy and External Relations, SNC-Lavalin International); *Evidence* (Jager, OPG); *Evidence* (Hopwood, UNENE).

Lepreau facility (1 unit) in New Brunswick. In 2008, New Brunswick's 600-megawatt Candu 6 reactor underwent refurbishment to extend its operating life for an additional 25 to 30 years.[38] Despite cost overruns, Brett Plummer of the New Brunswick Power Corporation told the Committee that the station's refurbishment will have long-term benefits for the province:

> In terms of the refurbishment cost, the overruns were $1.4 billion. The energy replacement cost was $1 billion. Those costs are incorporated into the price of Point Lepreau over the life of the plant. The cost of the life of the plant is still 8.3¢ per kilowatt, which is extremely competitive [...] Point Lepreau is set up to run for another 35 to 40-plus years of non-emitting electricity for the province of New Brunswick. It's a huge baseload for New Brunswickers.[39]

The nuclear energy industry is currently focused on extending the lifespan of 10 power generating reactors at Ontario's Bruce Power and Darlington sites by up to 30 years. According to NRCan, the $25-billion investment "could create 14,000 jobs over the next 10-year refurbishment period."[40] Furthermore, the Committee heard the following with regards to each site:

- At the Bruce Power site, refurbishments over the next 20 years are expected to provide 5,000 direct and indirect jobs annually, representing $980 million to $1.2 billion in labour income into the Ontario economy, in addition to $751 million to $1.07 billion in annual economic benefit through equipment, supplies and materials both directly and indirectly. Furthermore, the site is expected to create and sustain 22,000 direct and indirect jobs annually through 2064, "while creating $4 billion in annual Ontario economic benefit through the direct and indirect spending on operational equipment, supplies, materials and labour income."[41]

- At the Darlington site, the mid-life refurbishment of four nuclear reactors, which account for 20% of Ontario's power supply, is expected to cost $12.8 billion over a 10-year period. By extending the station's operational life to 2055, the project is "the equivalent of removing two million cars from Ontario's roads per year," and will contribute an estimated $89.9 billion to the provincial GDP (based on estimates from the Conference Board of Canada).[42] Moreover, it will create jobs for "thousands of skilled trades workers [...] and provide an opportunity for apprentices to gain valuable work experience."[43]

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38 RNNR, *Evidence* (Plummer, NB Power).

39 *Ibid.*

40 RNNR, *Evidence* (O'Dea, NRCan).

41 Bruce Power, *The Role of Nuclear: Present and Future* (17 November 2016).

42 RNNR, *Evidence* (Jager, OPG).

43 RNNR, *Evidence* (Schumann, IUOE).

support for the refurbishment of existing nuclear power plants in Ontario has been consistent, "[running] well above 80%."[51]

Despite being cost-competitive in the long-term, the high up-front capital cost of nuclear projects was identified as a major barrier to the development of new nuclear generating capacity in Canada.[52] According to Mr. O'Dea, the competitiveness of nuclear energy requires "a long-term vision and specific energy strategies, since we need to make profitable the significant initial investment required for nuclear energy." He explained that such investment becomes competitive over time, because most nuclear facilities can last for 60 years or longer.[53] On the other hand, Shawn-Patrick Stensil of Greenpeace told the Committee that the costs of nuclear energy "have only ever risen, [while] renewable costs are declining rapidly." He advised government to consider more opportunities in the renewable energy sector.[54]

B. The State of the Candu Industry

The Canadian Deuterium Uranium (Candu) Reactor is a world-renowned Canadian invention that was developed in the 1950s by AECL, in cooperation with industry, and remains one of the single largest R&D investments ever made by the Canadian government.[55] The Committee heard that the state of Candu technology remains strong both in Canada and internationally,[56] and that new international Candu sales could have significant economic benefits for Canada. Justin Hannah of SNC-Lavalin told the Committee that his company recently commissioned the Conference Board of Canada to conduct a study on the potential economic impact of exporting two new Candu reactors; the Board estimated the impact to be "up to 37,000 person-years of employment, with a net GDP increase of approximately $3.8 billion."[57]

Candu technology has already been exported to China, India, Pakistan, South Korea, Romania, and Argentina. Furthermore, SNC-Lavalin is pursuing potential new-build opportunities in Argentina (1 unit), Romania (2 units), the United Kingdom (4 units) and China (2 units).[58] According to Mr. Hannah, the joint Canadian-Chinese development project of Advanced Fuel Candu Reactors (AFCRs) is of special interest:

> The project is aimed at adapting the unique design of the Candu reactor to utilize recycled uranium fuel, and in the longer term, thorium. This significant innovation positions the AFCR as a more sustainable nuclear solution through its ability to consume spent nuclear fuel and to reduce overall waste volume by 30% to 40%. It will also allow

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51 *Ibid.*

52 RNNR, *Evidence* (O'Dea, NRCan).

53 *Ibid.*

54 RNNR, *Evidence*, 1st Session, 42nd Parliament 8 December 2016 (Shawn-Patrick Stensil, Nuclear Analyst, Greenpeace Canada).

55 RNNR, *Evidence* (Hannah, SNC-Lavalin).

56 RNNR, *Evidence* (Hunt, Canadian Nuclear Society).

57 RNNR, *Evidence* (Hannah, SNC-Lavalin).

58 *Ibid.*

> China to expand its nuclear fleet while reducing dependence on imported uranium and coal-fired electricity, all while meeting the highest safety standards and environmental protections. [In September 2016], SNC-Lavalin and [the China National Nuclear Corporation] signed a joint venture agreement in Ottawa, in the presence of the Prime Minister and Chinese Premier Li, to signify the bilateral commitment [...] to further progress this innovative technology.[59]

Mr. Hannah added that SNC-Lavalin is positioning the AFCR as a synergistic technology with China's existing light-water reactor fleet. He explained that China is expected to build about 150 reactors over the next 20 years, and that SNC-Lavalin has shown that the optimal deployment ratio for AFCRs consuming recycled uranium is 4:1 (i.e., 20 AFCR units for each 100 reactors).[60]

According to Mr. O'Dea, the biggest opportunities for the Canadian industry are overseas, especially in growing economies like India's and China's where wide systems of nuclear power plants are on the horizon. He added that other countries, such as Romania and Poland, are aiming to increase their energy independence, and have already expressed interest in importing Canadian nuclear technologies.[61] Canada has signed international nuclear co-operation agreements and MOUs with several countries, including China, India, the United States, and the United Kingdom.[62]

To maximize on the industry's international economic opportunities, Mr. Hannah recommended that the government extend the export credits that have historically supported Candu exports to include the full supply chain of Canadian nuclear exports and international operations.[63] He stated that the availability of export credit will have "a direct correlation to [the industry's] economic impact, because it allows offshore clients to [...] procure or purchase Canadian goods and services from Canada, to the benefit of Canadian exporters."[64]

The Committee also heard of Candu spinoff technologies and industries with R&D potential. Examples include nascent reactor designs with the ability to recycle spent Candu fuel, and spinoff industries that use helium-3, a by-product of the decay of tritium, to create sensitive neutron detectors.[65] According to Mr. Jager, nascent reactors that can run on spent Candu fuel are still in an early development stage; they require fuel reprocessing capabilities, which are currently not available in Canada.[66] Rick Holt of Queen's University

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59 *Ibid.*

60 *Ibid.*

61 RNNR, *Evidence* (O'Dea, NRCan).

62 *Ibid.*

63 RNNR, *Evidence* (Hannah, SNC-Lavalin); RNNR, *Evidence* (Oberth, OCI).

64 RNNR, *Evidence* (Hannah, SNC-Lavalin).

65 RNNR, *Evidence*, 1st Session, 42nd Parliament, 1 December 2016 (Mark Daymond, Professor, Mechanical and Materials Engineering, Queen's University); *Evidence* (Robinson, Tyne Engineering); *Evidence* (Plummer, NB Power); *Evidence* (Austin, Cameco).

66 RNNR, *Evidence* (Jager, OPG).

told the Committee that advancing Candu technologies beyond the current systems requires long-term investments from government.[67]

C. Advanced Reactor Technologies

The Committee heard that nuclear technologies are still in their early stage of development. According to Jerry Hopwood of the University Network of Excellence in Nuclear Engineering (UNENE), even though Canada has been developing nuclear energy since the 1940s, there is much prospect to refine current technologies and make them more beneficial and widely applicable.[68] Furthermore, Simon Irish of Terrestrial Energy highlighted the potential of industry-led advanced reactor (ARs) design, explaining that ARs are smaller, less expensive and simpler to build compared to current commercial reactors, and have the potential to reduce civilian nuclear energy waste by more than 95%.[69] He argued that ARs represent an opportunity for Canada to increase industrial competitiveness and support economic growth, while helping meet its climate goals and maintain its international leadership role in the production and export of nuclear technology.[70] Professor Glen Harvel of the University of Ontario Institute of Technology told the Committee that the success of advanced nuclear reactors will ultimately depend on the capital and operational cost of each reactor unit.[71]

The following sections discuss three types of advanced reactors that were brought to the Committee's attention: small modular reactors (SMRs), fusion nuclear reactors, and the integral molten salt reactor (IMSR).

1. Small Modular Reactors

The term "small modular reactor" refers to a size of reactor, typically less than 300 megawatt electric,[72] rather than a type of technology. The Committee heard that SMRs could be used to generate non-emitting power in off-grid communities and sites,[73] or to supply urban households with stable, low-emission energy in lieu of larger, more capital-intensive nuclear plants.[74] The anticipated socioeconomic benefits of SMRs include: 1) providing a cost-effective, low-emission baseload energy source for northern/remote communities and resource development sites across Canada; 2) reducing the country's overall reliance on fossil fuels, and thus greenhouse gas emissions;

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67 RNNR, *Evidence*, 1st Session, 42nd Parliament, 1 December 2016 (Rick Holt, Professor Emeritus, Mechanical and Materials Engineering, Queen's University).

68 RNNR, *Evidence* (Hopwood, UNENE).

69 RNNR, *Evidence*, 1st Session, 42nd Parliament, 29 November 2016 (Simon Irish, Chief Executive, Director, Terrestrial Energy Inc.).

70 RNNR, *Evidence* (Irish, Terrestrial Energy).

71 RNNR, *Evidence* (Harvel, UOIT).

72 Terrestrial Energy, The Nuclear Choices Facing Canadians (9 December 2016).

73 RNNR, *Evidence* (Hunt, Canadian Nuclear Society); *Evidence*, 1st Session, 42nd Parliament, 17 November 2016 (John Barrett, President and Chief Executive Officer, Canadian Nuclear Association).

74 RNNR, *Evidence* (Jager, OPG).

3) maintaining Canada's international leadership position in nuclear energy and security; and 4) helping meet Canada's climate goals and commitments to mission innovation in COP 21.[75]

The Committee heard that Canada is uniquely positioned to benefit from developing SMRs for two main reasons: 1) existing expertise in nuclear technology development, including "a performance-based regulator able to incorporate different types of technologies in its reviews;" and 2) an existing market for SMRs, including remote communities and natural resource development operations that would benefit from alternatives to fossil fuels such as diesel.[76] Furthermore, Mr. Lesinski of the CNL told the Committee that SMRs, and vSMRs (i.e., very small modular reactors of 1-50 megawatt electric), are gaining appeal in leading nuclear nations, and thus represent an opportunity for Canada "to take a leadership role in the development of this versatile technology."[77] He added that seizing these opportunities would require the government to establish a goal of having a demonstration SMR or vSMR in Canada within the next 10 years.[78] Mr. Stensil was more sceptical of the potential of SMRs. In reference to remote communities in Canada, he advised governments to consider other alternatives to diesel, namely renewable micro-grids, stating that "to get to a good decision, we need to have both options on the table, and right now [...] the only options we have are SMRs against diesel."[79]

While some SMRs have already been built,[80] the technology is still short of wide-scale commercialization.[81] The CNL is proposing a 10-year plan that would see the commissioning of a demonstration SMR or vSMR by year nine for an estimated total cost of $600 million. As Mr. Lesinksi explained:

> The notional funding profile, which would be further refined if there were interest in pursuing this proposal, calls for modest investment of approximately $15 million in the first two years to conduct a request for expressions of interest, or RFEOI, that would serve to gather concrete information on the following: the level of interest in the private sector; the technologies available, together with their merits and risks; the potential for risk sharing with investors and technology vendors; opportunities for cost sharing and alternative financing arrangements; stakeholder and first nations interest; and potential host communities, among others. This initiative could be managed and overseen by AECL, with CNL as a service provider, so that AECL, as the government's adviser on nuclear technology could properly assess overall value to Canada.[82]

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75 RNNR, *Evidence* (Lesinski, CNL); *Evidence* (Hunt, Canadian Nuclear Society).

76 RNNR, *Evidence* (O'Dea, NRCan).

77 RNNR, *Evidence* (Lesinski, CNL).

78 *Ibid.*

79 RNNR, *Evidence* (Stensil, Greenpeace).

80 RNNR, *Evidence* (Hopwood, UNENE).

81 RNNR, *Evidence* (Jager, OPG).

82 RNNR, *Evidence* (Lesinski, CNL).

Richard Sexton of AECL told the Committee that one of the main challenges facing SMRs is that there are currently over 100 different designs with potential for commercialization. He added that the Chalk River Laboratories could help both government and commercial companies identify the most appropriate technologies to pursue.[83] According to Mr. Binder, by the end of 2016, "five SMR vendors have engaged the CNSC in vendor design reviews to verify, at a high level, if the design meets regulatory requirements and to identify any fundamental barriers."[84]

In 2016, Sustainable Development Technology Canada (SDTC) provided $5.7 million for the development of Terrestrial Energy's SMR-related project. Furthermore, NRCan has partnered with the Government of Ontario to study the feasibility of different small modular reactor (SMR) technologies, and has funded a study by the Fedoruk Centre on Aboriginal attitudes toward nuclear energy to better understand the potential application of SMRs in remote communities.[85]

2. Fusion Nuclear Reactors

Nuclear fusion is a process whereby hydrogen atoms are fused together at high temperatures and pressures to create energy. According to Michael Delage of General Fusion, it is a non-emitting process that relies on an abundant fuel source (i.e., hydrogen) and produces large amounts of energy: "one kilogram of fusion fuel produces the same amount of energy as roughly 10,000 tonnes of coal."[86]

In a supporting document submitted to the Committee on 16 January 2017, General Fusion outlines Canada's long history of R&D in fusion energy:

> In the 1960's, recognition of the potential of fusion energy led to the establishment of a number of groups studying plasma physics and fusion energy, particularly at the Universities of British Columbia, Alberta, Saskatchewan, Toronto and Institut National de la Recherche Scientifique (INRS) in Montreal. All of these were major players in the field in the 1970's and 1980's. In addition, the Laser-Plasma group at the National Research Council (NRC) became a significant player in laser fusion related studies during this period. These activities eventually led to the establishment of a Canadian fusion energy program in the 1980's with the construction and operation of the Tokamak de Varennes (TdeV) in Quebec and the Canadian Fusion Fuels Technology Project (CFFTP) in Ontario, led by Ontario Hydro (the provincial electric power utility) and Atomic Energy of Canada Limited (AECL). Canada was also an initial member of the development group for ITER.[87]

The document adds that, even though the federal government cancelled the national fusion energy program in the mid-1990s, "there is still significant core expertise

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83 RNNR, *Evidence* (Sexton, AECL).

84 RNNR, *Evidence* (Binder, CNSC).

85 RNNR, *Evidence* (O'Dea, NRCan).

86 RNNR, *Evidence*, 1st Session, 42nd Parliament, 29 November 2016 (Michael Delage, Vice-President of Technology and Corporate Strategy, General Fusion).

87 Fusion Energy, *Fusion 2030: Roadmap for Canada* (16 January 2017).

remaining in a few of the groups which now can be used to start a new effort to finally achieve fusion energy [in Canada]." Canadian innovative capacity is evidenced by existing expertise in magnetic and laser fusion energy technologies in Saskatchwan and Alberta; world leading expertise in tritium technology, fusion fuels, and neutron-material interactions at the CNL and various universities in Ontario; as well as expertise in supporting areas, such as materials and nano-materials development, in several universities in Quebec and Ontario.[88]

According to General Fusion, a new Canadian National Fusion Program would require "an initial investment of approximately $25M per year over the first five years from the federal government, matched by additional provincial contributions." Subsequently, such efforts would lead to "an initial assessment review in 2020 to determine the path forward to an engineering "demo" fusion system, to be operational by 2030."[89] SDTC has recently provided General Fusion's reactor project with two rounds of funding: $13.9 million in 2009 and $12.7 million in 2016.[90]

3. The Integral Molten Salt Reactor

Another advanced reactor design that was presented to the Committee is the integral molten salt reactor (IMSR) – a 400 megawatt thermal, non-emitting, molten fluoride salt reactor system, fuelled by low enriched uranium. According to a brief provided by Terrestrial Energy to the Committee on 9 December 2016, the IMSR's key innovation is "the integration of the primary components of the reactor core into a sealed and replaceable vessel that has an operating life of seven years." Such design choice avoids the challenges related to material lifetime that often impede early deployment. Furthermore, the IMSR is the only commercial scale reactor to operate on a liquid fuelled system (i.e., using molten salt, as opposed to conventional solid fuels), a feature that enhances the reactor's safety profile by allowing heat from the fission process to dissipate through convection in the salt mixture, thereby eliminating the need for the pressurized water coolants used in solid-fuelled systems. Terrestrial Energy describes the IMSR to be a "walk-away safe" reactor: "even if all power to the system failed and no human were present at the plant, the reaction would shut down and the reactor would cool quietly on its own."[91]

In the words of Mr. Irish, "the IMSR promises to give industry a better product, industrial heat that is not tethered to grid or pipeline." It can be used for various applications in markets around the world – for example, to fuel natural resource extraction, petrochemical production and desalination activities, or to back up wind and solar power in lieu of natural gas. According to Mr. Irish, Terrestrial Energy is on track with its plans to

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88 *Ibid.*

89 *Ibid.*

90 RNNR, *Evidence* (O'Dea, NRCan).

91 Terrestrial Energy, *The Nuclear Choices Facing Canadians* (9 December 2016).

license, construct, and commission the $2-billion IMSR project, which could become "the first commercial advanced nuclear power plant in the world."[92]

CANADIAN RESEARCH BEYOND THE NATIONAL RESEARCH UNIVERSAL

The Committee heard that the impending closure of the nearly 60-year-old NRU in 2018 is one of the main challenges facing the Canadian nuclear R&D sector.[93] As a large research reactor, the NRU has been a reliable source of high-flux neutrons used in a wide range of medical and industrial sectors, including the production of medical isotopes for diagnosis and treatment of various cancers and cardiovascular diseases (among others),[94] and to conduct research with applications in the environment, agriculture and natural resource sectors.[95] According to Christopher Heysel of McMaster University, neutrons are "especially important for research into materials sciences because they penetrate deep into materials and provide information about interior structures of matter at the atomic level." This function is important for developing advanced materials for diverse products, including clean energy technologies, high-efficiency engines, and information technology hardware.[96] Furthermore, Dr. Jean Koclas of the École Polytechnique de Montréal explained that access to a reliable neutron source is essential for the future of the Candu industry. He stated the following:

> The only place in Canada where advanced materials for the future of the Candu reactor can be studied with confidence is when we have a high neutron flux in a high volume, not in a very small location but in a very large core area where conditions resemble what we have in nuclear power plants. You need this type of facility to conduct such research. You also need a larger research reactor to accommodate actual fuel from Candu reactors. In the absence of a large research reactor in our country, we will have to send fuel designs outside of the country. It should be clear to anyone that the facilities outside this country do not provide what is required to restore fuel in the complete fuel bundle of a Candu reactor; they can only provide small parts. It means that in the medium to long term, the Canadian way of dealing with nuclear power plants will simply get off the grid in global terms. We will not be able to go from generation II reactors, which we have now, to generation III, and even less so, for generation IV.[97]

Mr. Hunt told the Committee that "unless the supply of high-flux neutrons is addressed by the Government of Canada, over the long term there is a risk that nuclear expertise in Canada must diminish."[98] The NRU shutdown is expected to displace approximately 250 Canadian neutron beam researchers that may have to change their

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92 RNNR, *Evidence* (Irish, Terrestrial Energy).

93 RNNR, *Evidence*, 1st Session, 42nd Parliament, 22 November 2016 (Christopher Heysel, Director, Nuclear Operations and Facilities, McMaster Nuclear Reactor, McMaster University).

94 RNNR, *Evidence* (Barrett, Canadian Nuclear Association).

95 RNNR, *Evidence* (Heysel, McMaster University).

96 *Ibid.*

97 RNNR, *Evidence*, 1st Session, 42nd Parliament, 22 November 2016 (Jean Koclas, Professor, Nuclear Engineering Institute, Engineering Physics Department, École Polytechnique de Montréal).

98 RNNR, *Evidence* (Hunt, Canadian Nuclear Society).

research area, or relocate to other countries to access neutron sources.[99] According to Ron Oberth of the Organization of Canadian Nuclear Industries (OCNI), OCNI members are already looking to collaborate with international facilities "that can do some of the things NRU does to ensure that [they] continue to support [the nuclear] industry with constructive and valuable R&D."[100]

The Committee heard of several plans and proposals to supplant the NRU functions in the short-, medium- or long-term. Examples include:

- **The revitalization of the Chalk River laboratories**: In 2015, the federal government committed $800 million over five years to revitalize the Chalk River Labs.[101] Furthermore, CNL's Vision 2026 is expected to transform the Chalk River Campus into "a world-class, right-sized and sustainable nuclear laboratory delivering science and technology, structured to meet current and adapt to changing Canadian federal, commercial, and public priorities."[102] A major new facility for testing a variety of materials and processes, the Harriet Brooks Building, named for Canada's first female nuclear physicist, was recently inaugurated at the labs.[103] Other facilities are being planned.[104]

- **Increasing the power and operating time of other reactors**: The McMaster University reactor is planning to increase its power and operating time to address the gap in nuclear research and medical isotope production. In addition to housing Canada's second most powerful research reactor after the NRU, the McMaster facility is complemented by a new cyclotron facility that produces fluorine-18 (a medical isotope used for cancer diagnosis), and a new, industrial-size, post-irradiation examination hot cell facility where researchers can test highly radioactive materials, such as components from Canada's nuclear power plants. The Committee heard that the McMaster option is a "viable, medium-term solution" to keep Canada through a neutron gap until another large neutron source is developed.[105]

- **Alternative technologies to produce medical isotopes**: The federal government has invested in the development of alternative technologies to produce medical isotopes, including cyclotrons and linear accelerators. The Sherbrooke centre in Quebec, which has been one of the recipients of such funding, is expected to move into the commercial stage by the spring or

99 RNNR, *Evidence* (Heysel, McMaster University).

100 RNNR, *Evidence* (Oberth, OCNI).

101 RNNR, *Evidence* (O'Dea, NRCan).

102 RNNR, *Evidence* (Lesinski, CNL).

103 RNNR, *Evidence* (O'Dea, NRCan).

104 RNNR, *Evidence* (Sexton, AECL).

105 RNNR, *Evidence* (Heysel, McMaster University).

summer of 2018.[106] Furthermore, Nordion and Bruce Power are working to develop alternative ways to produce the kind of high specific activity cobalt previously produced at the NRU.[107] Their plan is to replace "a good portion" of the isotope, currently produced at Chalk River, by the first quarter of 2019. Accelerator-based isotopes can supply only local markets due to their short half-life.[108]

- **TRIUMF's proposed Institute for Advanced Medical Isotopes** (IAMI): TRIUMF, a leading developer of accelerator technology in Canada, is proposing the creation of a new institute that would produce next-generation isotopes for treating cancer and other diseases.[109] According to TRIUMF, IAMI will provide the infrastructure necessary to keep the organization's laboratory, and by extension Canada, at the cutting edge of innovation in nuclear medicine. TRIUMF and its regional research partners (i.e., the University of British Columbia, the BC Cancer Agency, and Simon Fraser University) are requesting $12.25M each from the federal and provincial governments for the capital construction of the facility.[110]

- **Requests for a new source of high-flux neutrons**: Some witnesses recommended that the government find a long-term source of high-flux neutrons for research purposes, namely by building a new reactor or upgrading an existing reactor to replace the NRU's functions.[111] According to Mr. Heysel, the McMaster facility could be refurbished to be a large neutron source to support Canadian research. However, its application for funding through the Canada Foundation for Innovation's major science initiatives program was not considered "on the grounds that neutron-based research activities remain a responsibility of the federal government through NRCan."[112] One of the main recommendations of the 2009 report of the Expert Review Panel on Medical Isotope Production is to build a new nuclear reactor to replace the NRU.[113]

The Committee heard that the future of Canadian nuclear R&D requires long-term investment in the sector. Aside from university-based research, Mark Daymond of Queen's University told the Committee that industry-sponsored R&D takes place in few

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106 RNNR, *Evidence*, 1st Session, 42nd Parliament, 22 November 2016 (Éric Turcotte, Associate Professor, Department of Nuclear Medicine and Radiation Biology, Université de Sherbrooke).

107 RNNR, *Evidence*, 1st Session, 42nd Parliament, 24 November 2016 (James Scongack, Vice-President, Corporate Affairs, Bruce Power); RNNR, *Evidence* (Oberth, OCI).

108 RNNR, *Evidence* (Scongack, Bruce Power).

109 RNNR, *Evidence*, 1st Session, 42nd Parliament, 1 December 2016 (Jonathan Bagger, Director, TRIUMF).

110 TRIUMF, *Protecting Canada's Global Leadership in Nuclear Innovation and Technology* (1 December 2016)

111 RNNR, *Evidence* (Koclas, École Polytechnique de Montréal); *Evidence* (Turcotte, Université de Sherbrooke); *Evidence* (Heysel, McMaster University).

112 RNNR, *Evidence* (Heysel, McMaster University).

113 RNNR, *Evidence* (Turcotte, Université de Sherbrooke).

organizations, drawing on a "somewhat diminishing pool of funds." Dr. Daymond urged the federal and provincial (Ontario) governments to signal a long-term intent to pursue nuclear technology in order to sustain the future development of the sector in Canada.[114] Similarly, Mr. Austin stated that "it's apparent that if there isn't further investment in nuclear innovation, R&D, and technology development, the competitive advantage that Canada currently has all across the nuclear value chain is not going to be there in the years to come."[115]

The Committee also heard that the nuclear industry would benefit from more focused funding. For example, according to Professor Harvel, current R&D funding, which covers Canada's full nuclear industry spectrum, ends up being too spread out, leading to "marginal improvements in each area, as opposed to significant advancements in maybe some key focus areas." He expressed the need for more focus, particularly in cases of competing technologies that require large capital investment to be developed.[116] Furthermore, Mr. Robinson stated that "the strength in the Canadian nuclear industry over the years was primarily due to some focal points in R&D, such as the NRU reactor and the fusion industry." Mr. Robinson suggested that the government focus its investment on small and medium industries that can create commercially viable products.[117]

Other witnesses advised governments against focusing their funding on specific programs or technologies, calling for policies that support nuclear R&D, while allowing industry experts to decide where to invest most strategically.[118] While agreeing that current R&D funding is somewhat diluted and that nuclear research tends to be rather scattered, Dr. Éric Turcotte of the Université de Sherbrooke argued that funding various research groups helps maintain leadership in a competitive R&D environment. He stated that "if a decision was made in the nuclear sector to concentrate everything within a single centre, all the other centres would close within one or two years, and that would be catastrophic."[119] Mr. Delage expressed a similar view with regards to investment in different advanced reactor technologies; he favoured a strategy of "watering many flowers," adding that the need for larger investments in specific technologies is still a few years ahead of the current state of R&D.[120] Lianne Ing of Bubble Technology Industries was also supportive of policies – namely, the federal Scientific Research and Experimental Development (SRED) Tax Incentive Program – that allow companies to decide on what technologies are best suited for their business markets. She stated the following:

> It is very difficult to predict what is going to be the next disruptive technology. It is disruptive because people aren't expecting it to happen. When government tries to pick

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114 RNNR, *Evidence* (Daymond, Queen's University).

115 RNNR, *Evidence* (Austin, Cameco).

116 RNNR, *Evidence* (Harvel, UOIT).

117 RNNR, *Evidence* (Robinson, V., Tyne Engineering).

118 RNNR, *Evidence* (Irish, Terrestrial Energy); *Evidence*, 1st Session, 42nd Parliament, 29 November 2016 (Lianne Ing, Vice-President, Bubble Technology Industries Inc.); *Evidence* (Delage, General Fusion).

119 RNNR, *Evidence* (Turcotte, Université de Sherbrooke).

120 RNNR, *Evidence* (Delage, General Fusion).

> winners by focusing funding into very specific technology selections, there's a possibility that you end up undermining a small company that might be on the verge of some remarkable breakthrough. We think the SRED tax incentive program is very good in that it allows us to decide what sort of research we think our company should pursue.[121]

Ms. Ing's only criticism of the SRED program was that it no longer covers capital expenditure. She stated that many research projects are capital-equipment-intensive and require significant investment by businesses; "having no support for capital expenditures [makes] it difficult for companies to compete in the high-tech sector."[122]

RECOMMENDATIONS

Based on the evidence presented in the previous sections, the Committee recommends the following:

1) **The Committee recommends that the Government of Canada work with industry, Indigenous governments and communities, provincial/territorial governments, and international partners to ensure that Canada's nuclear sector continues to advance its rigorous regulatory and safety practices by:**

   a) **continuing to invest in research and development (R&D) and innovations to advance the sector's safety profile, including its operations and waste management practices in Canada and abroad;**

   b) **ensuring that enough financial securities are available to address the impacts of any unexpected nuclear incident or accident on public safety, health and/or the environment; and**

   c) **staying abreast of international developments in the fields of nuclear safety and waste management.**

2) **The Committee recommends that the Government of Canada continue its support for Canadian nuclear R&D and innovation in the short, medium and long term, by:**

   a) **considering long-term options to provide a reliable, high-flux neutron source for Canadian researchers;**

   b) **working in collaboration with industry, especially small companies, to ensure that researchers and experts have access to the services and infrastructure they need to excel in their innovation and R&D pursuits; and**

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121 RNNR, *Evidence* (Ing, Bubble Technology).

122 *Ibid.*

c) working with industry, the healthcare community and provincial/territorial governments to ensure that the Canadian supply of medical isotopes remains uninterrupted in the short, medium and long term.

3) The Committee recommends that the Government of Canada continue to support the development and commercialization of Canadian nuclear technologies in Canada and abroad by:

   a) continuing to provide funding that applies to the full spectrum of the sector's operations, while allowing industry experts the flexibility to invest these funds according to their business needs and market research; and

   b) providing financial support to help small businesses cover their capital expenditures for large projects (e.g., through the federal Scientific Research and Experimental Development program).

4) The Committee recommends that the Government of Canada continue to work with industry, Indigenous governments and communities, provincial/territorial governments, as well as international partners to promote and advance Canadian leadership in nuclear power generation technologies at home and abroad by:

   a) addressing any knowledge gaps or misinformation pertaining to Canadian nuclear products and technologies;

   b) providing industry with the necessary regulatory and/or diplomatic resources to support their international exports and operations; and

   c) considering the expansion of export credits to include the full scope of Canadian nuclear exports.

5) The Committee recommends that the Government of Canada work in collaboration with industry, the academic community, Indigenous governments and communities, and provincial/territorial governments to sustain and improve Canadian expertise in the nuclear sector by:

   a) supporting efforts by Canadian universities and research/training organizations to build new facilities and equipment and/or to advance education and research in areas that benefit the sector's development;

   b) supporting programs that can train the high-skilled professionals needed to operate the full spectrum of the sector's activities, including nuclear fuel development and transport; reactor construction, operation, maintenance, refurbishment and inspection; as well as waste management and decommissioning operations; and

c) supporting programs that can train the high-skilled professionals needed to develop future nuclear technologies and industries, namely spin-off Candu technologies and advanced nuclear reactors.

6) The Committee recommends that the Government of Canada continue to support the development of small modular reactors (SMRs), recognizing the potential for SMRs to provide clean and reliable power to remote and northern communities and open new areas to economically valuable resource development.

7) The Committee recommends that industry, along with academia and innovators, establish a nuclear innovation council with representatives from the federal and provincial governments to leverage non-power applications (e.g., for health care, agriculture, manufacturing, etc.) of the nuclear sector for national benefit.

APPENDIX A
LIST OF WITNESSES

Organizations and Individuals	Date	Meeting
Canadian Nuclear Society	2016/11/15	32
Peter Easton, Director of Communications		
Colin Hunt, Secretary		
Department of Natural Resources	2016/11/15	32
Sharonne Katz, Acting Director Nuclear Energy Division, Electricity Resources Branch, Energy Sector		
Dave McCauley, Director Uranium and Radioactive Waste Division, Electricity Resources Branch, Energy Sector		
Niall O'Dea, Director General Electricity Resources Branch, Energy Sector		
Atomic Energy of Canada Limited	2016/11/17	33
Shannon Quinn, Vice-President Science, Technology and Commercial Oversight		
Richard Sexton, Acting Chief Transition Officer		
Canadian Nuclear Association		
John Barrett, President and Chief Executive Officer		
Canadian Nuclear Safety Commission		
Michael M. Binder, President and Chief Executive Officer		
Ramzi Jammal, Executive Vice-President and Chief Regulatory Operations Officer		
Organization of Canadian Nuclear Industries		
Ron Oberth, President and Chief Executive Officer		
École Polytechnique de Montréal	2016/11/22	34
Jean Koclas, Professor Nuclear Engineering Institute, Engineering Physics Department		
McMaster University		
Andrea Armstrong, Research Associate McMaster Nuclear Reactor		
Christopher Heysel, Director Nuclear Operations and Facilities, McMaster Nuclear Reactor		
Karin Stephenson, Manager, Commercial Operations McMaster Nuclear Reactor		
Université de Sherbrooke		
Eric Turcotte, Associate Professor Department of Nuclear Medicine and Radiation Biology		

Organizations and Individuals	Date	Meeting
University Network of Excellence in Nuclear Engineering	2016/11/22	34
Jerry Hopwood, President		
University of Ontario Institute of Technology		
Glenn Harvel, Associate Dean Faculty of Energy Systems and Nuclear Science		
Bruce Power	2016/11/24	35
James Scongack, Vice-President Corporate Affairs		
Nuclear Waste Management Organization		
Elena Mantagaris, Director, Government and External Relations		
Laurie Swami, President and Chief Executive Officer		
Derek Wilson, Vice-President		
Office of the Auditor General		
John Affleck, Principal		
Julie Gelfand, Commissioner of the Environment and Sustainable Development		
Ontario Power Generation Inc.		
Glenn Jager, President and Chief Nuclear Officer		
Bubble Technology Industries Inc.	2016/11/29	36
Lianne Ing, Vice-President		
Cameco Corporation		
Dale Austin, Manager Government Relations		
CANDU Owners Group Inc.		
Fred Dermarkar, President and Chief Executive Officer		
General Fusion		
Michael Delage, Vice-President of Technology and Corporate Strategy		
Terrestrial Energy Inc.		
Simon Irish, Chief Executive		
Nordion	2016/12/01	37
Emily Craven, Marketing Manager		
Richard Wiens, Director, Strategic Supply Gamma Technologies		
Queen's University		
Mark Daymond, Professor Mechanical and Materials Engineering		
Rick Holt, Professor Emeritus		

Organizations and Individuals	Date	Meeting
Mechanical and Materials Engineering		
SNC-Lavalin International	2016/12/01	37
Justin Hannah, Director Marketing, Strategy and External Relations		
TRIUMF		
Jonathan Bagger, Director		
Tyne Engineering		
Vince Robinson, President		
John Robinson, Chief Executive Officer		
Canadian Coalition for Nuclear Responsibility	2016/12/08	39
Gordon Edwards, President		
Greenpeace Canada		
Shawn-Patrick Stensil, Nuclear Analyst		
International Union of Operating Engineers		
Steven Schumann, Canadian Government Affairs Director		
Aecon Construction Group Inc.	2016/12/13	40
James Gandhi, Director, Business Development		
Canadian Nuclear Laboratories		
Mark Lesinski, President and Chief Executive Officer		
Lou Riccoboni, Vice President Corporate Affairs		
New Brunswick Power Corporation		
Kathleen Duguay, Manager Community Affairs and Nuclear Regulatory Protocol		
Brett Plummer, Chief Nuclear Officer and Vice-President Nuclear		

APPENDIX B
LIST OF BRIEFS

Organizations and Individuals
Bruce Power
General Fusion
Greenpeace Canada
Terrestrial Energy Inc.
TRIUMF

REQUEST FOR GOVERNMENT RESPONSE

Pursuant to Standing Order 109, the Committee requests that the government table a comprehensive response to this Report.

A copy of the relevant *Minutes of Proceedings* (Meetings Nos. 32, 33, 34, 35, 36, 37, 39, 40) is tabled.

Respectfully submitted,

James Maloney
Chair

Supplementary Opinion of the New Democratic Party

The nuclear energy and research sector is a large sector that many hard-working Canadians depend on for employment, energy and medical needs. We would like to thank our colleagues on the Natural Resources committee from the Liberal and Conservative parties for working together on this study in a constructive and collegial manner. As a result of that work, we believe this report is a strong reflection of our many shared concerns for this sector.

We do, however, have some areas of concern that require a stronger response or more attention. We have approached this study with some guiding principles that we believe are important to be reflected in this report. One of those principles is ensuring that government agencies and watchdogs are properly fulfilling their mandates, completely and with full transparency. When a government oversight body is not reaching that level of expectation, Canadians start to lose faith in that body's effectiveness, independence and ability to protect the Canadian public. We have seen how these kinds of issues have effected the National Energy Board over time, and it would behoove other government agencies to try to avoid those same pitfalls.

The Canadian Nuclear Safety Commission (CNSC)has a very serious and important role to fulfill in the oversight of Canada's nuclear sector and to ensure that Canadians are protected through proper regulation of said sector. Unfortunately, the effectiveness of the CNSC was brought into serious doubt in the Fall 2016 report of the Environment Commissioner, who audited the work of the CNSC. As the Commissioner noted in her testimony, "it was unclear whether the CNSC was conducting the appropriate number and type of inspections, because its planning process was not very well documented." She also noted that the CNSC "could not show that planning was rigorous, systematic, and risk-based to verify that nuclear facilities were complying with all regulations."

The concerns raised by the Environment Commissioner echo concerns raised by CNSC whistleblowers in a July 2016 letter. Unfortunately, when this letter was made public, the

head of the CNSC, Dr. Michael Binder, dismissed its significance. As various media reports stated, at a CNSC public meeting on Wednesday August 17th, 2016, Dr. Binder openly questioned if the whistleblower letter was in fact genuine and from CNSC staff. He further went on to joke that this may be part of a conspiracy theory. Further to this, the CNSC indicated that a written submission from Greenpeace, which included Access to Information documents lending support to some of the whistleblower allegations, would not be accepted or be considered. This is despite the fact that the CNSC has put their unsolicited submissions on the record at past meetings. These actions do not help the CNSC nor do they build public confidence in the institution.

When Dr. Binder testified before the committee, Mr. Cannings specifically asked if "CNSC ever publicly released an assessment of the off-site consequences of a Fukushima-scale radioactive release at a Canadian nuclear plant, yes or no?" Dr. Binder answered in the affirmative and then tabled a document with the committee which was purported to be what Mr. Cannings had requested. But the committee later received correspondence from Dr. Sunil Nijhawan which refuted Dr. Binder's testimony and the document Dr. Binder tabled with the committee. His letter stated that the report that Dr. Binder tabled "did not in fact consider the offsite effects of a "Fukushima-scale radioactive release" requested by Mr. Cannings."

During testimony before the committee, Shawn-Patrick Stensil of Greenpeace testified to the importance of this information. He stated the following:

> "...because for emergency planning purposes we should be ready for worst-case scenarios. That's what other countries such as Germany and Belgium have done since Fukushima. They've actually modelled these types of accidents and asked what they need to be ready for off-site, so that they can protect the public.
>
> The CNSC, at hearings in 2012 and 2013, heard from hundreds of Ontarians that we need to look at these types of studies, whatever you think about the nuclear industry, to better our emergency plans. They've consistently dodged modelling a

> Fukushima-scale accident and done a lot of—I don't know—bafflegab to avoid actually addressing the question.
>
> This goes back to your original question about the CNSC. It really worries me that they haven't been direct with the public about that."

Finally, during her testimony before the committee, the Environment Commissioner indicated that CNSC "was quite difficult to work with" and stated that CSNC "was aggressive" with auditors from the CNSC. She went on to say that "If you look at the Canadian Nuclear Safety Commission's response, you will see there is a kind of code. It says it agrees with our findings, but that it will continue on as before and that it is doing everything correctly."

This sort of approach from CNSC is, in our opinion, inappropriate from a national regulator. It is inappropriate for a national regulator to thumb its nose at officers of Parliament or at elected Members of Parliament, all who serve the people. This approach risks further eroding public confidence in the Canadian nuclear industry, at no fault of the industry itself.

Upon their election, the current government promised to clean up government, make it more transparent and open, and to bring "sunny ways" to our country. Unfortunately, recent controversy with the leadership of the CNSC is casting a cloud that is contrary to the government's commitments. The Minister must stop avoiding his responsibilities and address the issues affecting public trust in Canada's nuclear regulator.

We also would like to note that the committee heard testimony that was not included in the majority report about the balance between investment in new nuclear technologies and clean, renewable technologies such as solar. Mr. Stensil testified before the committee that "the challenge facing the nuclear industry involves not only the costs of disposing of waste and the risk of accidents, but also the competition. Technologies are improving very quickly." He went on to state that "in the last RFP the Ontario

government put out, they got wind power in at 6.5¢ for the first time. That's lower than nuclear generation, and it's lower than wind was five years ago at 13¢."

While decisions on construction of energy generation infrastructure fall to other levels of government, we believe that the testimony on the rising competitiveness of alternate forms of renewable energy technology merit consideration in the allocation of federal funding for research and development.

We believe that if the Government of Canada enacts the recommendations above, we will be able to better ensure the viability and safety of the nuclear sector to the benefit of all Canadians.

GOVERNMENT OF CANADA RESPONSE TO RECOMMENDATIONS IN THE STANDING COMMITTEE ON NATURAL RESOURCES' REPORT:

"THE NUCLEAR SECTOR AT A CROSSROADS: FOSTERING INNOVATION AND ENERGY SECURITY FOR CANADA AND THE WORLD"

The Government of Canada has reviewed the report of the Standing Committee and thanks its members for their efforts in developing this report. The Government also wishes to extend its thanks to the numerous witnesses who provided expert testimony to the Committee, providing the members with a diversity of perspectives on the nuclear sector.

The Government agrees with all of the Committee's recommendations. The Government's response to the specific recommendations made by the Committee follows. We outline federal activities, programs, and engagement mechanisms—as well as the contributions of other nuclear sector stakeholders—to foster innovation, increase coordination, and support a strategic vision for the future of nuclear energy and nuclear science and technology in Canada.

Nuclear energy is an important part of Canada's current clean energy mix and will continue to play a key role in achieving Canada's low carbon future. Nuclear energy is the second-largest source of non-emitting electricity in Canada. In 2015 it accounted for 15% of national electricity generation, 33% of electricity generated in New Brunswick, and almost 60% of Ontario's electricity. Nuclear energy displaces over 50 million metric tons of carbon dioxide emissions each year compared to the same amount of electricity produced from natural gas. To put that figure in context, the Government of Canada's target under the Paris Agreement is to reduce carbon dioxide emissions by 219 million metric tons by 2030. With $26 billion being invested in the refurbishment of CANDU (CANada Deuterium Uranium) reactors in Ontario, nuclear energy will remain a primary source of clean and reliable energy in Canada for many decades to come.

Canada has been a world leader in nuclear energy since the development of Canada's own CANDU reactor technology by Atomic Energy Canada Ltd (AECL) in 1952. Today, there are a total of 31 CANDU reactors in operation on four continents, and the world continues to look to Canada as an innovator in nuclear technology for energy, as well as for medical, industrial, and space applications.

As the Standing Committee's report indicated, the nuclear sector in Canada is at a crossroads. Expert witnesses drew attention to a number of opportunities to advance nuclear safety, support nuclear innovation, research and development, and enhance collaboration to promote Canadian leadership in nuclear energy and nuclear science and technology at home and abroad.

This report was timely as it dovetailed with *Generation Energy*, a national dialogue on Canada's path to a low-carbon future led by the Honourable Jim Carr, Minister of Natural Resources Canada. There is strong alignment between the Committee's report and what the Government heard through the *Generation Energy* dialogue, including from stakeholder roundtables on *"Generation Energy: What's Next for Nuclear"*, which were chaired by the Parliamentary Secretary to the Minister of Natural Resources in spring 2017. Five themes, in particular, emerged from the roundtables, as follows:

1. **The Government of Canada is an important partner**, essential for industry success. There is a role for the Government in **providing certainty** (policy, regulatory, funding) to improve investor confidence and deepen relationships with partner governments.

2. **Nuclear energy is an important part of Canada's energy and climate change initiatives**, and public education to demystify the nuclear sector by highlighting the roles of nuclear science and technology in everyday life will **build and maintain public confidence**.
3. Establishing **lasting partnerships between various players and across the entire breadth of the sector** (including large companies, utilities, small and medium enterprises or SMEs, governments, laboratories and academia), **will bring the industry to the next level**.
4. There is a need to recognize and promote the fact that **next generation nuclear workers are diverse and have a passion for environmentalism and global citizenship**. With nuclear power plant refurbishments underway in Ontario, there will be many opportunities for young people entering the nuclear field today and for years to come.
5. **The nuclear industry has a bright future**, not only in power, but also across the full spectrum of the industry (health, security, agriculture, etc.). **An overall strategy could help guide future partnerships and investments.**

A consistent theme throughout the Committee's report is one of partnerships, and bringing together industry, academia, Indigenous governments and communities, federal, provincial, and territorial governments, as well as international partners, to advance the nuclear sector both in Canada and abroad.

In the Government's response to each of the Committee's recommendations, linkages are drawn to the themes heard during the "*Generation Energy: What's Next for Nuclear?*" roundtables, including the importance of partnerships.

RECOMMENDATION #1: ***The Committee recommends that the Government of Canada work with industry, Indigenous governments and communities, provincial/territorial governments, and international partners to ensure that Canada's nuclear sector continues to advance its rigorous regulatory and safety practices by:***

a) continuing to invest in R&D and innovations to advance the sector's safety profile, including its operations and waste management practices in Canada and abroad;
b) ensuring that enough financial securities are available to address the impacts of any unexpected nuclear incident or accident on public safety, health and/or the environment; and
c) staying abreast of international developments in the fields of nuclear safety and waste management.

GOVERNMENT RESPONSE:

The Government of Canada agrees with this recommendation, which is bolstered by the *What's Next for Nuclear* theme #3 of establishing lasting partnerships between various players across the sector. Nuclear energy is reliable, safe, and environmentally responsible as long as it is developed within a robust regulatory framework that adequately addresses safety, security, non-proliferation, and waste management concerns. Collaboration between industry, federal and provincial governments, laboratories and research organizations, and international partners and institutions is essential to advancing these rigorous regulatory and safety practices in Canada. The Government of Canada is committed to providing responsible stewardship to support a strong and safe nuclear sector.

a) Through programs managed by AECL, the Canadian Nuclear Safety Commission (CNSC), and Defence Research and Development Canada (DRDC), the Government of Canada continues to invest in research, development, and innovations to advance the sector's safety profile and protect the health, safety, and security of the public.

The federal government has committed $76 million annually for 10 years to the Federal Nuclear Science & Technology Work Plan, for nuclear-related science and technology in support of core federal priorities and the mandates of 13 federal departments and agencies. The work plan, managed by AECL, provides funding to Canadian Nuclear Laboratories (CNL) to advance nuclear research in five theme areas:

1. Supporting the development of biological applications and understanding the implications of radiation on living things;
2. Enhancing national and global security by supporting non-proliferation and counter-terrorism;
3. Nuclear emergency preparedness and response;
4. Supporting safe, secure and responsible use and development of nuclear technologies; and
5. Supporting environmental stewardship and radioactive waste management.

With respect to the sector's safety profile, the Federal Nuclear Science & Technology Work Plan aims to support Canada's position as a global player in areas of security, health, energy and nuclear regulation while maintaining the unique technical knowledge needed to regulate Canada's nuclear industry, and to meet Canada's obligations in international energy, regulatory, and security fora.

In addition, under its mandate to fulfill Canada's radioactive waste and decommissioning responsibilities, AECL provides support to CNL to undertake science and technology projects that will support infrastructure decommissioning, environmental remediation, and waste management requirements at AECL sites.

The CNSC funds research to deliver on its mandate to regulate the use of nuclear energy and materials to protect health, safety, security and the environment; to implement Canada's international commitments on the peaceful use of nuclear energy; and to provide objective scientific, technical, and regulatory information to the public.

The CNSC's research supports new techniques to improve its understanding of new technology and innovation in the sector. The CNSC's 2016-17 fiscal year research and development expenditures totalled $3.3 million. Areas of focus for technological development in the coming years are: enhancements to safety systems of existing reactors (ten of which are expected to be refurbished over the next decade), new reactor technologies that are being applied to small reactor designs, decommissioning of shutdown reactors, and solutions for the safe and long-term storage of radioactive waste.

The CNSC's regulatory regime is subject to continuous improvement—including regular review and updating of regulations, standards and guides. The CNSC participates with all stakeholders in the development of relevant industry standards through bodies such as the Canadian Standards Association (CSA) Group, which includes seeking input from the public. When the CNSC amends its regulations, it similarly works in collaboration with the nuclear sector, the public, and

Indigenous Peoples to seek their input, and holds public Commission meetings to discuss the proposed amendments.

The government also provides funding to enhance Canada's resilience to radiological threats through the Canadian Safety and Security Program, led by Defence Research and Development Canada's Centre for Security Science, in partnership with Public Safety Canada. The program's mission is to strengthen Canada's ability to anticipate, prevent, mitigate, prepare for, respond to, and recover from natural disasters, serious accidents, crime, and terrorism through the convergence of science and technology with policy, operations, and intelligence.

The Government recognizes that the Canadian nuclear industry invests in research and development to advance safety and sustainability of the sector across the full fuel cycle, from mining to fuel fabrication, operations, refurbishment, waste management, and decommissioning. For example, through the CANDU Owners Group, an industry-funded forum for collaboration among utilities that own CANDU reactors, industry is advancing research and development to demonstrate the safe performance of CANDU reactors and their operations in Canada and around the world. The Government is committed to continuing work with industry to advance the safety profile of the nuclear sector, in collaboration with provinces and territories, Indigenous governments, and communities.

b) On January 1, 2017, the Government of Canada brought into force the *Nuclear Liability and Compensation Act (NLCA)* that establishes a modern regime to manage nuclear civil liability and compensation in the unlikely event of a nuclear accident causing injury or damage at a Canadian nuclear installation. The NLCA came into force on January 1, 2017, following the completion of implementation steps including the publication of the supporting regulations in May 2016, and the development of supporting financial security documents. It can be viewed at http://www.laws.justice.gc.ca/eng/acts/N-28.1/FullText.html.

Natural Resources Canada is the lead federal department for policy development in respect of nuclear liability legislation, and for ensuring that the process of compensation for damages arising from a nuclear incident is well coordinated and administered in Canada. The department consulted with industry, provincial governments, and the international community in developing the new legislation to modernize Canada's nuclear liability regime, which ensures that adequate financial securities are available to address the impacts of a nuclear incident on public safety, health and/or the environment in Canada.

Operators of nuclear installations designated under the NLCA are absolutely and exclusively liable for any civil damages caused by an incident at that installation and are required to carry financial security to cover their liability. The NLCA increases the liability limit for nuclear power plant operators from the $75 million in the previous legislation to $1 billion over a period of four years (with $650 million applying on January 1, 2017 to $1 billion applying on January 1, 2020). This amount is in line with other jurisdictions around the world. Because the level of risk is different for the activities of classes of nuclear installations other than nuclear power plants, the *Nuclear Liability and Compensation Regulations* assign operators of a particular class a liability amount that is proportional to the level of risk posed by that class of nuclear installation.

Pursuant to the requirements of the legislation and its regulations, all nuclear operators now have in place the increased financial security required of them. Natural Resources Canada administers the legislation and monitors the operators' financial security on a regular basis.

The new legislation also broadens the number of categories of nuclear damage for which compensation may be sought, including certain forms of environmental damage, preventive measures and economic loss. It also improves the procedures for delivering compensation: in the event of a serious incident, the NLCA could provide special compensation measures imposed by the government to replace the normal court process.

The NLCA permitted Canada to ratify the International Atomic Energy Agency's (IAEA) Convention on Supplementary Compensation for Nuclear Damage on June 6, 2017. The Convention addresses liability and compensation within member countries arising from a nuclear incident occurring within a member country or during nuclear material transport. Canada's ratification of the Convention creates treaty relations with parties to the Convention, including the United States.

Internationally, the Government of Canada participates, through Natural Resources Canada, in the IAEA International Expert Group on Nuclear Liability (INLEX). Participation in this forum enables the Government to explore and advise on best practices related to nuclear liability legislation and international nuclear liability treaties.

c) The Government recognizes that international engagement is essential to stay informed of developments in nuclear safety and waste management, and to contribute to the advancement of the state-of-art in these fields. International engagement helps Canada ensure it has a robust framework to address safety and waste management issues, and it enables Canada to advance strategic priorities with partners and demonstrate leadership in advancing the development of nuclear energy.

Canada actively participates in a number of international committees and activities at the IAEA and the Nuclear Energy Agency. The IAEA promotes the safe, secure and peaceful use of nuclear technologies, whereas the Nuclear Energy Agency is a specialised agency within the Organisation for Economic Co-operation and Development (OECD) that facilitates cooperation on scientific, technical, and legal issues among countries with advanced nuclear technology infrastructures. In addition, Canada collaborates bilaterally with key partners such as the United States, United Kingdom, China, and India on issues that encompass nuclear safety and waste management.

Canada regularly opens its doors to international scrutiny on its practices to ensure its standards and practices are world leading. The CNSC fully supports IAEA peer review missions, including the International Regulatory Review Service (IRRS), the International Physical Protection Advisory Service, and other technical reviews. For example, in 2015, a team of IAEA experts completed a two-week mission to review national nuclear security practices in Canada at the request of the Government of Canada. In the past, Canada has also initiated an IRRS mission, which is an IAEA service offered to Member States at their request to review their regulatory regimes and processes.

To fulfill its international commitments and treaty obligations, Canada also actively participates in nuclear safety and security organizations and treaties, such as the International Partnership for Nuclear Disarmament Verification, the Comprehensive Nuclear-Test-Ban Treaty, the Non-

Proliferation Treaty, and the Fissile Material Cut-off Treaty. Through the CNSC, Canada participates in meetings of other international organizations, such as the International Nuclear Regulators Association, the CANDU Senior Regulators Group, and the G7 Nuclear Safety and Security Group.

Canada is a contracting party to the IAEA *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*. As a party to the Convention, Canada undertakes a comprehensive review of its waste management governance and practices every three years. Following this review, Canada submits a national report that outlines how the safety of radioactive waste management is achieved. The report presents how Canada is staying abreast of international developments in this area and how Canada has integrated those best practices into its active radioactive waste management and decommissioning activities. Canada's national report is peer reviewed by the Contracting Parties to the Joint Convention, and has been well received by the international forum. Canada also continues to demonstrate its leadership role and commitment to the peer review process by regularly putting forward its technical specialists in the field as reviewing officers to assist with the Joint Convention.

Canadians have been recognized as leaders in these fora. For example, the CNSC's Executive Vice-President and Chief Regulatory Officer, Ramzi Jammal, was elected President of the Convention and led the Seventh Review Meeting of the CNS in March 2017, at the IAEA headquarters in Vienna. Canadian participation in these fora directly informs the Government's understanding of international developments in nuclear safety and security, health, waste management and energy technologies and ensures that regulatory activities are consistent with internationally agreed upon best practices and principles, as appropriate in a Canadian context. Canada's involvement also allows it to influence and enhance nuclear safety from an international regulatory perspective and to exchange information and experience among regulatory organizations.

Beyond the federal government, nuclear power plant operators participate in a number of groups to share best practices and keep abreast of nuclear safety developments. The CANDU Owners Group facilitates sharing operating experience among CANDU reactors owners internationally to ensure the safe operation of CANDU power plants worldwide. Canadian power plant operators also participate in the World Association of Nuclear Operators, which has a mandate to maximize the safety and reliability of nuclear power plants worldwide. The Association unites nuclear companies and countries to assess, benchmark, and improve performance through mutual support, exchange of information, and emulation of best practice. In addition, Canadian nuclear power plant operators participate in the World Institute of Nuclear Security, a non-governmental voluntary organization that provides a forum to share best practices in strengthening the physical protection and security of nuclear and radioactive materials and facilities.

As a non-profit organization established by Canadian nuclear electricity producers to design and implement Canada's plan for the safe, long-term management of nuclear fuel waste, the Nuclear Waste Management Organization (NWMO) works with experts from across Canada and internationally to support its design, siting, and confidence-building activities. It supports research projects with 15 Canadian universities and has exchange agreements with national radioactive waste management organizations in Sweden, Finland, Switzerland, France, South Korea, and United Kingdom. The NWMO, by incorporating innovative approaches in its

public and stakeholders engagement activities, is also setting best practices and is a recognized leader through its collaborative siting process and commitment of finding a willing-host community for this project.

By collaborating with leading researchers in Canada and other countries, the NWMO helps ensure its work is based on international best practices. At the same time, by sharing its own research advances, the NWMO is making significant contributions to the field of nuclear waste management.

RECOMMENDATION #2: ***The Committee recommends that the Government of Canada continue its support for Canadian nuclear research and development (R&D) and innovation in the short, medium and long term, by:***

- ***a) considering long-term options to provide a reliable, high-flux neutron source for Canadian researchers;***
- ***b) working in collaboration with industry, especially small companies, to ensure that researchers and experts have access to the services and infrastructure they need to excel in their innovation and R&D pursuits; and***
- ***c) working with industry, the healthcare community and provincial/territorial governments to ensure that the Canadian supply of medical isotopes remains uninterrupted in the short, medium and long term.***

GOVERNMENT RESPONSE:

The Government of Canada agrees with this recommendation, which aligns with the *What's Next for Nuclear* theme #3 of establishing lasting partnerships across the sector to bring industry to the next level. Partnerships between government, academia, and industry are key to ensuring access to the facilities, support, and expertise that the sector needs advance research, development, and innovation in nuclear science and technology.

a) The Government recognizes the potential value of a new high-flux neutron source for Canadian researchers. A high-flux research reactor could enable ongoing fuel, materials and safety research to support reliable, low-cost, low-carbon electricity to power Canada and its economy. It could also support emerging opportunities, including the development of the next generation of nuclear energy technologies such as small and very small modular reactors that may be suited to providing clean energy to northern communities and remote mining installations.

AECL's National Research Universal (NRU) reactor has been one of Canada's most productive science and technology facilities for 60 years. It was foundational to the development of the CANDU technology, which is the basis for an industry that supports 30,000 jobs and provides 15% of Canada's electricity – and almost 60% of Ontario's electricity. NRU has also contributed to the health of Canadians and patients globally through isotope production that was carried out over many decades. Recognizing that a reactor of this age cannot continue to operate indefinitely, the NRU reactor will be permanently shut down in March 2018.

The Government recognizes that, although the science and technology mission at Chalk River Laboratories is much broader than just the NRU reactor, its shutdown will have impacts on nuclear research and development in Canada. The NRU is used to test and develop fuel, produce medical and industrial isotopes, and enable materials research, including through the Canadian

Neutron Beam Centre. As these capabilities cannot be fully replicated at other facilities in Canada, researchers will inevitably lose access to a high-flux neutron source in Canada with NRU's closure.

The nuclear community in Canada has called for a long-term solution to enable access to a high-flux neutron source, and is mobilizing to respond to the immediate loss of NRU. The Government believes that the full range of options for charting a way forward should be considered:

1. **Access high-flux neutrons at foreign facilities:** In the short term, access could be maintained by securing agreements for Canadian researchers to access to high-flux neutrons sources at foreign facilities.
2. **Develop a domestic source of medium-flux neutrons:** In the medium term, a portion of the research community's needs could be met by developing a domestic source of medium-flux neutrons through expansion of neutron beamlines and operations at McMaster's Nuclear Research Reactor, which will be Canada's largest research reactor following closure of NRU, recognizing that, this would not fully replicate the capabilities of a high-flux neutron source in Canada, the balance of the community's needs could be met through access to foreign facilities.
3. **Build a new domestic source of high-flux neutrons:** In the longer-term, domestic access to a source of high-flux neutrons could be restored with the construction of a multi-purpose nuclear research reactor or a non-reactor, accelerator-based source.
4. **Focus in other areas:** The resources needed to secure access to a high-flux neutron source could be used to build Canadian expertise in other areas of nuclear science and materials science research.

Accordingly, the Government is engaging with stakeholders in nuclear R&D, the broader user community of neutron beams in Canada, and potential partners to explore the full range of possible options and models for access to high flux neutrons. Through these discussions, the Government will seek to identify possible solutions based on partnerships that bring together federal and provincial governments, academia, industry, and international partners to support scientific research by Canadians for the benefit of Canadians.

b) The Government recognizes that access to research and development services and infrastructure is essential in enabling the Canadian nuclear industry to remain on the cutting edge of research and innovation. The Chalk River Laboratories—Canada's largest science and technology complex—are integral to Canada's science and technology landscape. Scientists who have worked and trained at the Chalk River Laboratories have had significant impact in Canada's scientific and innovation achievement—including two Nobel Prize winners whose work was started and enabled by the Chalk River Laboratories. For decades, CNL has provided research and development services to the nuclear industry.

The Government recognizes that the model for, and cost structure of, access to facilities at Chalk River Laboratories has changed. Starting in 2009, the Government undertook a restructuring of AECL with a view to reducing risks and costs to Canadian taxpayers while leveraging AECL's capabilities for the benefit of Canadians and industry. The restructuring was undertaken with the objective of implementing a Government-owned, Contractor-operated model to bring private-sector rigour and efficiency while leveraging the significant expertise and facilities at the laboratories.

Under the new structure, AECL's mandate is to enable nuclear science and technology in order to sustain and develop Canada's capabilities in a cost-effective manner. To deliver on this mandate CNL provides technical services and research and development products for third parties on a commercial basis. The objective is to leverage the assets and capabilities of CNL to undertake commercial work on at least a full cost-recovery basis.

To ensure Chalk River Laboratories have the facilities and infrastructure needed to continue to be a hub for nuclear innovation in Canada, the Government is investing $1.2 billion over ten years, starting in 2014-2015, in the revitalization of the laboratories. These investments are intended to create a "big science" infrastructure for the broad benefit of all those in Canada wishing to leverage its capabilities, accessible to academics, industry experts, and others—including small companies.

The Government recognizes that industry also leverages a range of services and infrastructure at universities, research organizations, private laboratories, and other facilities beyond the national laboratories at Chalk River—in Canada and worldwide. Through the Nuclear Leadership Forum convened by the Canadian Nuclear Association, industry has mapped the nuclear science and technology landscape in Canada and its contributions to Canadian research and development networks across the country.

The Government of Canada is committed to engaging with industry to understand their innovation, research, and development goals, and to identify how the federal government can work in partnership with industry, provinces, and academia to ensure researchers, experts, and small businesses continue to have access to the services and infrastructure they need to excel in their pursuits.

c) The market for isotopes is global and integrated, with individual countries both contributing to and drawing from global, rather than national, supply chains for isotope products. This considered, the Government of Canada is committed to increasing the security of Canada's access to medical isotopes in the short, medium and long term. In 2010, in response to the prolonged, unplanned outage of the NRU, the Government of Canada announced a long-term strategy to help ensure the security of global medical isotope supplies. The strategy was three-pronged:

1. Maintain safe and reliable isotope production by the NRU until October 2016, allowing for a transition period towards a more diversified global supply chain. Routine NRU isotope production was discontinued at the end of October 2016 as scheduled, with international producers adjusting their output schedules to compensate.
2. Invest $60 million to support the research and development of non-reactor isotope production technologies in Canada (cyclotrons and linear accelerators). As of mid-2017, these alternative forms of Mo-99 and Tc-99m production have reached the clinical trial stage. These technologies will add new Canadian isotope production sources once they reach commercial production stage.
3. Engage the international community to encourage better coordination of global supply and more efficient use of medical isotopes.

Due in part to this strategy and ongoing Canadian efforts, the current global isotope supply situation has improved significantly. Indeed, isotope production at other facilities in the international supply chain have added capacity to compensate for the cessation of routine

production at the NRU. As a result, according to 2017 projections issued by the OECD's High-Level Group on the Security of Supply of Medical Radioisotopes suggest that, under normal conditions, global Mo-99 supply will remain sufficient to meet demand in 2017–2018 and beyond, with adequate excess supply to deal with some level of unplanned shortages. In addition, Canadian companies continue to make progress in the development of alternative, non-reactor methods of producing isotopes, which will further supplement Canada's supply with new domestic production capabilities.

The Government of Canada will continue to engage Canadian medical isotope stakeholders, including through the Multi-Stakeholder Working Group on Medical Isotopes, and will continue to participate in future international fora aimed at fostering communication, joint planning, and understanding of the Canadian and global isotopes markets.

RECOMMENDATION #3: ***The Committee recommends that the Government of Canada continue to support the development and commercialization of Canadian nuclear technologies in Canada and abroad by:***

- ***a) continuing to provide funding that applies to the full spectrum of the sector's operations, while allowing industry experts the flexibility to invest these funds according to their business needs and market research; and***
- ***b) providing financial support to help small businesses cover their capital expenditures for large projects (e.g., through the federal Scientific Research and Experimental Development program).***

GOVERNMENT RESPONSE:

The Government of Canada agrees with this recommendation, which aligns with the *What's Next for Nuclear* theme #1 that the Government of Canada is an important partner, essential for industry's success.

Government support for innovation in the nuclear sector provides benefits to Canadians, as it is a significant contributor to the economy, providing over 30,000 direct jobs and adding $6 billion annually to our GDP. Through leadership in nuclear science, Canada has made important contributions in medicine, agriculture, manufacturing, and natural resource use. It has also made possible world-class contributions over the years by Canadian scientists to fundamental science, particularly in the fields of physics and material science.

a) The Government of Canada provides funding through federal programs for technology development and industrial support that cover the full innovation spectrum, from research and development to commercialization and market development. Many of these programs do not establish industry-specific envelopes, but nuclear technologies and nuclear operations could play a role in their implementation, alongside other segments of Canadian industry. As a result, there are opportunities for funds to be applied to the nuclear sector within the suite of programs the Government provides across the innovation spectrum, leveraging additional support from industry and provincial partners.

In addition, to accelerate global clean energy innovation, Canada has joined Mission Innovation, a global initiative of 22 countries and the European Union. Mission Innovation members have agreed to double their federal investments in clean energy innovation over five years, while encouraging greater levels of private-sector investment and international collaboration in

transformative clean energy technologies. Canada is one of nine Mission Innovation countries that has identified nuclear energy as part of our clean energy portfolio.

To help Canada reduce carbon pollution while creating good middle-class jobs, Budget 2017 announced a range of initiatives that expand on federal support for clean technologies. Although they are not exclusively targeted to the nuclear energy sector, these initiatives could support nuclear energy technologies at different points in the innovation spectrum, recognizing that nuclear energy is an important component of Canada's clean energy mix:

- To support the environmental performance and competitiveness of Canada's energy, mining, forest, agriculture, and fisheries sectors, Budget 2017 announced $200 million over four years to encourage the research, development, demonstration, and adoption of clean technology in the natural resource sectors.
- Budget 2017 also created a new initiative, the Impact Canada Fund, to introduce a new mission-oriented approach to accelerate efforts toward solving Canada's big challenges.
- To further reduce risks through the commercialization gap, Budget 2017 recapitalized Sustainable Development Technology Canada (SDTC)'s SD Tech Fund with $400 million in new funding over five years. This flagship program supports the development and pre-commercial demonstration of clean technologies that address environmental issues such as climate change, air quality, clean water, and clean soil. The SD Tech Fund targets a key funding gap at the pre-commercial technology development and demonstration stages of the innovation spectrum resulting from barriers such as the low level of maturity and financial risks associated with advancing new technologies emerging from the research stage.

The Government has also announced measures that seek to simplify and provide greater flexibility to federal innovation funding programs. Budget 2017 proposed to establish Innovation Canada, a new platform led by ISED that will coordinate and simplify the support available to Canada's innovators. The Clean Growth Hub, within Innovation Canada, with provide focused support to clean technology stakeholders—including small companies—connecting them with available resources and export supports to help grow their businesses.

In addition, Budget 2017 consolidated several existing business innovation programs—the Strategic Aerospace and Defence Initiative, Technology Demonstration Program, Automotive Innovation Fund, and Automotive Supplier Innovation Program—under a single, streamlined Strategic Innovation Fund, and with expanded eligibility.

The Government is also committed to the creation of a $35 billion Canada Infrastructure Bank that will invest in projects that contribute to Canada's long-term economic development, that support the creation of good middle-class jobs, and which help Canada achieve its goals of lowering greenhouse gas emissions and building communities that are socially inclusive. The Bank is intended to amplify federal support by bringing in private sector and institutional investors to invest in transformational infrastructure projects.

b) The Government recognizes the challenges that small businesses, in particular, face in covering capital expenditures for large projects. These challenges are acute in high technology and capital-intensive industries such as the nuclear energy sector.

The Government provides support for research and development activities through the Scientific Research and Experimental Development (SR&ED) tax incentive program. The SR&ED program is intended to provide broad-based support for research and development performed in every industrial sector in Canada, with enhanced support for small businesses. It is one of the most generous research and development tax incentives in the industrialized world and is projected to have provided about $2.7 billion in assistance in 2016. In general, three broad categories of activity are eligible: basic research, applied research, and experimental development. Most current expenditures, including wages and salaries, in respect of research and development in Canada may be eligible for the SR&ED tax incentives. Capital expenditures made after 2013 do not qualify for the SR&ED tax incentives.

The Government is also providing support to help small businesses access financing, investment, and funding to cover capital expenditures needed to support their growth. To attract private capital and help promising clean technology firms grow and expand, Budget 2017 made an additional $1.4 billion in new financing on a cash basis available through the Business Development Bank of Canada and Export Development Canada. This financing support, which is already available to proponents, takes the form of: equity financing; working capital to support investments in assets, inventory, talent and market expansion; and project financing to enable first-of-its-kind, high-capital-intensive, early commercial-scale technology deployment.

To increase late-stage venture capital available to Canadian entrepreneurs, Budget 2017 proposed to make available through the Business Development Bank of Canada up to $400 million for a new Venture Capital Catalyst Initiative. The Government is actively working with these Crown corporations to deliver these important initiatives to further increase support to promising clean technology firms, in particular, small and medium-sized enterprises.

Budget 2017 also proposed to invest up to $950 million over five years in support of a small number of business-led innovation "superclusters" that have the greatest potential to accelerate economic growth. The initiative will offer contributions to not-for-profit entities representing industry-led consortia that include large firms, innovative small and medium-sized enterprises (SMEs), and industry-relevant research institutions. Capital expenditures clearly linked to research, development, demonstration, or commercialization project objectives are eligible for funding. The solicitation of Letters of Intent for this initiative closed in July 2017.

In addition to these commitments, the National Research Council of Canada Industrial Research Assistance Program (NRC-IRAP) provides a comprehensive suite of innovation services and funding to SMEs. Through expert technical and business advice, financial assistance, access to business information, contacts, and national and international networks, the program provides customized solutions to some 10,000 SMEs annually.

RECOMMENDATION #4: ***The Committee recommends that the Government of Canada continue to work with industry, Indigenous governments and communities, provincial/territorial governments, as well as international partners to promote and advance Canadian leadership in nuclear power generation technologies at home and abroad by:***

- ***a) addressing any knowledge gaps or misinformation pertaining to Canadian nuclear products and technologies;***
- ***b) providing industry with the necessary regulatory and/or diplomatic resources to support their international exports and operations; and***
- ***c) considering the expansion of export credits to include the full scope of Canadian nuclear exports.***

GOVERNMENT RESPONSE:

The Government of Canada agrees with this recommendation, which aligns with the *What's Next for Nuclear* theme #2 that public education to demystify the sector is important for building and maintaining public confidence in nuclear energy. It also aligns with theme #1 that the Government of Canada is an important partner in providing certainty to improve investor confidence and to deepen relationships with partner governments.

a) The Government of Canada recognizes the importance of informed understanding of nuclear products and technologies in advancing the efforts of the nuclear sector. Nuclear energy is an important part of Canada's clean energy and climate change initiatives, and beyond energy, the nuclear sector contributes to a wide range of other scientific and economic activities, including in medicine, human health and safety, material testing, food safety, even space exploration. Despite this, Canada's contributions and leadership in nuclear science and technology are not broadly known by the public. To address these gaps, the Government is committed to creating partnerships with non-government actors to directly engage the public—including youth and Indigenous communities—on energy and other applications of nuclear science and technology.

This commitment will leverage existing Government activities and engagement on nuclear energy issues. In April 2017, Natural Resources Canada launched *Generation Energy*, a national dialogue on Canada's path to an affordable, lower-carbon future. The goal of *Generation Energy* is to engage Canadians on energy issues to raise awareness of the current energy landscape in Canada and to listen to youth, Indigenous peoples, academics, industry and interested Canadians about their vision of Canada's energy future. Nuclear energy was a part of the discussion, and was featured in a workshop at Queen's University on the role of nuclear and renewables in a low-carbon future.

To facilitate Canadians' understanding of nuclear safety and science and deliver on its mandate to provide objective, scientific, technical, and regulatory information to the public, the CNSC has strengthened its consultation, communication, and outreach efforts. In 2014-2015, CNSC participated in over 160 outreach activities, including open houses, activities in communities who have nuclear related operations in or close to their boundaries, youth-related activities, and activities aimed at informing medical practitioners and licensees. The CNSC 101 program is designed to build public understanding of Canada's nuclear regulatory regime. Over the past three years, the CNSC has held 36 sessions at 24 different locations across the country with over 880 participants.

Ingenium, Canada's museums of science and innovation, is a willing partner in communicating Canada's leadership in nuclear science and technology. The Museum of Science and Technology is the repository of a national nuclear science and technology collection that includes the Zero Energy Experimental Pile, or ZEEP, reactor—the first operational nuclear reactor outside of the United States—and early nuclear medicine technology. Ingenium is communicating Canada's nuclear story through new galleries in the renewed Canada Science and Technology Museum and Let's Talk Energy, a national program that aims to enhance energy awareness and literacy among Canadians to contribute to a sustainable energy future.

Industry is also developing initiatives to advance public knowledge and mitigate knowledge gaps and misinformation. For example, the Canadian Nuclear Association (CNA) has established a website to serve students and teachers to learn and/or teach about nuclear energy on which you can find information on a broad spectrum of subjects from Canada's Nuclear History to Radiation.

Alongside this engagement, the Government is also committed to addressing knowledge gaps related to Canadian nuclear products and technologies. Within the Canadian clean technology sector, there is currently a lack of comprehensive economic information on sales, investment, jobs, and exports. Budget 2017 announced the Government's intent to establish a Clean Technology Data Strategy, led by NRCan and ISED, with collaboration from Statistics Canada. Nuclear energy technologies will be included in the strategy, the data from which will support innovation, improve knowledge in the private sector and stakeholder communities, and help inform future government decision-making related to clean technology growth and opportunities in Canada.

b) The Government recognizes that nuclear energy provides Canada with a unique asset in forging and deepening global relationships that go beyond trade. Further, industry's nuclear expertise, competence, and experience give Canada status and weight at the global diplomatic table on issues of nuclear security, non-proliferation, and related matters. It is in the country's and the Government's interest to develop and use this asset.

Countries pursuing nuclear energy regard it as having a particular strategic nature due to its complexity, the difficulty and cost of acquiring it, its affordable and reliable power-generating potential, and its many applications throughout the economy. Nuclear cooperation and trade between countries is built on trusting, long-term government-to-government relationships that require political-diplomatic investment to achieve and maintain. These are often formalized through Nuclear Cooperation Agreements signed by the Government of Canada and other nations, which are a prerequisite to enable nuclear collaboration and trade.

In recent years, Canada has established partnerships for collaboration in strategic areas with the United States, the United Kingdom, India and China, each with annual action plans of concrete activities promoting collaboration between governments, regulators, laboratories, and businesses. Further, Canada is active multilaterally, with strong representation at the IAEA and the OECD Nuclear Energy Agency (NEA), among other institutions. Since 2015, Canada's nuclear industry has been supported on international visits by the Prime Minister, the Minister of Natural Resources, and the Parliamentary Secretary to the Minister of Natural Resources.

Additionally, Global Affairs Canada (GAC)'s Trade Commissioner Service, present in 161 cities worldwide, provides a wide variety of services to industry. The Trade Commissioner Service

provides on-the-ground intelligence and practical advice on foreign markets to help industry make timelier and cost-effective decisions in order to achieve international success. The work of the Trade Commissioner Service is achieved through four key services which consist of helping Canadian companies prepare for international markets, providing market potential assessment for companies venturing into foreign markets, providing qualified contacts, and problem solving in complex situations. The Trade Commissioner Service has worked extensively with the nuclear industry to advance projects in China, Argentina, Romania, and the United Kingdom, among others. Global Affairs Canada's Global Opportunities for Associations (GOA) funding program has also supported a number of industry trade missions in recent years with the objective of assisting the Canadian nuclear supply chain foster international business opportunities.

c) Export Development Canada (EDC) supports Canada's export trade by helping Canadian companies respond to international business opportunities, including through the provision of export credits or other financial services, bonding products, and small business support. EDC is active in the nuclear energy sector and will consider support for nuclear energy projects or their affiliated components. All EDC transactions, regardless of sector, are assessed against a due diligence framework that takes into account the alignment with EDC's mandate, corporate social responsibility risk, commercial risk, and credit risk of the transaction. EDC is also party-to the Nuclear Sector Understanding of the OECD, which sets standards for international export credit agencies, like EDC.

RECOMMENDATION #5: ***The Committee recommends that the Government of Canada work in collaboration with industry, the academic community, Indigenous governments and communities, and provincial/territorial governments to sustain and improve Canadian expertise in the nuclear sector by:***

- ***a) supporting efforts by Canadian universities and research/training organizations to build new facilities and equipment and/or to advance education and research in areas that benefit the sector's development;***
- ***b) supporting programs that can train the high-skilled professionals needed to operate the full spectrum of the sector's activities, including nuclear fuel development and transport; reactor construction, operation, maintenance, refurbishment and inspection; as well as waste management and decommissioning operations; and***
- ***c) supporting programs that can train the high-skilled professionals needed to develop future nuclear technologies and industries, namely spin-off Candu technologies and advanced nuclear reactors.***

GOVERNMENT RESPONSE:

The Government agrees with this recommendation and recognizes its relevance to a parallel theme (#4), which emerged from *What's Next for Nuclear* that next-generation nuclear workers are diverse and have a passion for environmentalism and global citizenship.

The nuclear sector is already making significant investments in education, training, and professional enrichment to develop highly skilled professionals. Canadian industry supports research and training organizations that enhance the nuclear sector's ability to promote diversity and develop the necessary capabilities and expertise.

For example, the University Network of Excellence in Nuclear Engineering (UNENE) is an alliance of Canadian universities, nuclear power utilities, research groups, and regulatory agencies that supports nuclear education and research and development programs in Canadian universities. Its purpose is to develop a sustainable supply of qualified nuclear engineers and scientists to meet the current and future needs of the national nuclear sector. UNENE accomplishes this through university education—including a Master of Nuclear Engineering degree program delivered jointly by participating universities—and by encouraging young people to choose a career in the nuclear sector.

The nuclear sector has also made progress in engaging, recruiting, and training Indigenous persons. The uranium industry is the largest industrial employer of Indigenous persons in Canada, and Indigenous people represent 48 percent of the roughly 3,300 employees working at uranium mine sites. Cameco, a Canadian uranium company, has collaboration agreements with the indigenous communities in which it works that include commitments to community investment, business and workforce development. Bruce Power, a private nuclear power plant operator in Ontario, similarly has an Aboriginal Policy that seeks to develop strategies in several key areas including employment, business development, education, training and community sponsorship that appropriately reflect the interests of Indigenous groups.

The sector has also been active in addressing the gender gap between women and men in the nuclear and electricity sector workforce. Women in Nuclear (WiN) Canada is working to emphasize and support the role of women in the nuclear sector, and Electricity Human Resources Canada has launched several initiatives to promote diversity and equality in the workforce. These include a Leadership Accord on Gender Diversity in the Canadian Electricity Industry—a public commitment by employers and others to promote diversity and inclusion—and the Connected Women Mentorship Program.

The Government of Canada is committed to working with the sector to sustain and improve Canadian expertise in nuclear science and technology, in collaboration with provinces and territories, Indigenous governments, and communities.

a) The Government of Canada is committed to supporting post-secondary research and research training at universities and research organizations. Canada is a world leader when it comes to investing in research at postsecondary institutions, ranking first among G7 nations and eighth among OECD nations.

To this end, the Government provides support through a number of different programs and institutions, such as the Natural Sciences and Engineering Research Council (NSERC), the Canada Research Chairs Program, and the Canada Foundation for Innovation, that researchers and industry can leverage to advance research for the nuclear sector's benefit.

In addition to the support provided to Canadian universities and research organizations, the Government is investing heavily in the revitalization of the Chalk River Laboratories, which is owned by AECL and managed by CNL through a Government-owned, Contractor-operated model. For almost six decades, the Chalk River Laboratories have been at the centre of scientific advancements in Canada, from the development of Canada's nuclear power reactor technology, to research leading to the use of medical isotopes in the detection and treatment of various types of cancer. Today, the Chalk River Laboratories are Canada's largest science and technology

complex and support work in areas as varied as energy, health, environment, and safety and security.

The Government has committed $1.2 billion over ten years to new and renewed science infrastructure and site support services at Chalk River Laboratories. The result will be a world-class science campus that is equipped to serve the needs of Canadians as well as industry. This investment will allow Canada to continue to be at the forefront of nuclear research and development for many decades to come.

By investing in renewing the laboratories' infrastructure, the government is leveraging the laboratories' unique capabilities with a goal of fostering innovation across the value chain. For instance, existing capabilities which support basic research for the benefit of the federal government are being leveraged to further support applied research for industry in areas such as life extension and asset management for CANDU operators, radiopharmaceutical development, and the development of small modular and advanced reactors.

b) and c) The Government of Canada is committed to maintaining highly skilled personnel and expertise in all areas of the nuclear sector's current and future activities. Retaining and building nuclear sector expertise is a chief goal for industry. The *Nuclear Safety and Control Act* provides the legislative basis for the qualification, training and examination of nuclear workers, and the General Nuclear Safety and Control Regulations specify that the licensee must ensure the presence of a sufficient number of trained, qualified workers.

The next generation nuclear workforce is diverse and has a strong passion for environmentalism and global citizenship. This is a source of strength for the industry. To create opportunities to engage youth and develop the next generation of leaders, Canada is joining as a founding member in a new Nuclear Education, Skills, and Technology (NEST) initiative under the Nuclear Energy Agency, with a seat on the Management Board. NEST will marshal researchers from around the world to work on focused projects that generate useful innovation breakthroughs to real-world problems. The initiative will support education and enrichment activities to attract top talent and build lasting networks among next generation leaders in the nuclear sector worldwide.

More broadly, the Government is creating opportunities to enhance learning and foster collaboration with industry in ways that could benefit the nuclear sector:

- Budget 2016 provided $73 million over four years to create new co-op placements and work-integrated learning opportunities for post-secondary students enrolled in science, technology, engineering and mathematics (STEM) and business programs. This investment is expected to create up to 8,700 new work-integrated learning placements over the next four years, making more opportunities available to young women and men interested in STEM.
- Budget 2017 announced renewed and expanded funding of $221 million over five years, starting in 2017-18, for Mitacs, a not-for-profit organization that builds partnerships between industry and educational institutions. Mitacs has set an ambitious goal of nearly tripling the number of work-integrated learning placements for Canadian post-secondary students and graduates to 10,000 placements annually. Mitacs placements with industry have included projects focused on areas of interest to the nuclear industry, including: probabilistic safety analysis for nuclear technologies; safety assessment

methods for nuclear fuel waste; engineering analysis for CANDU 6 reactors; and analysis related to refurbishment and life extension of nuclear power plants. The nuclear industry could further take advantage of Mitacs to engage high quality graduate students and post-doctoral fellows to work on projects important to nuclear innovation.

- NSERC Industrial Research Chair Grants help industry and academia collaborate on research and training in areas where there is an important industrial need. Through organizations such as UNENE and NWMO, the sector has already successfully established Industrial Research Chairs in areas of nuclear safety, nuclear engineering, materials science, health physics and environmental safety, and waste disposal, among others.
- NSERC Collaborative Research and Development Grants help companies access unique knowledge, expertise, and educational resources available at Canadian postsecondary institutions and to train students in essential technical skills required by industry. Through organizations such as UNENE, the sector has established a number of collaborative grants in support of the nuclear industry's current operations in Canada.
- NSERC's College and Community Innovation Program provides Innovation Enhancement grants that enable Canadian colleges to increase their capacity to work with local companies, particularly small and medium-sized enterprises (SMEs). The grants support the growth of applied research capacity, leading to increased business collaborations that facilitate commercialization, as well as technology transfer, adaptation and adoption of new technologies.
- Networks of Centres of Excellence (NCE) programs, supported by Canada's three federal research agencies, seek to focus research resources on social and economic challenges, commercialize research breakthroughs, increase private-sector research and development, and train highly qualified people. NCE programs include Business-Led Networks of Centres of Excellence (BL-NCE), which fund large-scale collaborative research networks that bring a wide range of research expertise to bear on specific challenges identified by an industrial sector.

Federal investments at Chalk River Laboratories are also a recognition that Canada needs to maintain and grow its number of highly qualified personnel in nuclear science, and further develop its knowledge and capabilities for advanced reactor designs. This includes investments in research and development through AECL's Federal Nuclear Science & Technology Work Plan and commercial revenues generated by the laboratories in support of nuclear industry and researchers. These efforts are aligned with the needs of Canada's nuclear industry, the Government's broader innovation priorities, and Canada's overall competitive advantage.

AECL, in partnership with nuclear power plant operators, the CANDU Owners Group, Canadian universities, and the Canadian Nuclear Society has also established the CANTEACH program, a repository of legacy technical materials relating to CANDU power plant technology. The aim of CANTEACH is to develop, maintain and electronically disseminate a comprehensive set of education and training documents. Other industry members and the CNSC also contribute information to the program.

RECOMMENDATION #6: ***The Committee recommends that the Government of Canada continue to support the development of small modular reactors (SMRs), recognizing the potential for SMRs to provide clean and reliable power to remote and northern communities and open new areas to economically valuable resource development.***

GOVERNMENT RESPONSE:

The Government of Canada agrees with this recommendation, understanding that SMRs are at an early stage of development in Canada, that many questions need to be answered before their potential can be realized, and that the views and needs of northern and remote communities will be central to decisions regarding northern and remote energy solutions. The Government sees this recommendation as directly linked to the *What's Next for Nuclear* theme #5: a Canadian nuclear strategy could help guide future partnerships and investments, which includes the area of emerging technologies such as SMRs. The *What's Next for Nuclear* theme #1—that the Government of Canada is an important partner, essential for industry's success—also applies.

SMRs operate at a smaller scale than current nuclear power plants. Although not yet commercially proven in Canada, they may have future applications on the power grid in Canada as a replacement to fossil fuel power plants or as load-following units equipped with systems for storing excess electricity to complement larger shares of variable renewables. SMRs may also have applications in the production of heat and electricity at both on- and off-grid industrial sites, and to help off-grid northern and remote communities reduce their reliance on diesel. As such, they have the potential to support a range of Government priorities, including: enabling innovation, growth, and job creation; meeting Canada's greenhouse gas reduction targets and growing the economy; developing clean energy in northern and remote communities; and promoting clean technologies for Canada's natural resource sectors.

Developers are interested in developing and demonstrating SMRs in Canada in particular because of Canada's stable economy, nuclear expertise and existing supply chain, and a credible regulatory system that allows for innovation.

The Government has taken steps to understand the landscape for SMRs in Canada with a view to advancing Canadian priorities and supporting industry efforts to develop these innovative technologies. In 2016, Natural Resources Canada co-funded a study with the Ontario Ministry of Energy on the economics and technological readiness of SMRs for Ontario, which found that most of the technologies evaluated were compatible with the needs of remote mines and communities at prices competitive with diesel power. CNL is undertaking research on SMRs as part of AECL's Federal Nuclear Science and Technology Work Plan to better understand these technologies with respect to federal responsibilities and priorities. From June to August 2017, CNL opened a Request for Expressions of Interest to gather input regarding SMR technology in Canada and the role that the laboratories can play in bringing this technology to market.

The CNSC offers a pre-licensing Vendor Design Review (VDR) service to assess a nuclear power plant design based on a vendor's reactor technology. This service is available to SMR developers. These reviews are optional and do not certify a reactor design, but they do verify, at a high level, the acceptability of a design with respect to Canadian nuclear requirements and expectations, as well as Canadian codes and standards. They also identify fundamental barriers to licensing a new design in Canada and assure that a resolution path exists for any design issues identified in the review. Five VDRs were underway at the time the CNSC gave evidence to the

Standing Committee in November 2016; at the time of the Government's response, the number of VDRs has increased to at least seven.

The CNSC is also examining its licensing framework for SMRs. In 2016, the CNSC sought input on a discussion paper (DIS 16 04) on the appropriate regulatory measures for SMRs, which will help shape the regulatory framework for oversight in the future.

Starting with provinces, territories, and utilities, the Government of Canada will use its convening power to bring together a dialogue to develop a Canadian roadmap for SMRs. It will seek to build on the initiatives that have already been advanced by key stakeholders such as AECL, CNL, the Canadian Nuclear Association, and the CANDU Owners Group and explore options and a vision for SMRs in Canada.

STANDING COMMITTEE RECOMMENDATION #7: ***The Committee recommends that industry, along with academia and innovators, establish a nuclear innovation council with representatives from the federal and provincial governments to leverage non-power applications (e.g., for health care, agriculture, manufacturing, etc.) of the nuclear sector for national benefit.***

GOVERNMENT RESPONSE:

The Government of Canada agrees with this recommendation, which aligns with the *What's Next for Nuclear* theme #5 that the nuclear industry has a bright future—not only in power, but across the full spectrum of the industry—and that an overall strategy could help guide future partnerships and investments. It also aligns with an overarching theme of the importance of partnerships, bringing together industry, academia, Indigenous governments and communities, and provincial and territorial governments. Each has a role to play, and sharing a common vision for the future of nuclear in Canada would be of immense value in charting a path forward.

The Government is committed to working in partnership with the provinces, territories, Indigenous governments and communities, academia, and industry to further Canadian priorities and to bring a Canada-wide approach to the advancement of Canada's nuclear sector. To this end, an innovation council could enable collaboration and promote both power and non-power applications of nuclear expertise and technologies. It could also serve an advisory function, strengthening Government of Canada stakeholder consultations in the areas of nuclear innovation policy and programming.

If industry, along with academia and innovators, were to establish an innovation council with representatives from the federal and provincial governments, this could provide a useful forum for to continue our discussions on *What's Next for Nuclear* in Canada that took place under Generation Energy. In this way, an innovation council could serve as one of the vehicles for developing and advancing a common vision on the future of nuclear in Canada.

Cost of nuclear medicine skyrocketing, doctors say patient access to tests could be limited


ELIZABETH PAYNE, OTTAWA CITIZEN
More from Elizabeth Payne, Ottawa Citizen
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Aerial view of the Atomic Energy plant in Chalk River. OTTAWA CITIZEN

Nuclear medicine doctors are sounding alarms about the skyrocketing cost of medical isotopes, something they say could limit patient access to sophisticated tests for cancer, heart disease and other illnesses.

The cost of some nuclear medicine have increased by as much as 1,000 per cent recently, say physicians, partly as a result of the shutdown of isotope production at the National Research Universal (NRU) reactor at Chalk River this fall.

The rapid price increase is “significant enough that hospital budgets will either have to be revised or they will have to decrease procedures,” warned Dr. Norman Laurin, past-president of the Canadian Association of Nuclear Medicine. Tight hospital budgets in Ontario and elsewhere leave little wiggle room to absorb massive price hikes in the compounds that are used for diagnostic scans.

One result will likely be greater use of CT scans for diagnostic tests, which, in some cases, are less accurate and can expose patients to as much as 25 to 50 per cent more radiation. There will also be longer waiting lists for tests, said Dr. Andrew Ross, the Halifax-based current president of the Canadian Association of Nuclear Medicine.

A medical isotope is a radioactive substance used, in small amounts, in the diagnosis of health conditions of the heart, the circulatory system and organs.

The Canadian Association of Nuclear Medicine wants the federal government to set up a transition fund, to help provinces deal with price hikes and an unstable market. It also

wants the federal government to look at lessening the regulatory burden on medical isotopes, which might improve the supply.

“We are saying that unless there is a very high level of brainstorming between the federal government, the provinces and the profession to tackles these issues, the risk is that Canadians will not get access to important tests for the diagnosis and treatment of their diseases,” said Laurin.

Nuclear medicine experts and others warned of coming shortages or price hikes beginning in about 2008 when a series of outages at the National Research Universal (NRU) reactor in Chalk River “highlighted (the) fragility of the supply chain that delivers medical isotopes … to patients in Canada and globally,” according to Natural Resources Canada. The then Conservative government also announced plans to stop isotope production at NRU in 2016.

At one time, the NRU, the world’s oldest experimental reactor, was responsible for up to 50 per cent of the world’s medical isotope production, said Laurin. The type of isotope that was produced in Chalk River, accounts for about 80 per cent of nuclear diagnostic procedures.

Until recently, Canada continued to be a major supplier of medical isotopes, but now that has stopped. The nuclear reactor will be put on hot standby for 18 months, meaning it could be restarted in a matter of weeks, and then it will be shut down. Ross said it is possible it could be restarted if there is a shortage in the world supply.

The rising price of medical isotopes is the result of several factors, said Laurin. The loss of one of the major players in the market, Canada’s NRU, is key. At the same time, the price of pharmaceutical agents that combine with the isotopes have also risen sharply. Isotopes used in nuclear medicine are coming from suppliers in South Africa, Australia and elsewhere, which also adds to the cost.

The result of the price hike is that decisions are being made about which tests can be offered to patients and which are too expensive.

“For patients, it means hospitals have to make decisions in terms of which tests they can afford to provide to patients. The tests that they can afford are not necessarily the best tests,” said Dr. Jean-Luc Urbain, a former president of the Canadian Association of Nuclear Medicine.
The federal government has invested tens of millions of dollars into research to find an alternate source of medical isotopes, but supplies are expected to remain limited and prices high for the near future. Potential alternatives are just at the early stages of clinical testing.

The Ontario government, meanwhile, is reviewing the situation, said a spokesman, “and engaging with all relevant ministry partners to better understand the reasons behind any price increases, implications and possible solutions.”

Mayor worried about the loss of Chalk River nuclear reactor


ANDREW DUFFY
More from Andrew Duffy
Published on: March 16, 2015 | Last Updated: March 16, 2015 4:54 PM EDT


Deep River Mayor Joan Lougheed

Deep River Mayor Joan Lougheed says the federal government's decision to shutter the nuclear reactor that put her town on the map is troubling and short-sighted.

"We still have a large number of citizens who are employed there so whenever there's change, there's always concern," the mayor said in an interview Monday. "There's a lot of interest in what's going on there — and what the future will bring."

Deep River, which is now celebrating the 70th anniversary of its founding, was purpose-built in the mid-1940s to accommodate the scientists and technicians hired to work in Canada's top nuclear research laboratory.

The federal government confirmed Monday that the nuclear reactor at the heart of those research labs — which came online in 1957 — will be permanently shut down in three years. The National Research Universal reactor (NRU), which now produces medical isotopes and supports nuclear research, will cease operations on March 31, 2018.

Lougheed said the town is preparing for the shutdown while at the same time lobbying the federal government to change its mind.

RELATED

- Historic NRU reactor at Chalk River to close in 2018
- Timeline of National Research Universal reactor (NRU) at Chalk River
- Expanded medical isotope production part of Chalk River legacy

Deep River has joined with Renfrew County council to hire a lobbyist to press its case with federal officials. They want the government to keep the reactor active while building a new one.

“There’s a joint effort to lobby the government about the importance of the reactor — both historically and for the future of nuclear research,” Lougheed said. “We’re hoping the effort creates awareness about how important the facility is.”

The Chalk River nuclear reactor is operated by Canadian Nuclear Laboratories (CNL), a subsidiary of Atomic Energy of Canada Limited (AECL), a Crown corporation.

In a news release, CNL president Bob Walker said that while the reactor is a big part of the program at Canadian Nuclear Laboratories, it is not the only part: the reactor supports about one-third of the organization’s work.

What’s more, he said, the reactor will require its existing workforce for the next five years as it’s monitored and then decommissioned. “New opportunities are expected to present themselves over the years ahead. We will be actively working to retain, retrain and redeploy those staff eventually affected by the shutdown of the NRU (reactor).”

Later this year, the federal government is expected to name the private sector firm that has won the contract to manage all of the former AECL sites now under CNL control.

Mayor Lougheed said the private firm, when it takes over management of the research facility in Chalk River, may be open to a new approach.

“There could be a change in decision-making once the government-private company partnership is implemented,” Lougheed said. “There may be a will under that management model to go back in the direction of maintaining the reactor or starting to build a new one.”

Lougheed said the shutdown of the nuclear reactor is expected to affect 300 people who work at CNL’s Chalk River Laboratories, which employs about 3,000.

Maintaining the aging nuclear reactor has become an expensive proposition. According to the federal government, taxpayers will have spent more than $460 million to keep the reactor in service and operating safely between 2008 and 2016.

County calls on feds to keep NRU running

Renfrew County council thinks NRU reactor can last longer and there should be a plan to replace it

- The Daily Observer
- 16 Dec 2017
- SEAN CHASE

The County of Renfrew is calling on the federal government to extend the life of the National Research Universal (NRU) reactor at Chalk River for another three years.

As it stands now, the NRU will begin shutdown and decommissioning procedures on March 31, 2018 when its operating licence expires. However, County council has passed a resolution seeking an extension so the NRU can continue producing medical isotopes.

“We urge the Canadian government to decide now to continue operating NRU until at least 2021, and use that time to order a new reactor vessel and plan refurbishment for 25 years,” said Petawawa Mayor Bob Sweet, chairman of the development and property committee, as he introduced the motion.

Canadian Nuclear Laboratories (CNL), the corporation that manages Chalk River under the Government-owned, Contractor-operated (GoCo), has applied to the Canadian Nuclear Safety Commission (CNSC) for a 10-year renewal of its operating licence. Recently the NRU/CNL Alumni Network has forwarded a proposal to keep the NRU running, while working with South Africa in terms of isotope manufacturing and nuclear research. Canada and South Africa signed a nuclear co-operation agreement in 2016 setting out the transfer of Canadian-supplied nuclear material, equipment and technology. Renfrew Reeve Peter Emon pointed out that the alumni network’s proposal hits on themes presented by the county back in 2015 when stakeholders were asked for their opinions on how Chalk River should be managed under GoCo.

“We were of the opinion that the NRU could last longer and there should be a plan to replace it,” said Renfrew Reeve Peter Emon noting that the reactor, which just marked its 60th anniversary, is still in good shape. “There is a viable market that should not be shut down by the federal government.”

The county resolution also calls for Ottawa to consider continuing to operate the Canadian Neutron Beam Centre and design a new business model for the production of Molybdenum-99 (Mo99), which is used for diagnostic nuclear medical imaging. Atomic Energy of Canada Limited (AECL) should also lead a consortium that would replace the inefficient and unfair supply chain model with an industrial radiopharmacy model centred at Chalk River, the resolution added. That consortium would work with South Africa on the

design and construction of a fully-integrated Mo-99 production facility at a CANDU reactor site. Finally the resolution calls for the launch of an international trade organization to deal strictly with the export of Mo-99.

Deep River Reeve Glen Doncaster conceded that the eve of the NRU shutdown was not the most opportune time for the NRU/ CNL Alumni Network to unveil this ambitious proposal adding it should have commenced five years ago. He explained that the NRU and the 52-year-old South African reactor, Safari-1, which is also slated for shutdown, were the world's largest producers of medical isotopes.

"The NRU has produced many outstanding science and technology achievements over its lifetime," said Doncaster.

Despite breakdowns and safety concerns, AECL has said that NRU is safe to operate until at least 2021. He explained that AECL had been producing isotopes for MDS Nordion, a leading provider of medical isotopes and radiopharmaceuticals, at a loss financially. The shutdowns in 2007 and 2008 forced the government to look at the NRU, Doncaster added, and decide to get out of the isotope business. However, if even parts of the resolution are implemented Doncaster feels it will be good for a nuclear industry that accounts for 110,000 jobs in Canada.

"Being able to continue that technology using the NRU reactor or a similar type reactor to continue to advance that science and to perform safety case experiments in relation to CANDU technology is important to this country," he said.

Office of the
County Warden

County of Renfrew
Ontario . Canada
Experience Our History, Share Our Future!

9 INTERNATIONAL DRIVE
PEMBROKE, ON, CANADA
K8A 6W5
613-735-7288
FAX: 613-735-2081
www.countyofrenfrew.on.ca

November 29, 2017

The Honourable Jim Carr
Minister of Natural Resources Canada
House of Commons
Ottawa ON K1A 0A6
Email: Jim.Carr@parl.gc.ca

RE: Chalk River National Research Universal (NRU) Reactor

Dear Minister Carr:

At the November 29, 2017 session of Council of the Municipal Corporation of the County of Renfrew, the following resolution was passed:

> WHEREAS we have been assured by Atomic Energy of Canada (AECL)/CNL that NRU can be licensed and safely operated up to March 2018, and very probably licenced up to 2021;
> AND WHEREAS logically the operating cost of a multi-purpose research reactor like NRU should be shared among the various users;
> AND WHEREAS "With regard to radioisotopes, we're [South Africa] major world players—the number two exporter of medical radioisotopes in the world...We export to 60 countries every day...And it is a profitable business. We undertake that patients can be injected with our products no later than 36 hours after it comes out of the reactor, even if the patient is on another continent...The idea now is to make Pelindaba a two-reactor site. After 20 years or so, Safari-1 [now 52 years old] would be replaced." –Dr. Kelvin Kemm, chairperson of the South African Nuclear Energy Corporation (Necsa);
> AND WHEREAS two CANDU 600 reactors would not only fill South Africa's need for electricity, but produce medical isotopes and desalinated water for reactor cooling; and just two CANDU Mo-99 target bundles a week from a dedicated target channel could supply the entire world with Mo-99, earning $1.1 billion/year* to an AECL-led consortium selling Mo/Tc generators and Tc-99m loaded syringes to hospitals;
> AND WHEREAS the total electricity revenue from Point Lepreau at 7 cents/kWh and 80% capacity factor would be $312 million/year – and electricity would be a by-product of Mo-99 production!
> *Assuming 250 kW per target bundle, and 55% Mo-99 losses from radioactive decay and chemical processing.
> NOW THEREFORE we urge the Canadian Government to:
> 1. Decide now to continue operating NRU until at least 2021, and use that time to order a new reactor vessel and plan refurbishment for 25 years.
> 2. Continue to operate the Canadian Neutron Beam Centre, and resume Mo-99 production with LEU targets until the shutdown for refurbishment.

3. Design a new business model for Mo-99 production, whereby AECL would lead a consortium, which would replace the inefficient and unfair 'Supply Chain' model with an 'Industrial Radiopharmacy' model, centred at Chalk River. Australia and South Africa have already successfully implemented that model.
4. Draft a Memorandum of Understanding (MOU) within the Canada-South Africa nuclear cooperation agreement, with respect to a proposed medical isotope consortium, focusing on the design and construction of a fully-integrated Mo-99 production facility at a CANDU reactor site, incorporating a dedicated fuel channel loaded with Safari-1 Mo-99 target bundles; and at the same time planning the irradiation testing of full-scale prototype target bundles in the NRU loop facility.
5. Review and expedite 'Implementing Procedures' with respect to the 2016 Canada-South Africa nuclear cooperation agreement, with the objective of removing any barriers to the sale of CANDU reactors, medical isotopes, LEU nuclear fuel and LEU Mo-99 targets to South Africa.
6. Challenge the Canadian Neutron Beam Facility and the CNL Metallurgy Laboratory to develop a 40-year pressure tube for CANDU reactors.
7. Launch an international trade organization designated OMEC – "Organization of Mo-99 Exporting Countries" – with the objective of coordinating and unifying Mo-99 policies among member countries to secure fair and stable prices for Mo-99 procedures and radiopharmaceutical suppliers; an efficient, economic and regular supply of Mo-99 to consuming nations; and a fair return on capital to investors.

Yours sincerely,

Jennifer Murphy

Jennifer Murphy, Warden
County of Renfrew
warden@countyofrenfrew.on.ca

c. MP Gallant, Renfrew-Nipissing-Pembroke
John W. Hilborn, Retired Physicist AECL

Town of Deep River

Quick Facts

- Located on the Trans-Canada Highway mid-way between Ottawa and North Bay, offering access to key North American markets and the Ottawa International Airport.
- Population: **4,100** with an median household income of **$90,321.00.** The average home sale price in 2015 was **$272,000.00.**
- Largest employers: CNL (2900 employees in the area); Garrison Petawawa (6700 employees in the area); and science & technology companies Eddy-Fi, Bubble Tech and Tyne Engineering.
- Highly educated community, with 80% of residents having a post-secondary certificate. Popular areas of study are architecture, engineering, physical & life sciences, business management and administration, and health.
- Home to full-time Police and Fire Departments, an award-winning hospital, a Catholic school (grades JK to 8) and a public school (grades JK to 12).
- Major retailers include Canadian Tire, Home Hardware, Giant Tiger, Mark's Work Warehouse, and Valu Mart Groceries. Other amenities include restaurants, hotels, camp grounds, a gym, daycare, and 10 places of worship.

Deep River offers the perfect blend between opportunities in the high-technology nuclear industry and a laid back, close-to-nature lifestyle.

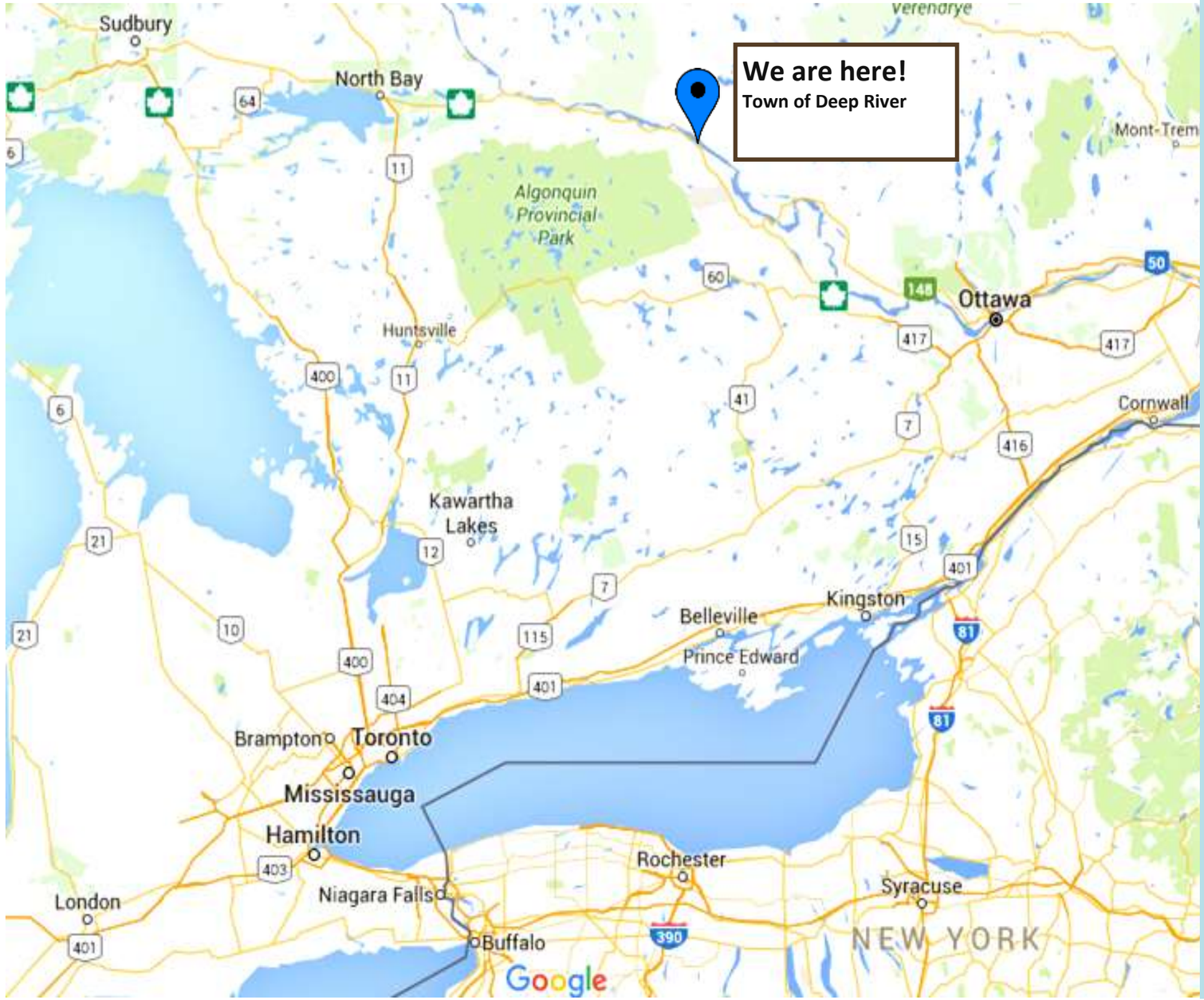
Canadian Nuclear Laboratories

- Visit their website at **www.cnl.ca**
- Involved in healthcare, biology, chemistry, environmental science, electronics, condensed matter physics, nuclear design, safety, waste management, and even space exploration.
- Currently transitioning to a government-owned, contractor -operated (**GOCO**) model headed by the Canadian National Energy Alliance (**CNEA**)
- **2900 of 3500** CNL employees work at the Chalk River Laboratories site, with another 600 in Pinawa and Port Hope.
- **880** CNL employees and their families reside in Deep River.
- CNL has generated an estimated **4930** total jobs in this area (directly and indirectly).
- CNL payroll in the county: **$240 million/year** (not including pensioners).
- CNL revenues: **$600 million/year.**
- **260** companies in Ontario supply **$40 million** worth of goods & services to CNL each year.

Garrison Petawawa

- Visit their website at **http://www.army-armee.forces.gc.ca/en/cfb-petawawa/index.page**
- Located in Petawawa, Ontario—a 20 minute drive from Deep River
- The **largest military base** in Canada
- **6,100** military personnel live in Petawawa with 7,000 family members and 900 civilians for a total population of **14,000**

www.deepriver.ca
(613) 584-2000
townmail@deepriver.ca



Visit us from…

North Bay	166km	1h 40m
Ottawa	193km	2h 5m
Kingston	290km	3h 20m
Toronto	425km	5h
London	604km	6h 30m
Syracuse	476km	4h 40m
Buffalo	635km	6h

Our Official Plan Review

An Exciting New Vision

Preservation and enhancement of the Deep River parkland and trail system – Deep River is a one of a kind planned community.

Expansion of the commercial growth area along the Highway 17 corridor, including exploring alternatives that avoid the need for new, direct access entrances onto Highway 17.

Promoting the revitalization of the downtown area, including the marina and waterfront.

Extending sewage disposal infrastructure into single-service areas {i.e., water only) to avoid future development of partial services.

Attraction of more CNL employees to minimize transportation and commute times. Deep River is the Company Town for CNL.

Promotion of green energy initiatives and encouraging sustainable design elements in new construction, including Leadership in Energy and Environmental Design {LEED) certification.

Upgrade and expansion of the water, sewage and storm water infrastructure required to achieve the desired community vision for Deep River.

Promotion of bicycle use and investment in related infrastructure including bicycle parking installations at public facilities.

Extensive research and community consultation relating to affordable housing and senior's housing options.

Official Plan Summary

The Town of Deep River is undertaking a review of its Official Plan to support the sustainability of the community. The goal of the review is to develop a new, community-based Official Plan through evidence based community consultation. Over the past year Council has appointed the Deep River Official Plan Review Steering Committee to oversee two Official Plan Workshops (Planning Issues Identification and Community Visioning), and meetings with residents, members of the business and land development communities, and representatives from Canadian Nuclear Laboratories (CNL). The community response has been extremely positive with an overwhelming desire for aggressive growth and development that will strengthen the social,economic and environmental fabric of the community. This vision will succeed by completing the following objectives:

- Attracting more employees from CNL and Garrison Petawawa to live in Deep River.
- Promote a diversity of housing types through intensification and the development of identified growth areas in the community.
- Maintain Downtown Deep River as a focus of economic, cultural, residential and recreational uses.
- Promote the Trans-Canada Highway (17) as a destination for commercial development that will benefit from access and exposure to this major transportation route through the Town.
- Maintain and enhance the outstanding system of natural and landscaped open spaces, trail systems, Ottawa River waterfront and marina.

The key to implementing the community vision will be strong and collaborative relationships with CNL and Garrison Petawawa, the two major employers in the regional market area. In particular, the Town is exploring partnership opportunities with CNL on mutually beneficial opportunities with CNL including the development of a new multi-use community/discovery centre aimed at promoting the nuclear science heritage and exciting new research being conducted at the Laboratories.

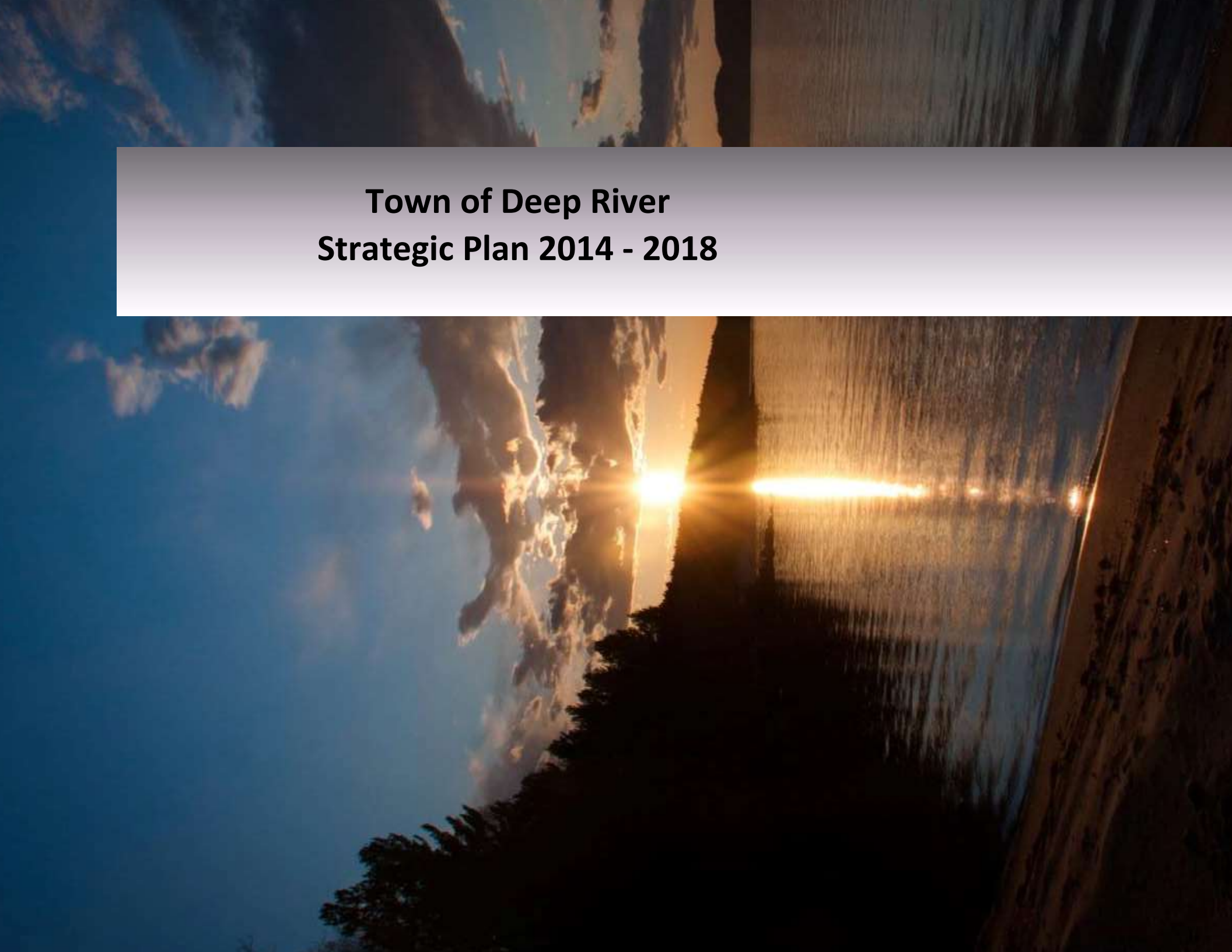
A strong partnership with the Government of Ontario is critical in order to plan for the necessary infrastructure and public service facilities required to serve existing and future residents of Ontario in the Town of Deep River. We look forward to working with you and your Ministry on this exciting venture to strengthen and perpetuate the knowledge economy in Ontario and support innovation in the field of nuclear technology and lifesaving medical advancements.

Thank you / Merci,

Mayor Lougheed and Members of Council

Telephone: (613) 584-2000

Town of Deep River
Strategic Plan 2014 - 2018



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STRATEGIC PLANNING

COUNCIL'S STRATEGIC PLAN

The Town's Strategic Plan is a recurrent work in progress. Over time, new priorities, new opportunities, new pressures and new challenges will emerge. Incorporating annual business plans into the Town's strategic planning process will provide the flexibility required to respond quickly and effectively to changing circumstances and directions.

ANNUAL BUSINESS PLANNING PROCESS

The 2014 - 2018 Strategic Plan is the essential driver of the Town's annual business planning process. Council's strategic goals are incorporated into annual departmental business plans and budgets. This process is outlined in Appendix One.

COMMUNITY BUILDING FRAMEWORK

The strategic plan and work plan are critical elements of the Town's comprehensive community building framework that will empower the Town to achieve its vision to be **"an attractive and prosperous community".**

COUNCIL'S 2014 - 2018 WORK PLAN

For our mission, vision and values to have positive impact on the municipality, they must be accompanied by deliberate actions to propel the community toward desired outcomes. Council's 2014 - 2018 Work Plan outlines the goals, actions and measures that will help achieve Council's strategic directions. It also provides a framework to help guide decision-making and resource allocation. (See Appendix One).

The emphasis of this work plan is on the strategies and actions that will accomplish Council's desired focal points for 2014 - 2018. Measures have also been established for the strategic goals captured in the Town's vision, mission and values. The actions and strategies to achieve Council's goals will be addressed and monitored through annual departmental business plans.

WE BELIEVE IN

Accountability – We deliver what we promised. We are accountable for our actions and results. We are accountable for the efficient and effective use of public funds.

Dedication – We willingly take on responsibility. We are committed to serving our community. We take initiative and we take on our share of the workload.

Honesty – Each of us demonstrates personal integrity, truthfulness and honesty in how we do our job. We inspire public confidence and trust in our government.

Innovation - We pursue innovation by being creative, showing initiative and taking risks. We encourage employees to exercise judgment in meeting customer needs.

Respect – We value an open, respectful and inclusive workplace. We value the cultural and social diversity of our community. We make it possible for every resident to participate in our community, and in our government.

Teamwork – We act as a team. We demonstrate high levels of trust and cooperation. We collaborate across departments to achieve our goals. We work in partnership with our community.

FOUR FUNDAMENTAL PILLARS

OUR MISSION

"To achieve balanced and sustainable socioeconomic prosperity!"

Our mission describes both our purpose and our practices. It acknowledges that the Town serves multiple stakeholders, and all of their interests are important to us. Our mission also speaks directly to our employees, without whose dedication, commitment and contributions we will not achieve our goals.

OUR VISION

"Deep River is an attractive and prosperous community, driven by extraordinary volunteers, supported by exceptional municipal services!"

Our vision is the future that our strategic plan is built upon and aligned toward. It describes a future conceptual understanding of the community we are collectively committed to achieving. Our vision and mission are founded upon the values that guide all of our actions and decisions. These values reflect what we expect from both our employees and our elected officials.

OUR VALUES

Our core values are the guiding principles that dictate behaviour and action. Core values can help people recognize what is right from wrong; they will help determine whether the Town is on the right path to achieve established business goals. Values establish an unwavering and static benchmark.

1. **Actively open and transparent communications between the Community and government, at all times and in both directions**
2. **As leaders, value everyone in our community equally, listening to all, and acting for the majority, effectively and then efficiently, favoring none above another in the proposed outcomes**
3. **Plan for, and invest in, the future so that the next generation can build upon our successes**
4. **Do no un-remedied harm to the physical environment**
5. **Embrace change prudently, without fear**
6. **Encourage newcomers since they diversify and strengthen our Community**

OUR STRATEGIC PRIORITIES

Our priorities determine how we bring our vision and values to life. By making progress in these areas and being faithful to our vision and values, we will continue to earn the trust and respect of our residents, help them succeed and strive to become known as one of the nation's best communities.

1. **Ensure that infrastructure is up to date**
2. **Investment in Economic Development**
3. **Leaders in environmental improvements**
4. **Capitalize on Community Groups (with sub-elements)**

STRATEGIC GOALS

1. To be accountable in everything we do,
2. To be innovative in everything we do,
3. To be honest in everything we do,
4. To be dedicated in everything we do,
5. To treat everyone with respect,
6. To act as a team,
7. To enhance our natural environment,
8. To enhance our cultural environment,
9. To enhance our social environment,
10. To enhance our economic environment,
11. To continuously improve our programs and services,
12. To provide accessible programs and services,
13. To be environmentally sustainable,
14. To be fiscally sustainable,
15. To have a process that is as fulfilling as the outcome,
16. To be highly valued and widely celebrated for the innovative and outstanding way we satisfy the needs of our residents,
17. To be highly valued and widely celebrated for the innovative and outstanding way we satisfy the needs of our businesses,
18. To be highly valued and widely celebrated for the innovative and outstanding way we satisfy the needs of our employees,
19. To ensure that our staff receives the same level of respect, commitment and care that they are expected to deliver to the community, and
20. To be **"an attractive and prosperous community"!**

AREAS OF FOCUS

1. To be an attractive and prosperous community,
2. To enhance our economic environment,
3. To enhance our social environment,
4. To be accountable in everything we do,
5. To be fiscally sustainable,
6. To be environmentally sustainable,
7. To provide outstanding service to our residents and businesses, and
8. To continuously improve our programs and services.

Photograph courtesy of Kim Knight

GOAL 1: TO BE AN ATTRACTIVE AND PROSPEROUS COMMUNITY

OBJECTIVE

To develop and implement the community planning framework to achieve our vision to be an attractive and prosperous community.

KEY ACTIONS 2015

- Commence the Comprehensive Review of the Town's Official Plan to conclude in Q4 of 2016
- Initiate a Community Development Grant Program to support volunteer organizations in the community

KEY ACTIONS 2016 - 2018

- Complete the Comprehensive Review of the Town's Official Plan
- Review and complete Zoning by-law update
- Complete urban design guidelines
- Confirm water and sewer infrastructure will meet future community needs
- Defend site specific planning application appeals at the OMB

MEASURES

- Annual progress report to Council

GOAL 2: TO ENHANCE OUR ECONOMIC ENVIRONMENT

OBJECTIVE

To create and support conditions that will ensure a thriving and sustainable local economy.

KEY ACTIONS 2015

- Appoint an Economic Development Advisory Committee to Council
- Participate in the First Impressions Community Exchange Program (FICE)
- Support Canadian Nuclear Laboratories
- Work with Canadian Nuclear Laboratories to move forward with providing the Chalk River Site with potable water
- Continue to develop strong working relationships with Chamber of Commerce, businesses and Renfrew County municipalities
- Launch annual economic development forums to bring local business leaders together to assist with the development of ongoing strategies to attract investment and retain businesses in Deep River

KEY ACTIONS 2016 - 2018

- Continue to support Canadian Nuclear Laboratories
- Create economic development strategy
- Develop a business retention and expansion program (BR&E)
- Seek opportunities to attract new businesses to Deep River
- Investigate making Deep River a broadband leader in high-speed connectivity to attract residents and businesses (200 gbs)
- Seek partnerships to support community development including new facilities
- Develop strategies to expedite business development through the approval process
- Define strategies and partnerships to achieve a Science Technology Park
- Continue to work with the business community to identify opportunities for existing employment areas

MEASURES

- Official Plan to identify new employment lands
- Set appropriate target to increase ratio of jobs per population
- Establish growth plan targets

GOAL 3: TO ENHANCE OUR SOCIAL ENVIRONMENT

OBJECTIVE

Take a leadership role in identifying opportunities to enhance the well-being of our community and work collaboratively with the community and the County of Renfrew to promote community well-being.

KEY ACTIONS 2011

- Appoint a Housing Advisory Committee to Council
- Investigate Housing options for residents within the community
- Complete site plan, building approvals and construction tenders to ensure timely development of new Deep River Primary Care Building
- Appoint an Accessibility Advisory Committee to Council

KEY ACTIONS 2016 - 2018

- Develop and implement Comprehensive Housing Strategy
- Construct Primary Care Building and install tenants
- Initiate an Accessibility Plan that promotes inclusion for all
- Celebrate Deep River's cultural diversity
- Create quarterly welcome events to attract young families and new residents to the Town of Deep River hosted by local businesses, community clubs and associations

MEASURES

- Survey residents to determine how they would rate Deep River's sense of community.
- Establish a baseline measure and determine targets for improvement
- Annual progress report to Council

GOAL 4: TO BE ACCOUNTABLE IN EVERYTHING WE DO

OBJECTIVE

To ensure public confidence by promoting open, effective and transparent governance.

KEY 2015 ACTIONS

- Implement a “Code of Conduct for Council and Staff
- Identify opportunities for governance training for staff, appointees and Council
- Redevelop website to make information more accessible to the public and to promote open and transparent decision-making
- Engage users of municipal facilities to gather intelligence
- Complete new four year Council strategic work plan
- Ensure compliance with accessibility legislation
- Initiate Standing Committee System
- Create Audit committee - Auditor’s Management Letter
- Strengthen Procurement Policy
- Strike advisory committees for Housing, Accessibility, Economic Development and the Environment
- Create a 70th Anniversary Advisory Committee

KEY 2016-2018 ACTIONS

- Develop continuing annual action plans for Council strategic work plan
- Implement ongoing governance training for staff, appointees and Council
- Identify potential partnership opportunities with local agencies and community groups
- Continue to enhance website including implementation of new web-based public engagement solutions
- Complete emergency preparedness and risk management reviews
- Implement actions to establish an affordable and functional Fire Department
- Personal reception of telephone calls to (613) 584-2000
- Update policies and By-laws with introduction of management policies

MEASURES

- Level of public satisfaction with customer service, local government accountability, accessibility, openness and inclusiveness
- External auditor satisfaction with Town financial accountability
- Internal auditor satisfaction with departmental procedures and operations
- Quarterly & Annual reports to Council

GOAL 5: TO BE FISCALLY SUSTAINABLE

OBJECTIVE

To ensure long-term financial sustainability of the Town by developing financial plans that maximize growth, equitable rates and fees, identifies opportunities for savings, maintains highly-valued programs and services and considers the needs of taxpayers.

KEY ACTIONS 2015

- Deliver 2015 budget increase that identifies new user fees and ensures overall increase reflects the needs of the community
- Continue to define and develop key performance indicators to support program performance based budgeting
- Complete five year capital forecast
- Complete and implement Asset Management Plan
- Initiate Marina comprehensive review and financial plan

KEY ACTIONS 2016-2018

- Lobby to be included in MoneySense Magazine's "Canada's Top Places to Live" ranking
- Create a four-year budget with a cumulative tax impact consistent with the rate of inflation
- Complete service delivery review and identify opportunities for savings and service improvement
- Continue to develop and refine Town's online performance measures
- Identify opportunities for additional funding from non-tax revenues
- Identify potential opportunities for staffing redeployment through efficiencies not program cuts
- Demonstrate value of Town programs and services
- Implement business intelligence to support strategic decision-making
- Complete review of user rates and fees
- Create and update ten year capital forecast on an annual basis
- Receive Auditor's Management Letter with no recommendations

MEASURES

- Quarterly and annual financial reports to Council including reserve balances and capital infrastructure gap
- Rate of taxation and level of taxes and fees as percentage of total revenue
- Cost per capita of Town programs and services
- Adherence to optimal replacement schedule for infrastructure and equipment

GOAL 6: TO BE ENVIRONMENTALLY SUSTAINABLE

OBJECTIVE

To develop and promote innovative and sustainable environmental practices that reduce the community impact on the environment.

KEY ACTIONS 2015

- Complete the Energy Management Plan
- Continue to review energy management at Town facilities to identify savings
- Partner with the county of Renfrew to implement the Forest Management Plan
- Competitive process for waste recycling collection with no diversions

KEY ACTIONS 2016 - 2018

- Consider the benefits of undertaking an Integrated Community Sustainability Plan (ICSP)
- Undertake broad-based community consultation into the development of an ICSP
- Complete development and approval of Town's first ICSP
- Implement energy management options at Town facilities
- Reduce costs of waste collection while maintaining service
- Investigate the creation of an Integrated Waste Management Plan
- Investigate the need for a Site Alteration By-law

MEASURES

- Establish baseline energy and environmental monitoring measures
- Combine waste collection services to reduce costs and greenhouse gas emissions highlighting diversion improvements

GOAL 7: TO PROVIDE OUTSTANDING SERVICE TO OUR RESIDENTS AND BUSINESSES

OBJECTIVE

To ensure excellence and accountability in providing effective and efficient customer service to our residents and businesses.

KEY ACTIONS 2015

- Redesign website to improve access to information and online services
- Implement on-line self serve bookings with payment options for convenient service procurement
- Implement real person phone answering to welcome customers to Town services
- Enter into partnership with the County of Renfrew to provide professional planning services
- Establish efficient and effective development review processes to streamline service delivery
- Review web and social media policies to support online community engagement

KEY ACTIONS 2016 - 2018

- Develop data and analytics that accurately reflect quantity and quality of citizen concerns
- Establish and communicate service delivery standards for all Town programs and services to track and improve response times to citizen inquiries
- Review and implement opportunities for additional online services including forms, payments and public feedback
- Review and implement new social media community engagement tools
- Survey residents satisfaction with Town programs and services

MEASURES

- Survey residents and businesses on how they rate the overall quality of service the Town provides
- Set baseline measures and targets for improvement

GOAL 8: TO CONTINUALLY IMPROVE OUR PROGRAMS AND SERVICES

OBJECTIVE

To establish a culture of innovation and renewal to ensure continual improvement in the development and delivery of cost-effective and responsive Town programs and services.

KEY ACTIONS 2015

- Review delivery of key Town programs and services to maximize effectiveness and efficiency of service delivery model
- Maintain infrastructure such as roads, facilities and water and sewer systems in a state of good repair
- Pursue partnership to showcase local artists in Town Hall as a Gallery

KEY ACTIONS 2016 - 2018

- Undertake Citizen Survey to identify programs and services valued by the community, the Town's effectiveness in meeting the needs of the community and identify areas for future improvement
- Implement Asset Management Plan
- Identify funding for ongoing infrastructure renewal projects through annual budget process and grant programs
- Identify funding for ongoing parks renewal and new development projects through annual budget process
- Integrate asset management program into departmental business plans
- Implement Comprehensive Marina Management Plan
- Pursue partnership opportunities for the development of recreation facilities

MEASURES

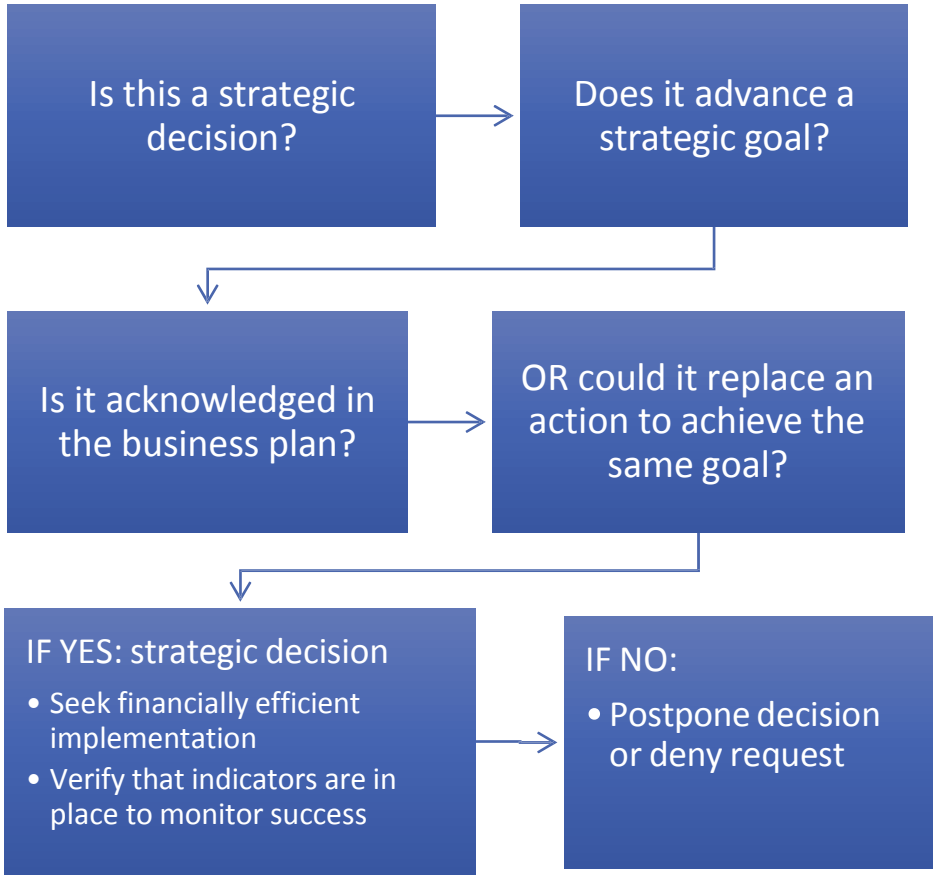
- Level of use and public satisfaction with key programs and services
- Initiate Municipal performance measure benchmarks
- Quarterly and annual reports to Council

APPENDIX ONE

STRATEGIC PLANNING PROCESS

APPENDIX TWO

STRATEGIC DECISION MAKING PROCESS



Attached are the outcomes from the September 21 Council Review of the current Town of Deep River Strategic Priorities.

- The list is kept in the same order for “Goals” and “Objectives”
- “Current Status & Plans” has been updated from the input received from Council at the September 21 meeting. The format has been normalised and terms made consistent:
    - “Completed” means just that. Recommend that these be removed from this list on a future revision.
    - “Completed. Now part of Standard Operating Procedures for Town”. While completed at this time, this activity is now part of the Standard Operating Procedure (SOP) for the Town and will be carried out periodically or when the situation so demands
    - There are a few activities to be completed are shown with a planned date.

GOAL 1: TO BE AN ATTRACTIVE AND PROSPEROUS COMMUNITY	CURRENT STATUS & PLANS
OBJECTIVE: To develop and implement the community planning framework to achieve our vision to be an attractive and prosperous community.	
KEY ACTIONS COMPLETED 2015 TO DATE	
• Initiate a Community Development Grant Program to support volunteer organizations in the community	Completed
• Complete update of Property Standards By-law	Completed
• Complete the Comprehensive Review of the Town's Official Plan	Completed
• Confirm water and sewer infrastructure will meet future community needs	Completed. Now part of Standard Operating Procedures for Town
• Defend site specific planning application appeals at the OMB	Completed. Now part of Standard Operating Procedures for Town
KEY ACTIONS TO BE COMPLETED	
• Review and complete Zoning by-law update	To be completed by Q4 2018
• Complete urban design guidelines	To be completed by Q1 2019
MEASURES	
Annual progress report to Council	

GOAL 2: TO ENHANCE OUR ECONOMIC ENVIRONMENT	CURRENT STATUS & PLANS
OBJECTIVE: To create and support conditions that will ensure a thriving and sustainable local economy.	
KEY ACTIONS COMPLETED 2015 TO DATE	
• Appoint an Economic Development Advisory Committee to Council	Completed
• Participate in the First Impressions Community Exchange Program (FICE)	Completed
• Continue to work with the business community to identify opportunities for existing employment areas	Completed
• Work with Canadian Nuclear Laboratories to move forward with providing the Chalk River Site with potable water	Completed for the Deep River aspects of the work. CNL in process of completing their work on this project.
• Seek partnerships to support community development including new facilities	Completed. Now part of Standard Operating Procedures for Town
• Develop strategies to expedite business development through the approval process	Completed. Now part of Standard Operating Procedures for Town
• Continue to develop strong working relationships with Chamber of Commerce, businesses and Renfrew County municipalities	Completed. Now part of Standard Operating Procedures for Town
• Launch annual economic development forums to bring local business leaders together to assist with the development of ongoing strategies to attract investment and retain businesses in Deep River	Completed. Now part of Standard Operating Procedures for Town
KEY ACTIONS TO BE COMPLETED	
• Review municipal taxes for competitiveness	To be completed by Q4 2017
• Keys Property	Investigate business potential – To be completed by Q3 2018

GOAL 2: TO ENHANCE OUR ECONOMIC ENVIRONMENT	CURRENT STATUS & PLANS
• Laurentian View Dairy	Investigate business potential – To be completed by Q3 2018 Phase 2 environmental assessment
• Create Economic Development Strategy	Commence development in 2018
• Continue to support Canadian Nuclear Laboratories	Will become key focus of Economic Development Strategy for post 2018
• Seek opportunities to attract new businesses to Deep River	Will become key focus of Economic Development Strategy for post 2018
• Define strategies and partnerships to achieve a Science Technology Park	Will become part of Economic Development Strategy for post 2018 A 10-year project.
MEASURES	
Official Plan to identify new employment lands	
Set appropriate target to increase ratio of jobs per population	
Establish growth plan targets	

GOAL 3: TO ENHANCE OUR SOCIAL ENVIRONMENT	CURRENT STATUS & PLANS
OBJECTIVE: Take a leadership role in identifying opportunities to enhance the well-being of our community and work collaboratively with the community and the County of Renfrew to promote community well-being.	
KEY ACTIONS COMPLETED 2015 TO DATE	
• Appoint a Housing Advisory Committee (HAC) to Council	Completed
• Investigate Housing options for residents within the community	Completed. HAC is ongoing and now part of Standard Operating Procedures for Town
• Develop and implement Comprehensive Housing Strategy	Completed
• Appoint an Accessibility Advisory Committee (AAC) to Council	Completed. AAC is ongoing and now part of Standard Operating Procedures for Town
• Celebrate Deep River's cultural diversity	Completed
• Complete site plan, building approvals and construction tenders to ensure timely development of new Deep River Primary Care Building	Determined as not being viable and discontinued as an action
KEY ACTIONS TO BE COMPLETED	
• Initiate an Accessibility Plan that promotes inclusion for all	To be completed by Q1 2018
• Create quarterly welcome events to attract young families and new residents to the Town of Deep River hosted by local businesses, community clubs and associations	Welcome Guide To be completed Q1 2018
MEASURES	
Survey residents to determine how they would rate Deep River's sense of community.	
Establish a baseline measure and determine targets for improvement	
Annual progress report to Council	

GOAL 4: TO BE ACCOUNTABLE IN EVERYTHING WE DO	CURRENT STATUS & PLANS
OBJECTIVE: To ensure public confidence by promoting open, effective and transparent governance.	
KEY ACTIONS COMPLETED 2015 TO DATE	
• Implement a "Code of Conduct for Council and Staff	Completed.
• Identify opportunities for governance training for staff, appointees and Council	Completed. Now part of Standard Operating Procedures for Town
• Redevelop website to make information more accessible to the public and to promote open and transparent decision-making	Completed. Now part of Standard Operating Procedures for Town
• Engage users of municipal facilities to gather intelligence	Completed. Now part of Standard Operating Procedures for Town
• Complete new four year Council strategic work plan	Completed.
• Ensure compliance with accessibility legislation	Completed. Now part of Standard Operating Procedures for Town
• Initiate Standing Committee System	Completed.
• Create Audit committee - Auditor's Management Letter	Completed.
• Strengthen Procurement Policy	To be completed Q2 2018
• Strike advisory committees for Housing, Accessibility, Economic Development and the Environment	Completed.
• Create a 70th Anniversary Advisory Committee	Completed.
KEY ACTIONS TO BE COMPLETED	
• Strike Advisory Committee for 150th Anniversary	Completed.
• Develop continuing annual action plans for Council strategic work plan	Completed. Now part of Standard Operating Procedures for Town

• Implement ongoing governance training for staff, appointees and Council	Completed. Now part of Standard Operating Procedures for Town
• Identify potential partnership opportunities with local agencies and community groups	Completed: Snowmobile Club and Heritage Group. Others ongoing CNL, CNEA, OCWA, Laurentian Hills, Renfrew County, the Inclusion Project, Unity in Diversity, Community Association, etc. Research into new public engagement solutions. Continue to encourage involvement in upcoming events. ONGOING/ ECDV
• Continue to enhance website including implementation of new web-based public engagement solutions	Completed. Now part of Standard Operating Procedures for Town • Monitor flow and ease of use through communication with staff and public. • Post important notices and updates when necessary. • Monitor ease of use and accessibility issues. • Begin research into new public engagement solutions.
• Complete emergency preparedness and risk management reviews	Completed. Now part of Standard Operating Procedures for Town • Ensure annual compliance with Emergency Management Legislation
• Implement actions to establish an affordable and functional Fire Department	Ongoing
• Personal reception of telephone calls to (613) 584-2000	Completed. Now part of Standard Operating Procedures for Town • Continue to monitor satisfaction levels of personal reception of telephone calls at front desk.
• Update policies and By-laws with introduction of management policies	Completed. Now part of Standard Operating Procedures for Town • Finance and Administration to list management policies for review and prioritization
MEASURES	
Level of public satisfaction with customer service, local government accountability, accessibility, openness and inclusiveness	
External auditor satisfaction with Town financial accountability	
Internal auditor satisfaction with departmental procedures and operations	

CURRENT STATUS & PLANS	
GOAL 5: TO BE FISCALLY SUSTAINABLE	
OBJECTIVE: To ensure long-term financial sustainability of the Town by developing financial plans that maximize growth, equitable rates and fees, identifies opportunities for savings, maintains highly-valued programs and services and considers the needs of taxpayers.	
KEY ACTIONS COMPLETED 2015 TO DATE	
• Deliver 2015 budget increase that identifies new user fees and ensures overall increase reflects the needs of the community	Completed.
• Complete service delivery review and identify opportunities for savings and service improvement	Completed.
• Continue to define and develop key performance indicators to support program performance based budgeting	Completed. Now part of Standard Operating Procedures for Town
• Complete five year capital forecast	Completed. Now part of Standard Operating Procedures for Town
• Complete and implement Asset Management Plan	Completed. Now part of Standard Operating Procedures for Town
• Continue to develop and refine Town's online performance measures	Completed. Now part of Standard Operating Procedures for Town
• Identify opportunities for additional funding from non-tax revenues	Completed. Now part of Standard Operating Procedures for Town
• Identify potential opportunities for staffing redeployment through efficiencies not program cuts	Completed. Now part of Standard Operating Procedures for Town
• Demonstrate value of Town programs and services	Completed. Now part of Standard Operating Procedures for Town
• Implement business intelligence to support strategic decision-making	Completed. Now part of Standard Operating Procedures for Town

GOAL 5: TO BE FISCALLY SUSTAINABLE	CURRENT STATUS & PLANS
• Create and update ten year capital forecast on an annual basis	Completed. Now part of Standard Operating Procedures for Town
• Receive Auditor's Management Letter with no recommendations	Completed. Now part of Standard Operating Procedures for Town
• Initiate Marina comprehensive review and financial plan	Completed. Now part of Standard Operating Procedures for Town
• Lobby to be included in Money Sense Magazine's "Canada's Top Places to Live" ranking	In abeyance • Communities of population 5,000 and above only.
KEY ACTIONS TO BE COMPLETED	
• Create a four-year budget with a cumulative tax impact consistent with the rate of inflation	To be completed 2018
• Complete review of user rates and fees	To be completed Q4 2017 • Review other neighbouring Municipalities program rates • Provide recommendations for the annual operating budget.
MEASURES	
Quarterly and annual financial reports to Council including reserve balances and capital infrastructure gap	
Rate of taxation and level of taxes and fees as percentage of total revenue	
Cost per capita of Town programs and services	
Adherence to optimal replacement schedule for infrastructure and equipment	

GOAL 6: TO BE ENVIRONMENTALLY SUSTAINABLE	CURRENT STATUS & PLANS
OBJECTIVE: To develop and promote innovative and sustainable environmental practices that reduce the community impact on the environment.	
KEY ACTIONS COMPLETED 2015 TO DATE	
• Complete the Energy Management Plan	To be completed Q4 2018
• Continue to review energy management at Town facilities to identify savings	Completed. Now part of Standard Operating Procedures for Town
• Partner with the county of Renfrew to implement the Forest Management Plan	Completed. Now part of Standard Operating Procedures for Town
• Competitive process for waste recycling collection with no diversions	Completed. Now part of Standard Operating Procedures for Town
KEY ACTIONS TO BE COMPLETED	
• Integrated Community Sustainability Plan (ICSP)	Post 2018 • Undertake broad-based community consultation into the development of an ICSP • Consider the benefits ad costs • Complete development and approval of Town's first ICSP
• Implement energy management options at Town facilities	Develop Energy Management Strategy: post 2018
• Reduce costs of waste collection while maintaining service	Completed. Now part of Standard Operating Procedures for Town
• Investigate the creation of an Integrated Waste Management Plan	Create Waste Diversion Strategy. To be completed Q1 2018
• Investigate the need for a Site Alteration By-law	Completed
MEASURES	
Establish baseline energy and environmental monitoring measures	
Combine waste collection services to reduce costs and greenhouse gas emissions highlighting diversion improvements	

GOAL 7: TO PROVIDE OUTSTANDING SERVICE TO OUR RESIDENTS AND BUSINESSES	CURRENT STATUS & PLANS
OBJECTIVE: To ensure excellence and accountability in providing effective and efficient customer service to our residents and businesses.	
KEY ACTIONS COMPLETED 2015 TO DATE	
• Redesign website to improve access to information and online services	Completed
• Implement on-line self serve bookings with payment options for convenient service procurement	Completed
• Implement real person phone answering to welcome customers to Town services	Completed
• Enter into partnership with the County of Renfrew to provide professional planning services	Completed
• Establish efficient and effective development review processes to streamline service delivery	Completed
• Review web and social media policies to support online community engagement	Completed
• Review and implement opportunities for additional online services including forms, payments and public feedback	Completed
• Develop data and analytics that accurately reflect quantity and quality of citizen concerns	Completed. Now part of Standard Operating Procedures for Town
• Establish and communicate service delivery standards for all Town programs and services to track and improve response times to citizen inquiries	Completed. Now part of Standard Operating Procedures for Town
• Review and implement new social media community engagement tools	Completed. Now part of Standard Operating Procedures for Town
• Survey residents satisfaction with Town programs and services	Completed. Now part of Standard Operating Procedures for Town
KEY ACTIONS TO BE COMPLETED	
MEASURES	
Survey residents and businesses on how they rate the overall quality of service the Town provides	
Set baseline measures and targets for improvement	

GOAL 7: TO PROVIDE OUTSTANDING SERVICE TO OUR RESIDENTS AND BUSINESSES	CURRENT STATUS & PLANS
• Survey residents satisfaction with Town programs and services	Completed. Now part of Standard Operating Procedures for Town
KEY ACTIONS TO BE COMPLETED	
MEASURES	
Survey residents and businesses on how they rate the overall quality of service the Town provides	
Set baseline measures and targets for improvement	

GOAL 8: TO CONTINUALLY IMPROVE OUR PROGRAMS AND SERVICES	CURRENT STATUS & PLANS
OBJECTIVE: To establish a culture of innovation and renewal to ensure continual improvement in the development and delivery of cost-effective and responsive Town programs and services.	
KEY ACTIONS COMPLETED 2015 TO DATE	
• Review delivery of key Town programs and services to maximize effectiveness and efficiency of service delivery model	Completed. Now part of Standard Operating Procedures for Town
• Maintain infrastructure such as roads, facilities and water and sewer systems in a state of good repair	Now part of Standard Operating Procedures for Town
• Pursue partnership to showcase local artists in Town Hall as a Gallery	Completed.
KEY ACTIONS TO BE COMPLETED	
• Undertake Citizen Survey to identify programs and services valued by the community, the Town's effectiveness in meeting the needs of the community and identify areas for future improvement	Completed. Now part of Standard Operating Procedures for Town
• Implement Asset Management Plan	Completed. Now part of Standard Operating Procedures for Town
• Identify funding for ongoing infrastructure renewal projects through annual budget process and grant programs	Completed. Now part of Standard Operating Procedures for Town
• Identify funding for ongoing parks renewal and new development projects through annual budget process	Completed. Now part of Standard Operating Procedures for Town
• Integrate asset management program into departmental business plans	Completed. Now part of Standard Operating Procedures for Town
• Implement Comprehensive Marina Management Plan	Completed.
• Pursue partnership opportunities for the development of recreation facilities	Completed. Now part of Standard Operating Procedures for Town
MEASURES	
Level of use and public satisfaction with key programs and services	
Initiate Municipal performance measure benchmarks	
Quarterly and annual reports to Council	

Fire Protection and Prevention Act, 1997

S.O. 1997, CHAPTER 4

Consolidation Period: From December 8, 2016 to the e-Laws currency date.

Last amendment: 2016, c. 37, Sched. 9.

CONTENTS

PART I
DEFINITIONS

Definitions

1. (1) In this Act,

"community fire safety officer" means a community fire safety officer appointed under clause 2 (2) (a) or subsection 2 (4) or by an agreement under clause 3 (2) (a); ("agent local de la sécurité-incendie")

"community fire safety team" means a community fire safety team appointed under clause 2 (2) (a) or subsection 2 (4) or by an agreement under clause 3 (2) (a); ("équipe locale de la sécurité-incendie")

"fire chief" means a fire chief appointed under subsection 6 (1), (2) or (4); ("chef des pompiers")

"fire code" means the fire code established under Part IV; ("code de prévention des incendies")

"fire department" means a group of firefighters authorized to provide fire protection services by a municipality, group of municipalities or by an agreement made under section 3; ("service d'incendie")

"firefighter" means a fire chief and any other person employed in, or appointed to, a fire department and assigned to undertake fire protection services, and includes a volunteer firefighter; ("pompier")

"Fire Marshal" means the Fire Marshal appointed under subsection 8 (1); ("commissaire des incendies")

"fire protection services" includes,

(a) fire suppression, fire prevention and fire safety education,

(b) mitigation and prevention of the risk created by the presence of unsafe levels of carbon monoxide and safety education related to the presence of those levels,

(c) rescue and emergency services,

(d) communication in respect of anything described in clauses (a) to (c),

(e) training of persons involved in providing anything described in clauses (a) to (d), and

(f) the delivery of any service described in clauses (a) to (e); ("services de protection contre les incendies")

"Fire Safety Commission" means the Fire Safety Commission continued under Part X of this Act; ("Commission de la sécurité-incendie")

"Minister" means, in each Part of this Act, the member of the Executive Council to whom the administration of this Act, or of the Part of this Act, is assigned from time to time unless the Part provides otherwise; ("ministre")

"municipality" means local municipality as defined in the *Municipal Act, 2001*; ("municipalité")

"prescribed" means prescribed by regulation; ("prescrit")

"regulation" means a regulation made under this Act; ("règlement")

"volunteer firefighter" means a firefighter who provides fire protection services either voluntarily or for a nominal consideration, honorarium, training or activity allowance. ("pompier volontaire") 1997, c. 4, s. 1 (1); 2001, c. 25, s. 475 (1); 2013, c. 14, s. 2; 2015, c. 34, Sched. 1, s. 1.

Interpretation of land and premises

(2) For the purposes of this Act, a reference to land and premises or to land or premises includes any buildings, structures or things situated on or attached to the land or premises. 1997, c. 4, s. 1 (2).

Application of definition of firefighter

(3) The definition of firefighter in subsection (1) does not apply to Part IX. 1997, c. 4, s. 1 (3).

Automatic aid agreements

(4) For the purposes of this Act, an automatic aid agreement means any agreement under which,

(a) a municipality agrees to ensure the provision of an initial response to fires, rescues and emergencies that may occur in a part of another municipality where a fire department in the municipality is capable of responding more quickly than any fire department situated in the other municipality; or

(b) a municipality agrees to ensure the provision of a supplemental response to fires, rescues and emergencies that may occur in a part of another municipality where a fire department situated in the municipality is capable of providing the quickest supplemental response to fires, rescues and emergencies occurring in the part of the other municipality. 1997, c. 4, s. 1 (4).

Same

(5) A mutual aid plan established under section 7 does not constitute an automatic aid agreement for the purposes of subsection (4). 1997, c. 4, s. 1 (5).

Section Amendments with date in force (d/m/y)

PART II
RESPONSIBILITY FOR FIRE PROTECTION SERVICES

Municipal responsibilities

2. (1) Every municipality shall,

(a) establish a program in the municipality which must include public education with respect to fire safety and certain components of fire prevention; and

(b) provide such other fire protection services as it determines may be necessary in accordance with its needs and circumstances.

Methods of providing services

(2) In discharging its responsibilities under subsection (1), a municipality shall,

(a) appoint a community fire safety officer or a community fire safety team; or

(b) establish a fire department.

Services to be provided

(3) In determining the form and content of the program that it must offer under clause (1) (a) and the other fire protection services that it may offer under clause (1) (b), a municipality may seek the advice of the Fire Marshal.

Shared responsibilities

(4) Two or more municipalities may appoint a community fire safety officer or a community fire safety team or establish a fire department for the purpose of providing fire protection services in those municipalities.

Services outside municipality

(5) A municipality may, under such conditions as may be specified in the agreement, enter into an agreement to,

(a) provide such fire protection services as may be specified in the agreement to lands or premises that are situated outside the territorial limits of the municipality; and

(b) receive such fire protection services as may be specified in the agreement from a fire department situated outside the territorial limits of the municipality.

Automatic aid agreements

(6) A municipality may enter into an automatic aid agreement to provide or receive the initial or supplemental response to fires, rescues and emergencies.

Review of municipal fire services

(7) The Fire Marshal may monitor and review the fire protection services provided by municipalities to ensure that municipalities have met their responsibilities under this section and, if the Fire Marshal is of the opinion that, as a result of a municipality failing to comply with its responsibilities under subsection (1), a serious threat to public safety exists in the municipality, he or she may make recommendations to the council of the municipality with respect to possible measures the municipality may take to remedy or reduce the threat to public safety.

Failure to provide services

(8) If a municipality fails to adhere to the recommendations made by the Fire Marshal under subsection (7) or to take any other measures that in the opinion of the Fire Marshal will remedy or reduce the threat to public safety, the Minister may recommend to the Lieutenant Governor in Council that a regulation be made under subsection (9).

Regulation

(9) Upon the recommendation of the Minister, the Lieutenant Governor in Council may make regulations establishing standards for fire protection services in municipalities and requiring municipalities to comply with the standards.

Same

(10) A regulation under this section may be general or specific in its application and may be restricted to those municipalities specified in the regulation. 1997, c. 4, s. 2.

Territory without municipal organization

3. (1) The Fire Marshal, a services board established to provide services in territory without municipal organization or a prescribed person or organization may enter into agreements to provide fire protection services in territory without municipal organization and to govern the provision of those services.

Same

(2) An agreement referred to in subsection (1) may provide for,

(a) the appointment of a community fire safety officer or a community fire safety team; or

(b) the establishment of a fire department. 1997, c. 4, s. 3.

Community fire safety officer or team

4. (1) A community fire safety officer or a community fire safety team appointed in a municipality or in a group of municipalities shall provide the program established under clause 2 (1) (a) in the municipality or in the group of municipalities, as the case may be.

Same

(2) A community fire safety officer or a community fire safety team appointed by agreement with the Fire Marshal, a services board or a prescribed person or organization to provide services in territory without municipal organization shall provide a program which includes public education with respect to fire safety and certain components of fire prevention in the territory in accordance with the agreement. 1997, c. 4, s. 4.

Municipalities may establish fire departments

5. (0.1) The council of a municipality may establish, maintain and operate a fire department for all or any part of the municipality. 2001, c. 25, s. 475 (2).

Fire departments

(1) A fire department shall provide fire suppression services and may provide other fire protection services in a municipality, group of municipalities or in territory without municipal organization. 1997, c. 4, s. 5 (1).

Same

(2) Subject to subsection (3), the council of a municipality may establish more than one fire department for the municipality. 1997, c. 4, s. 5 (2).

Exception

(3) The council of a municipality may not establish more than one fire department if, for a period of at least 12 months before the day this Act comes into force, fire protection services in the municipality were provided by a fire department composed exclusively of full-time firefighters. 1997, c. 4, s. 5 (3).

Same

(4) The councils of two or more municipalities may establish one or more fire departments for the municipalities. 1997, c. 4, s. 5 (4).

Section Amendments with date in force (d/m/y)

Fire chief, municipalities

6. (1) If a fire department is established for the whole or a part of a municipality or for more than one municipality, the council of the municipality or the councils of the municipalities, as the case may be, shall appoint a fire chief for the fire department.

Same

(2) The council of a municipality or the councils of two or more municipalities may appoint one fire chief for two or more fire departments.

Responsibility to council

(3) A fire chief is the person who is ultimately responsible to the council of a municipality that appointed him or her for the delivery of fire protection services.

Fire chief, territory without municipal organization

(4) If a fire department is established in territory without municipal organization under subsection 3 (2), the agreement shall provide for the appointment of a fire chief.

Powers of fire chief

(5) The fire chief may exercise all the powers assigned to him or her under this Act within the territorial limits of the municipality and within any other area in which the municipality has agreed to provide fire protection services, subject to any conditions specified in the agreement.

Delegation

(6) A fire chief may delegate his or her powers or duties under sections 14, 19 and 20 and such other powers and duties as may be prescribed to any firefighter or class of firefighters, subject to such limitations, restrictions or conditions as may be prescribed or set out in the delegation. 1997, c. 4, s. 6.

Fire co-ordinators

7. (1) The Fire Marshal may appoint fire co-ordinators for such areas as may be designated in the appointment. 1997, c. 4, s. 7 (1).

Duties

(2) A fire co-ordinator shall, subject to the instructions of the Fire Marshal,

(a) establish and maintain a mutual aid plan under which the fire departments that serve the designated area agree to assist each other in the event of an emergency; and

(b) perform such other duties as may be assigned by the Fire Marshal. 1997, c. 4, s. 7 (2); 2002, c. 18, Sched. N, s. 1.

Section Amendments with date in force (d/m/y)

Municipal by-laws

7.1 (1) A council of a municipality may pass by-laws,

(a) regulating fire prevention, including the prevention of the spreading of fires;

(b) regulating the setting of open air fires, including establishing the times during which open air fires may be set;

(c) designating private roads as fire routes along which no parking of vehicles shall be permitted and providing for the removal and impounding of any vehicle parked or left along any of the fire routes at the expense of the owner of the vehicle. 2001, c. 25, s. 475 (3).

Definition

(2) For the purpose of clause (1) (c),

"private road" means any private road, lane, ramp or other means of vehicular access to or from a building or structure and may include part of a parking lot. 2001, c. 25, s. 475 (3).

Scope

(3) A by-law under this section may deal with different areas of the municipality differently. 2001, c. 25, s. 475 (3).

Officer

(4) A municipality may appoint an officer to enter upon land and into structures at any reasonable time to inspect the land and structures to determine whether by-laws enacted in accordance with this section are being complied with. 2001, c. 25, s. 475 (3).

Exercise of power

(5) The exercise of powers by an officer appointed under this section shall be carried out in accordance with Part XIV of the *Municipal Act, 2001*, other than clause 431 (a) of that Act or with Part XV of the *City of Toronto Act, 2006*, other than paragraph 4 of subsection 375 (1) of that Act, as the case may be. 2001, c. 25, s. 475 (3); 2006, c. 32, Sched. C, s. 20 (1).

Section Amendments with date in force (d/m/y)

PART III
FIRE MARSHAL

Appointment of Fire Marshal

8. (1) There shall be a Fire Marshal who shall be appointed by the Lieutenant Governor in Council.

Deputy Fire Marshal

(2) There shall be a Deputy Fire Marshal, who shall be appointed by the Lieutenant Governor in Council and who shall act in the stead of the Fire Marshal if he or she is absent or unable to act, and who, when so acting, has all the power and authority of the Fire Marshal. 1997, c. 4, s. 8.

Powers of Fire Marshal

9. (1) The Fire Marshal has the power,

(a) to monitor, review and advise municipalities respecting the provision of fire protection services and to make recommendations to municipal councils for improving the efficiency and effectiveness of those services;

(b) to issue directives to assistants to the Fire Marshal respecting matters relating to this Act and the regulations;

(c) to advise and assist ministries and agencies of government respecting fire protection services and related matters;

(d) to issue guidelines to municipalities respecting fire protection services and related matters;

(e) to co-operate with any body or person interested in developing and promoting the principles and practices of fire protection services;

(f) to issue long service awards to persons involved in the provision of fire protection services; and

(g) to exercise such other powers as may be assigned under this Act or as may be necessary to perform any duty assigned under this Act. 1997, c. 4, s. 9 (1).

Duties of Fire Marshal

(2) It is the duty of the Fire Marshal,

(a) to investigate the cause, origin and circumstances of any fire or of any explosion or condition that in the opinion of the Fire Marshal might have caused a fire, explosion, loss of life or damage to property;

(b) to advise municipalities in the interpretation and enforcement of this Act and the regulations;

(c) to provide information and advice on fire safety matters and fire protection matters by means of public meetings, newspaper articles, publications, electronic media and exhibitions and otherwise as the Fire Marshal considers advisable;

(d) to develop training programs and evaluation systems for persons involved in the provision of fire protection services and to provide programs to improve practices relating to fire protection services;

(e) to maintain and operate a central fire college;

(f) to keep a record of every fire reported to the Fire Marshal with the facts, statistics and circumstances that are required under this Act;

(g) to develop and maintain statistical records and conduct studies in respect of fire protection services; and

(h) to perform such other duties as may be assigned to the Fire Marshal under this Act. 1997, c. 4, s. 9 (2).

Application of *Public Inquiries Act, 2009*

(3) Section 33 of the *Public Inquiries Act, 2009* applies to any inquiry or investigation by the Fire Marshal under this Act. 2009, c. 33, Sched. 6, s. 59.

Employment of expert, etc.

(4) The Fire Marshal may employ legal, technical, scientific, clerical or other assistance that the Fire Marshal considers advisable or necessary in the conduct of any inquiry or investigation under this Act or in carrying out any of his or her powers or duties under this Act. 1997, c. 4, s. 9 (4).

Section Amendments with date in force (d/m/y)

Delegation

10. (1) The Fire Marshal may delegate any power or duty that is granted to or vested in the Fire Marshal under this Act to any person or class of persons, subject to such limitations, restrictions, conditions and requirements as may be set out in the delegation.

Same

(2) Subsection (1) applies with respect to any power or duty held by the Fire Marshal under this Act, including such statutory or discretionary powers as may be assigned to the Fire Marshal under this Act.

Certificate of appointment

(3) A certificate under the hand and seal of the Fire Marshal of the appointment of a person under this Act is proof in the absence of evidence to the contrary of the appointment in any court or elsewhere. 1997, c. 4, s. 10.

Assistants to the Fire Marshal

11. (1) The following persons are assistants to the Fire Marshal and shall follow the Fire Marshal's directives in carrying out this Act,

(a) the fire chief of every fire department;

(b) the clerk of every municipality that does not have a fire department;

(c) any member of a fire prevention bureau established by a municipality; and

(d) every person designated by the Fire Marshal as an assistant to the Fire Marshal. 1997, c. 4, s. 11 (1); 2002, c. 18, Sched. N, s. 2 (1).

Duty to report

(2) The assistants to the Fire Marshal shall report to the Fire Marshal all fires and other matters related to fire protection services as may be specified by the Fire Marshal. 1997, c. 4, s. 11 (2).

Submitting report

(3) A report under subsection (2) shall be made in the form and manner and within the time period specified by the Fire Marshal. 1997, c. 4, s. 11 (3).

Workers' compensation not affected

(4) The relationship between a person who is an assistant to the Fire Marshal under this section and the municipality or such other person by which he or she is employed continues for the purposes of the *Workplace Safety and Insurance Act, 1997* as if the person were not an assistant to the Fire Marshal. 1997, c. 4, s. 11 (4); 2002, c. 18, Sched. N, s. 2 (2).

Section Amendments with date in force (d/m/y)

PART IV
FIRE CODE

Fire Code

12. (1) The Minister may make regulations that are considered advisable or necessary for the purpose of establishing a fire code for Ontario governing standards for equipment, systems, buildings, structures, land and premises, as those standards relate to fire safety or the risk created by the presence of unsafe levels of carbon monoxide. 2013, c. 14, s. 3.

Same

(1.1) A regulation made under this section may,

(a) prescribe any method, matter or thing relating to fire protection;

(b) prescribe any method, matter or thing relating to protection against the presence of unsafe levels of carbon monoxide;

(c) govern standards for reducing the risk of, or consequences of, a fire that would seriously endanger the health or safety of any person or the quality of the natural environment for any use that can be made of it;

(d) govern standards for reducing the risk of, or consequences of, the presence of unsafe levels of carbon monoxide that would seriously endanger the health or safety of any person or the quality of the natural environment for any use that can be made of it;

(e) require and regulate fire protection equipment and systems and govern the maintenance of the equipment and systems;

(f) require and regulate protection equipment and systems related to the presence of unsafe levels of carbon monoxide and govern the maintenance of the equipment and systems;

(g) require and regulate means of egress, separations, finish materials, furnishings and decorations, standards of housekeeping and heating, ventilation, air conditioning and incinerating equipment and systems;

(h) control or prohibit any material, substance, equipment or system affecting fire safety;

(i) control or prohibit any material, substance, equipment or system affecting safety from the presence of unsafe levels of carbon monoxide;

(j) require and regulate procedures respecting fire safety and the keeping and furnishing of records and reports;

(k) require and regulate procedures respecting safety from the presence of unsafe levels of carbon monoxide and the keeping and furnishing of records and reports;

(l) require the approval of the Fire Marshal or of a prescribed person respecting any method, matter or thing;

(m) require notice to be given to the Fire Marshal or to a prescribed person respecting any change in use or occupancy;

(n) prescribe conditions for use, occupation or demolition;

(o) exempt any class of building, structure, lands or premises from compliance with the regulations or any provision of them and attach terms and conditions to the exemptions;

(p) govern the qualifications and training of persons servicing, maintaining, testing or repairing fire protection devices, equipment or systems and the licensing of those persons;

(q) govern the qualifications and training of persons servicing, maintaining, testing or repairing protection devices, equipment or systems related to the presence of carbon monoxide and the licensing of those persons;

(r) adopt by reference, in whole or in part, with the changes that the Minister considers necessary, any code or standard and require compliance with any code or standard that is so adopted. 2013, c. 14, s. 3.

Limitation of application

(2) Any regulation made under this section may be limited in its application territorially or to any class of building, structure, land or premises or to any building, structure, land or premises used for any specified purpose. 1997, c. 4, s. 12 (2).

Buildings under construction

(3) Subject to subsection (4), the fire code does not apply to the unoccupied parts of a building that is under construction within the meaning of the *Building Code Act, 1992* or of a predecessor to that Act. 1997, c. 4, s. 12 (3).

Same

(4) The fire code applies to the unoccupied parts of a building that is under construction within the meaning of the *Building Code Act, 1992*, or of a predecessor to that Act, if,

(a) there has been no substantial work related to the construction of the building for at least six months; or

(b) the conditions in the unoccupied portions threaten the safety of the occupied portions. 1997, c. 4, s. 12 (4).

Municipal by-law prevails

(5) If there is a conflict between a provision of the fire code and a provision of a municipal by-law respecting the keeping and manufacturing of explosives, the provision that is the most restrictive prevails. 1997, c. 4, s. 12 (5).

Section Amendments with date in force (d/m/y)

PART V
RIGHTS OF ENTRY IN EMERGENCIES AND FIRE INVESTIGATIONS

Entry on adjacent lands by firefighters, etc.

13. (1) A firefighter or such other person as may be authorized by the fire chief, the Fire Marshal or an assistant to the Fire Marshal may, without a warrant, enter on lands or premises,

(a) that are adjacent to the lands or premises on which a fire or emergency has occurred or is occurring, for the purposes of fighting the fire or of providing rescue or emergency services; or

(b) that are adjacent to the lands or premises on which there is a serious threat to the health and safety of any person or the quality of the natural environment, for the purpose of removing or reducing the threat. 1997, c. 4, s. 13 (1); 2001, c. 25, s. 475 (4).

Prevention of fire spreading

(1.1) A firefighter or such other person as may be authorized by the fire chief may, without a warrant, enter on lands or premises on which a fire is occurring, or that are adjacent to those lands or premises, for the purposes of pulling down or removing buildings, structures or things on or attached to the lands or premises on which a fire is occurring or that are adjacent to those lands or premises if, in the opinion of the fire chief, it is necessary to do so to prevent the spread of the fire. 2001, c. 25, s. 475 (5).

Entry onto land outside municipality

(2) A firefighter or such other person as may be authorized by the fire chief may, without a warrant, enter on lands or premises that are outside the territorial limits of the municipality of the fire department that employs the firefighter or fire chief for the purposes of fighting a fire or of providing rescue or emergency services on such lands or premises if,

(a) in the opinion of the fire chief, the fire or emergency threatens persons, property or the environment within the territorial limits of the municipality served by the fire department; and

(b) there is no fire department or other emergency response capability for the area in which the lands or premises are situated. 1997, c. 4, s. 13 (2).

Automatic aid

(3) A firefighter or such other person as may be authorized by the fire chief may, without a warrant, enter on lands or premises that are outside the territorial limits of the municipality of the fire department that employs the firefighter or fire chief for the purposes of fighting a fire or of providing rescue or emergency services on such lands or premises if the council of the municipality has entered

into an automatic aid agreement or any other agreement under which the entry is permitted. 1997, c. 4, s. 13 (3).

Common law right of entry preserved

(4) Nothing in this section derogates from a firefighter's right of entry at common law. 1997, c. 4, s. 13 (4).

Section Amendments with date in force (d/m/y)

Entry where fire has occurred or is likely to occur

14. (1) The Fire Marshal or a fire chief may, without a warrant, enter on land or premises if,

(a) a fire has occurred on the land or premises; or

(b) he or she has reason to believe that a substance or device that is likely to cause a fire may be situated on the land or premises.

Powers upon entry

(2) Upon entering on land or premises under subsection (1), the Fire Marshal or a fire chief may,

(a) close, and prevent entry to, the land or premises for the length of time necessary to complete the examination of the land or premises;

(b) in the case of an entry under clause (1) (a), remove from the land or premises, retain and examine any article or material, and take such samples or photographs, make videotapes and other images electronic or otherwise that in his or her opinion may be of assistance in determining the cause of the fire under investigation;

(c) make such excavations on the land or premises as he or she considers necessary;

(d) require that any machinery, equipment or device be operated, used or set in motion under specified conditions; and

(e) make any reasonable inquiry of any person, orally or in writing.

Entry to adjacent lands

(3) A person who enters on land or premises under subsection (1), may, without a warrant, enter on adjacent land or premises if the entry is necessary for the purposes of conducting an investigation into the cause of a fire or of determining whether a substance or device that is likely to cause fire is situated on the land or premises.

Same

(4) A person who enters on adjacent land or premises under subsection (3) may exercise any of the powers mentioned in subsection (2) on or with respect to the adjacent land or premises.

Use of force

(5) A person who enters land or premises under subsection (1) or (3) shall not use force to enter the land or premises.

Warrant authorizing entry

(6) A justice of the peace may issue a warrant authorizing the Fire Marshal or a fire chief named in the warrant to enter on land or premises and exercise any of the powers referred to in subsection (2) or (3) if the justice of the peace is satisfied on evidence under oath that there are reasonable grounds to believe that entry on the lands or premises is necessary for the purposes of conducting an investigation into the cause of a fire or of determining whether a substance or device that is likely to cause fire is situated on the land or premises and,

(a) the Fire Marshal or fire chief has been denied entry to the land or premises or has been obstructed in exercising any other of those powers with respect to the land or premises; or

(b) there are reasonable grounds to believe that the Fire Marshal or fire chief will be denied entry to the land or premises or obstructed in exercising any other of those powers with respect to the land or premises.

Execution and expiry of warrant

(7) A warrant issued under subsection (6) shall,

(a) specify the times, which may be at any time during the day or night, during which the warrant may be carried out; and

(b) state when the warrant expires.

Extension of time

(8) A justice of the peace may extend the date on which a warrant expires for such additional periods as the justice of the peace considers necessary.

Use of force

(9) A person authorized by a warrant issued under subsection (6) to enter land or premises for the purpose of doing a thing may call on police officers as necessary and may use force as necessary to make the entry and do the thing.

Application without notice

(10) A justice of the peace may receive and consider an application for a warrant or extension of a warrant under this section without notice to the owner or occupant of the land or premises. 1997, c. 4, s. 14.

Immediate threat to life

15. (1) If the Fire Marshal, an assistant to the Fire Marshal or a fire chief has reasonable grounds to believe that a risk of fire poses an immediate threat to life, he or she may, without a warrant, enter on any land or premises and, for the purpose of removing or reducing the threat, may,

(a) remove persons on the land or premises;

(b) post a fire watch;

(c) remove combustible or explosive material or anything that may constitute a fire menace;

(c.1) dispose of any material or thing that was removed under clause (c), in accordance with any directives issued by the Fire Marshal;

(d) eliminate ignition sources;

(e) install temporary safeguards, including fire extinguishers and smoke alarms;

(f) make minor repairs to existing fire safety systems;

(g) do any other thing that the Fire Marshal, an assistant to the Fire Marshal or a fire chief has reasonable grounds to believe is urgently required to remove or reduce the threat to life. 1997, c. 4, s. 15 (1); 2002, c. 18, Sched. N, s. 3; 2016, c. 37, Sched. 9, s. 1.

Notice to owner

(2) A person who enters land or premises under subsection (1) shall promptly after exercising any powers under this section give notice thereof to the owner if the owner's whereabouts in Ontario are known. 1997, c. 4, s. 15 (2).

Notice to be posted

(3) The person who gives notice under subsection (2) shall post a copy of the notice on the land or premises. 1997, c. 4, s. 15 (3).

Contents of notice

(4) The notice shall,

(a) describe the location of the land or premises;

(b) state the reason for the entry; and

(c) state the things done under subsection (1) to remove or reduce the threat to life. 1997, c. 4, s. 15 (4).

Use of force

(5) A person who enters on land or premises under this section may call on police officers as necessary and may use force as necessary to make the entry. 1997, c. 4, s. 15 (5).

Section Amendments with date in force (d/m/y)

Assistance

16. A person who enters on land or premises under section 14 or 15 may call on any other persons he or she considers advisable to assist. 1997, c. 4, s. 16.

Identification

17. On the request of an owner or occupant of the land or premises, a person who enters on land or premises under section 14 or 15 shall identify himself or herself and shall explain the purpose of the entry. 1997, c. 4, s. 17.

PART VI
INSPECTIONS

Interpretation

18. For the purposes of this Part, fire safety includes the following:

1. Safety from the risk that a fire, if started, would seriously endanger the health and safety of any person or the quality of the natural environment for any use that can be made of it.

2. Safety from the risk that the presence of unsafe levels of carbon monoxide on premises would seriously endanger the health and safety of any person. 2013, c. 14, s. 4.

Section Amendments with date in force (d/m/y)

Inspectors

19. (1) The Fire Marshal, an assistant to the Fire Marshal or a fire chief is an inspector for the purposes of this Part.

Inspections

(2) An inspector may, without a warrant, enter and inspect land and premises for the purposes of assessing fire safety.

Time of entry

(3) The power to enter and inspect land and premises without a warrant may be exercised at all reasonable times.

Assistance

(4) An inspector who enters land or premises under this section may take with him or her a police officer or such other person as he or she considers advisable to assist.

Identification

(5) On the request of an owner or occupant of the land or premises, an inspector shall identify himself or herself and shall explain the purpose of the entry.

Powers during inspection

(6) An inspector conducting an inspection may,

(a) examine a document or other thing that is relevant to the inspection;

(b) demand the production for inspection of a document or other thing that is relevant to the inspection;

(c) remove any thing that is relevant to the inspection for review and examination and remove any document that is relevant to the inspection for review and copying;

(d) conduct tests, take and remove samples, take photographs and make videotapes and other images, electronic or otherwise, that are relevant to the inspection;

(e) in order to produce a document in readable form, use data storage, information processing or retrieval devices or systems that are normally used in the premises being inspected; and

(f) question a person on matters relevant to the inspection.

Obligation to produce and assist

(7) If an inspector demands that a document or other thing be produced for inspection, the person who has custody of the document or thing shall produce it and, in the case of a document, shall on request provide any assistance that is reasonably necessary to interpret the document or to produce it in a readable form.

Document and thing removed from place

(8) A document or other thing that has been removed from land or premises,

(a) shall be made available to the person from whom it was removed on request and at a time and place that are convenient for the person and for the inspector; and

(b) shall, if it is possible to return the document or thing to the person, be returned within a reasonable time.

Copy admissible in evidence

(9) A copy of a document that purports to be certified by an inspector as being a true copy of the original is admissible in evidence to the same extent as the original and has the same evidentiary value. 1997, c. 4, s. 19.

Warrant authorizing entry

20. (1) A justice of the peace may issue a warrant authorizing an inspector named in the warrant to enter on lands or premises and exercise any of the powers referred to in subsection 19 (6) if the justice of the peace is satisfied on evidence under oath that there are reasonable grounds to believe that entry on the lands or premises is necessary to assess fire safety and,

(a) the inspector has been denied entry to the lands or premises or has been obstructed in exercising any other of those powers with respect to the lands or premises; or

(b) there are reasonable grounds to believe that the inspector will be denied entry to the lands or premises or obstructed in exercising any other of those powers with respect to the lands or premises.

Execution and expiry of warrant

(2) A warrant issued under subsection (1) shall,

(a) specify the times, which may be at any time during the day or night, during which the warrant may be carried out; and

(b) state when the warrant expires.

Extension of time

(3) A justice of the peace may extend the date on which a warrant expires for such additional periods as the justice of the peace considers necessary.

Use of force

(4) A person authorized under subsection (1) to enter land or premises for the purpose of doing a thing may call on police officers as necessary and may use force as necessary to make the entry and do the thing.

Assistance

(5) A person named in a warrant issued under subsection (1) may call on any other persons he or she considers advisable to execute the warrant.

Application without notice

(6) A justice of the peace may receive and consider an application for a warrant or extension of a warrant under this section without notice to the owner or occupant of the land or premises.

Identification

(7) On the request of an owner or occupant of the land or premises, a person who exercises a power conferred under subsection (1) shall identify himself or herself and shall explain the purpose of the entry.

Application

(8) Subsections 19 (7), (8) and (9) apply with respect to an inspection carried out under a warrant issued under this section. 1997, c. 4, s. 20.

Inspection orders

21. (1) An inspector who has carried out an inspection of land or premises under section 19 or 20 may order the owner or occupant of the land or premises to take any measure necessary to ensure fire safety on the land and premises and may for that purpose order the owner or occupant,

(a) to remove buildings or structures from the land or premises;

(b) to make structural and other repairs or alterations, including material alterations, to the buildings or structures;

(c) to remove combustible or explosive material or any thing that may constitute a fire hazard;

(d) to install and use specified equipment or devices as may be necessary to contain hazardous material on the land or premises and, in the event of a fire, to remove or transport the material;

(e) to discontinue the manufacturing, production or fabrication of any material, device or other thing that creates or poses an undue risk of fire or explosion;

(f) to do anything respecting fire safety including anything relating to the containment of a possible fire, means of egress, fire alarms and detection, fire suppression and the preparation of a fire safety plan;

(g) to remedy any contravention of the fire code.

Same, closure of premises

(2) An inspector who has carried out an inspection of land or premises under section 19 or 20 may, with the approval of the Fire Marshal and upon such terms and conditions as the Fire Marshal considers proper,

(a) order that the owner or occupant of the land or premises close the land or premises and prevent persons from entering thereon until such time as the corrective actions ordered under subsection (1) have been completed; or

(b) if the inspector is of the opinion that it is necessary for the immediate protection of persons and property that the lands or premises be closed immediately, cause the land or premises to be closed immediately and persons on the premises to be removed and direct that the lands or premises remain closed and that the premises be vacated until such time as the corrective actions ordered under subsection (1) have been completed. 1997, c. 4, s. 21 (1, 2).

Same, electrical installations

(3) If, upon an inspection, it is determined that the electrical installations in a building or structure create or pose a risk of fire because of the inadequacy or want of repair of the installations and their wiring, the inspector may order that the electrical installations in the building or structure be inspected by a representative of the Electrical Safety Authority referred to in Part VIII of the *Electricity Act, 1998* and that the costs of the inspection be paid by the owner or occupant of the building or structure. 1997, c. 4, s. 21 (3); 1998, c. 15, Sched. E, s. 12.

Section Amendments with date in force (d/m/y)

Limitation on orders relating to structural repairs

22. (1) No inspector shall make an order under clause 21 (1) (b) requiring structural repairs or alterations to a building, structure or premises that was constructed in compliance with the building code established under the *Building Code Act, 1992* or under a predecessor to that Act and that continues to comply with that code as it existed at the time of construction, unless the order is necessary to ensure compliance with the provisions of the fire code relating to the retrofitting of existing buildings.

Repairs, etc., deemed not to contravene Building Code

(2) If repairs, alterations or installations are carried out in compliance with an order made under subsection 21 (1) or for the purposes of complying with the fire code, the repairs, alterations or installations shall be deemed not to contravene the building code established under the *Building Code Act, 1992*.

Copy of order

(3) An inspector who makes an order requiring repairs, alterations or installations to be made to a building, structure or premises shall furnish a copy of the order to the proper chief building official appointed under the *Building Code Act, 1992*. 1997, c. 4, s. 22.

Contents of order

23. An order made under subsection 21 (1) or (2) shall set out,

(a) the reasons for the order;

(b) an explanation of the action required by the order;

(c) the time within which the owner or occupant must comply with the order; and

(d) the right to request a review of the order by the Fire Marshal under section 25 or, in the case of an order made by the Fire Marshal, the right of appeal to the Fire Safety Commission under section 26. 1997, c. 4, s. 23.

Service of order

24. (1) A copy of an order made under section 21 shall be served upon the owner and any occupant of the land and premises.

Same, multi-unit building

(2) In the case of an order respecting a building that contains two or more units intended for separate occupancy, the order shall be deemed to be served upon the occupants of the building if a copy of the order is posted in a conspicuous place in or outside the building.

Posting and service of order to close premises

(3) If an order is made under subsection 21 (2) requiring the closing of land or premises, a copy of the order shall be posted on the land or premises and shall be served on the owner of the lands or premises if the owner is in Ontario and his or her whereabouts are known. 1997, c. 4, s. 24.

Review of inspection order by Fire Marshal

25. (1) A person who considers himself or herself aggrieved by an order made by an inspector, other than the Fire Marshal, under subsection 21 (1) or (2) may, within 15 days after the order is served, submit a written request to the Fire Marshal for a review of the order. 1997, c. 4, s. 25 (1).

Extension of time

(2) The Fire Marshal may, upon application by a person referred to in subsection (1), extend the time for making a request under this section if he or she is satisfied that there are apparent grounds for granting relief to the person and that there are reasonable grounds for applying for the extension and may give directions that the Fire Marshal considers proper consequent upon the extension. 1997, c. 4, s. 25 (2); 2002, c. 18, Sched. N, s. 4 (1).

Same

(3) An application for an extension of time may be made either before or after the expiration of the time fixed in subsection (1) but shall be made within 30 days after a copy of the order under subsection 21 (1) or (2) is served. 1997, c. 4, s. 25 (3).

Powers of Fire Marshal

(4) The Fire Marshal may,

(a) refuse to consider the substance of the request and refer the matter to the Fire Safety Commission for a hearing under section 26; or

(b) confirm, amend or rescind the order or make such other order as he or she deems appropriate. 1997, c. 4, s. 25 (4).

No hearing required

(5) The Fire Marshal is not required to hold a hearing when conducting a review of an order under this section. 1997, c. 4, s. 25 (5).

Order stayed by application for review

(6) An application made under subsection (1) for a review operates as a stay of the order pending the outcome of the review. 2002, c. 18, Sched. N, s. 4 (2).

Lifting of stay

(7) The Fire Marshal may, upon request therefor by an inspector, which may be made without notice, order that the stay of the order be lifted if, in his or her opinion, the action is necessary in the interest of public safety. 2002, c. 18, Sched. N, s. 4 (2).

Section Amendments with date in force (d/m/y)

Appeal to Fire Safety Commission

26. (1) Any person who considers himself or herself aggrieved by an order made by the Fire Marshal under subsection 21 (1) or (2) or section 25 may appeal the order to the Fire Safety Commission. 1997, c. 4, s. 26 (1).

Time for filing appeal

(2) A notice of appeal from an order referred to in subsection (1) shall be filed with the Fire Safety Commission within 15 days after the order is served. 1997, c. 4, s. 26 (2).

Extension of time

(3) The Fire Safety Commission may, upon application by a person referred to in subsection (1), extend the time for appealing an order if it is satisfied that there are apparent grounds for granting the appeal and that there are reasonable grounds for applying for the extension and may give directions that it considers proper consequent upon the extension. 1997, c. 4, s. 26 (3); 2002, c. 18, Sched. N, s. 5 (1).

Same

(4) An application for an extension of time may be made either before or after expiration of the time fixed in subsection (2) but shall be made within 30 days after a copy of the order from which the appeal is made is served. 1997, c. 4, s. 26 (4).

Hearing by Commission

(5) If an application is made under subsection (1) or if a matter is referred to the Fire Safety Commission by the Fire Marshal under clause 25 (4) (a), the Commission shall appoint a time for and hold the hearing. 1997, c. 4, s. 26 (5).

Powers of Commission

(6) The Fire Safety Commission may confirm, amend or rescind the order of the Fire Marshal or make such other order as the Commission deems appropriate. 1997, c. 4, s. 26 (6).

Order stayed by appeal

(7) An appeal under subsection (1) operates as a stay of the order pending the outcome of the appeal. 2002, c. 18, Sched. N, s. 5 (2).

Lifting of stay

(8) The Fire Safety Commission may, upon application therefor by an inspector or the Fire Marshal, which may be made without notice, order that the stay of the order be lifted if, in its opinion, the action is necessary in the interest of public safety. 2002, c. 18, Sched. N, s. 5 (2).

Section Amendments with date in force (d/m/y)

Appeal to Divisional Court

27. (1) Any party to the hearing before the Fire Safety Commission under section 26 may appeal from the decision of the Commission to the Divisional Court in accordance with the rules of court on any question that is not a question of fact alone.

Minister to be heard

(2) The Minister is entitled to be heard at a hearing under this section.

Powers of court on appeal

(3) The judge who hears an appeal under this section may,

(a) refer the matter back to the Commission for reconsideration by the Commission;

(b) confirm or alter the decision of the Commission; or

(c) make such other order as he or she sees fit, including an order that the Fire Marshal or an inspector do any act he or she is authorized to do under this Act. 1997, c. 4, s. 27.

PART VII
OFFENCES AND ENFORCEMENT

Offences

28. (1) Every person is guilty of an offence if he or she,

(a) hinders, obstructs or interferes with the Fire Marshal, an assistant to the Fire Marshal or a fire chief in the exercise of his or her powers and duties;

(b) prevents an inspector from entering land or premises under section 19 or 20, refuses to answer questions on matters relevant to the inspection or provides the inspector with information, on matters relevant to the inspection, that the person knows, or ought reasonably to know, to be false or misleading;

(c) subject to subsection (2) contravenes any provisions of this Act or the regulations; or

(d) refuses or neglects to obey or carry out the directives of the Fire Marshal, an assistant to the Fire Marshal or a fire chief given under the authority of this Act. 1997, c. 4, s. 28 (1); 2002, c. 18, Sched. N, s. 6.

Same

(2) A person who contravenes a provision in Part IX of this Act is not guilty of an offence. 1997, c. 4, s. 28 (2).

Penalty

(3) An individual convicted of an offence under subsection (1) is liable to,

(a) in the case of an offence other than one described in clause (b), a fine of not more than $20,000 or imprisonment for a term of not more than one year, or both; and

(b) in the case of an offence for contravention of the fire code, a fine of not more than $50,000 or imprisonment for a term of not more than one year, or both. 2005, c. 33, s. 8.

Same

(4) A corporation convicted of an offence under subsection (1) is liable to a fine of not more than $100,000. 2005, c. 33, s. 8.

Offence, director or officer of corporation

(5) A director or officer of a corporation who knows that the corporation is violating or has violated a provision of the fire code is guilty of an offence and on conviction is liable to a fine of not more than $50,000 or to imprisonment for a term of not more than one year, or to both. 2005, c. 33, s. 8.

Liability of directors

(6) Despite subsections (1) and (3), every director or officer of a corporation who knowingly commits an offence under subsection (1) is guilty of an offence and on conviction is liable to a fine of not more than $50,000 or to imprisonment for a term of not more than one year, or to both. 2005, c. 33, s. 8.

Section Amendments with date in force (d/m/y)

Offence, removal of posted notice

29. Any person who removes a copy of an order or of a notice posted in accordance with subsection 15 (3), 24 (2), (3) or 31 (4) without the approval of the Fire Marshal, an assistant to the Fire Marshal or a fire chief is guilty of an offence and on conviction is liable to a fine of not more than $2,000 or to imprisonment for a term of not more than one year, or to both. 2005, c. 33, s. 9.

Section Amendments with date in force (d/m/y)

Offence, failure to comply with inspection order

30. Every person who fails to comply with an order made under section 21, 25 or 26 is guilty of an offence and on conviction is liable to a fine of not more than $20,000 for every day during which the default continues, and the imposition or payment of the fine does not relieve the person from complying with the order. 2005, c. 33, s. 10.

Section Amendments with date in force (d/m/y)

Order to close premises, etc.

31. (1) The Fire Marshal, an assistant to the Fire Marshal or a fire chief may apply to the Ontario Court of Justice for an order under this section if,

(a) a person who has been convicted of an offence under section 30 for failing to comply with an inspection order under section 21 or an order under section 25 or 26 has not complied with the order within 30 days of the conviction; or

(b) a person who has been convicted of an offence under clause 28 (1) (c) for contravening a provision of the fire code has not ceased to contravene the provision or remedied the contravention within 30 days of the conviction. 1997, c. 4, s. 31 (1); 2002, c. 18, Sched. N, s. 7 (1).

No notice required

(2) An application under subsection (1) may be made without notice to the person referred to in clause (1) (a) or (b). 1997, c. 4, s. 31 (2).

Order

(3) Upon an application under subsection (1), a judge may, if in his or her opinion it is necessary in the interest of public safety, order that the Fire Marshal, assistant to the Fire Marshal or fire chief,

(a) close access to, or remove, the building, structure or premises to which the order relates; or

(b) remove or remove and dispose of any substance, material or thing from the building, structure or premises. 1997, c. 4, s. 31 (3); 2002, c. 18, Sched. N, s. 7 (2).

Application

(4) If an order is made under clause (3) (a), subsection 24 (3) applies with necessary modifications to the service and posting of the order. 1997, c. 4, s. 31 (4).

Section Amendments with date in force (d/m/y)

Compliance order

32. (1) The Fire Marshal, an assistant to the Fire Marshal or a fire chief may, in addition to any other rights he or she may have under this Act, apply to a judge of the Superior Court of Justice for an order,

(a) requiring a person to comply with an inspection order made under section 21 or with an order made under section 25 or 26 if the person has failed to comply with the order; or

(b) requiring a person to remedy any contravention of a provision of the fire code. 1997, c. 4, s. 32 (1); 2002, c. 18, Sched. N, s. 8.

Powers of judge

(2) Upon an application being made under subsection (1), a judge may make the order requested or such other order as he or she sees fit. 1997, c. 4, s. 32 (2).

Appeal

(3) An appeal lies to the Divisional Court from the judge's order. 1997, c. 4, s. 32 (3).

Section Amendments with date in force (d/m/y)

Fire Marshal to carry out inspection order

33. (1) If an order made under subsection 21 (1) or (2) or section 25 or 26 requires a thing to be done, an inspector may apply to the Fire Safety Commission for an order authorizing him or her to cause the thing to be done. 1997, c. 4, s. 33 (1).

Hearing

(2) Upon receiving an application under subsection (1), the Fire Safety Commission shall appoint a time for and hold a hearing. 1997, c. 4, s. 33 (2).

Consolidation of hearings

(3) If an application is made under this section and an appeal is made under section 26 in respect of the same order, the Fire Safety Commission may, if it considers it practical to do so, consolidate the hearings. 1997, c. 4, s. 33 (3).

Grounds for decision

(4) The Fire Safety Commission may authorize the inspector to cause to be done any thing required to be done by an order made under subsection 21 (1) or (2) or section 25 or 26 if,

(a) the person required by the order to do the thing,

(i) has refused to comply with or is not complying with the order,

(ii) is not likely, in the Commission's opinion, to comply with the order promptly,

(iii) is not likely, in the Commission's opinion, to carry out the order competently, or

(iv) requests the assistance of the inspector in complying with the order; and

(b) in the Commission's opinion, failure to do the thing would seriously endanger the health or safety of any person or the quality of the natural environment for any use that can be made of it. 1997, c. 4, s. 33 (4).

Powers of Commission

(5) The Fire Safety Commission may, in addition to authorizing an inspector to cause to be done any thing required to be done by an order under subsection 21 (1) or (2) or section 25 or 26,

(a) rescind the order; or

(b) amend the order, or make such other order as the Commission deems should have been made under the relevant section, and order the inspector to do the thing in accordance with the amended order or the other order. 1997, c. 4, s. 33 (5).

Same

(6) If the order amended or made under clause (5) (b) provides for the removal of any combustible or explosive material or any thing that may constitute a fire hazard, the Fire Safety Commission may also authorize the inspector to dispose of the material or thing. 2002, c. 18, Sched. N, s. 9.

Section Amendments with date in force (d/m/y)

Warrant authorizing entry

34. (1) If a justice of the peace is satisfied on evidence under oath that there are reasonable grounds to believe that entry on certain land or premises is necessary for the purpose of doing a thing that the Fire Safety Commission has authorized to be done under section 33, the justice of the peace may issue a warrant authorizing the person named in the warrant to enter and do the thing on the land or premises including, where necessary, entering an adjacent property in order to access the property named in the warrant.

Execution and expiry of warrant

(2) A warrant issued under subsection (1) shall,

(a) specify the times, which may be at any time during the day or night, during which the warrant may be carried out; and

(b) state when the warrant expires.

Extension of time

(3) A justice of the peace may extend the date on which a warrant expires for such additional periods as the justice of the peace considers necessary.

Use of force

(4) A person authorized under subsection (1) to enter land or premises for the purpose of doing a thing may call on police officers as necessary and may use force as necessary to make the entry and do the thing.

Assistance

(5) A person named in a warrant issued under subsection (1) may call on any other persons he or she considers advisable to execute the warrant.

Application without notice

(6) A justice of the peace may receive and consider an application for a warrant or extension of a warrant under this section without notice to the owner or occupant of the land or premises.

Identification

(7) On the request of an owner or occupant of the land or premises, a person who exercises a power conferred under subsection (1) shall identify himself or herself and shall explain the purpose of the entry. 1997, c. 4, s. 34.

PART VIII
RECOVERY OF COSTS

Fire Marshal's order to pay costs

35. (1) The Fire Marshal, a fire chief or an assistant to the Fire Marshal may issue an order to pay the costs incurred by the Province of Ontario or a municipality,

(a) in doing any thing done in accordance with an authorization given under section 33, to any person required by an order made under subsection 21 (1) or (2) or section 25 or 26 to do the thing; or

(b) in entering land or premises and doing any thing under section 15, to the owner or the person having control of the land or premises. 1997, c. 4, s. 35 (1).

Idem

(2) An order under subsection (1) to pay costs shall include,

(a) a description of the things done for which the costs were incurred and a statement of the authority for doing the things;

(b) a detailed account of the costs incurred by the Province of Ontario or the municipality, as the case may be; and

(c) a direction that the person to whom the order is issued pay the costs to the Minister of Finance or the municipality, as the case may be. 1997, c. 4, s. 35 (2); 2002, c. 18, Sched. N, s. 10.

Section Amendments with date in force (d/m/y)

Appeal to Fire Safety Commission

36. (1) A person to whom an order to pay costs is issued may, by written notice served on the person who issued the order and on the Fire Safety Commission within 15 days after service on the person of a copy of the order, require a hearing by the Commission.

Costs specified in order to pay may be increased by Commission

(2) At a hearing by the Fire Safety Commission on an order to pay costs, the Fire Marshal or an assistant to the Fire Marshal or a fire chief may, on reasonable notice to all parties, ask the Commission to amend the order by adding new items of cost or by increasing the amounts set out in the order.

What Commission may consider at hearing

(3) At a hearing by the Fire Safety Commission on an order to pay costs, the Commission shall consider only whether any of the costs specified in the order,

(a) are unreasonable having regard to what was done; or

(b) do not relate to a thing,

(i) that the person to whom the order to pay costs was issued was required to do by an order made under subsection 21 (1) or (2) or section 25 or 26 or on any appeal from any such order, or

(ii) that the Fire Marshal, an assistant to the Fire Marshal or a fire chief was authorized to do under section 15.

Appeal to Divisional Court

(4) Any party to a hearing by the Fire Safety Commission on an order to pay costs may appeal from the decision of the Commission to the Divisional Court on any question that is not a question of fact alone.

Idem

(5) Subsections 27 (2) and (3) apply with necessary modification to an appeal under subsection (4). 1997, c. 4, s. 36.

Enforcement of order to pay costs

37. (1) An order to pay costs may be filed with the Superior Court of Justice and enforced as if it were an order of the court. 1997, c. 4, s. 37 (1); 2002, c. 18, Sched. N, s. 11.

Interest

(2) Section 129 of the *Courts of Justice Act* applies in respect of an order filed under subsection (1) and, for the purpose, the date of filing shall be deemed to be the date of the order. 1997, c. 4, s. 37 (2).

Section Amendments with date in force (d/m/y)

Instructions for municipality to recover costs

38. (1) The Fire Marshal, a fire chief or an assistant to the Fire Marshal may inform a municipality as to the amount of any of the following expenses incurred by the municipality or the Province of Ontario that relate to things done in connection with land or premises in the municipality and instruct the municipality to recover the amounts:

1. Expenses incurred in carrying out an order made under subsection 31 (3) that relates to the land or premises.

2. Where an order to pay costs has been issued under section 35 to a person who owns the lands or premises in the municipality,

i. expenses incurred in doing anything done in accordance with an authorization given under section 33 to do things to the land or premises, or

ii. expenses incurred in doing a thing under section 15 in order to remove or reduce an immediate threat to life on the land or premises. 1997, c. 4, s. 38 (1).

Municipal lien

(2) Upon receiving instructions under subsection (1), a municipality shall have a lien against the land or premises in respect of which expenses referred to in subsection (1) were incurred for the amount of the expenses. 1997, c. 4, s. 38 (2).

Lien

(3) The amount of any expenses referred to in subsection (1) shall have priority lien status, as described in section 1 of the *Municipal Act, 2001*, or section 3 of the *City of Toronto Act, 2006*, as the case may be, and shall be added by the treasurer of the municipality to the tax roll. 2002, c. 17, Sched. F, Table; 2006, c. 32, Sched. C, s. 20 (2).

Remitting costs to Province

(4) Subject to subsection (7), money collected in accordance with subsection (3) in order to recover expenses referred to in subsection (1) that were incurred by the Province of Ontario shall be paid by the municipality to the Minister of Finance; but the municipality may retain such amounts as may be reasonably attributable to the collection. 1997, c. 4, s. 38 (4).

Same

(5) A lien created under subsection (2) in favour of a municipality for amounts incurred by the Province of Ontario is not an estate or interest of the Crown within the meaning of clause 379 (7) (b) of the *Municipal Act, 2001* or clause 350 (7) (b) of the *City of Toronto Act, 2006*, as the case may be. 1997, c. 4, s. 38 (5); 2002, c. 17, Sched. F, Table; 2006, c. 32, Sched. C, s. 20 (3).

Interpretation

(6) In subsections (7) and (8),

"cancellation price" has the same meaning as in Part XI of the *Municipal Act, 2001* or Part XIV of the *City of Toronto Act, 2006*, as the case may be. 2006, c. 32, Sched. C, s. 20 (4).

Proceeds of tax sale

(7) If there is a sale of land under Part XI of the *Municipal Act, 2001* or Part XIV of the *City of Toronto Act, 2006*, as the case may be, and amounts are payable out of the proceeds to the Minister of Finance under this Act, the *Environmental Protection Act* or the *Ontario Water Resources Act*, those amounts shall not be paid until after payment of all other amounts payable out of the proceeds in respect of the cancellation price of the land. 1997, c. 4, s. 38 (7); 2002, c. 17, Sched. F, Table; 2006, c. 32, Sched. C, s. 20 (5).

Cancellation price

(8) Despite Part XI of the *Municipal Act, 2001* or Part XIV of the *City of Toronto Act, 2006*, the treasurer of a municipality may sell land under those Acts for less than the cancellation price, so long as the land is not sold for less than what the cancellation price would have been but for this Act, the *Environmental Protection Act* and the *Ontario Water Resources Act*, and the purchaser may be declared to be the successful purchaser under Part XI of the *Municipal Act, 2001* or Part XIV of the *City of Toronto Act, 2006*, as the case may be. 2006, c. 32, Sched. C, s. 20 (6).

Section Amendments with date in force (d/m/y)

Collection of costs

39. (1) The Fire Marshal, an assistant to the Fire Marshal or a fire chief may give written notice to the Minister of Finance of the amount of any of the following expenses incurred by the Province of Ontario that relate to things done in connection with the land and premises in territory without municipal organization, requesting the collection of the amount under the *Provincial Land Tax Act, 2006*:

1. Expenses incurred in carrying out an order made under subsection 31 (3) that relates to the land or premises.

2. Where an order to pay costs has been issued under section 35 to a person who owns the lands or premises in territory without municipal organization,

i. expenses incurred in doing anything done in accordance with an authorization given under section 33 to do things to the land or premises, or

ii. expenses incurred in doing a thing under section 15 in order to remove or reduce an immediate threat to life on the land or premises. 1997, c. 4, s. 39 (1); 2006, c. 33, Sched. Z.3, s. 12 (1).

Same

(2) When the Minister of Finance receives notice of an amount under subsection (1), the amount may be collected under the *Provincial Land Tax Act, 2006* as if the amount was a tax imposed under that Act. 2006, c. 33, Sched. Z.3, s. 12 (2).

(3) Repealed: 2006, c. 33, Sched. Z.3, s. 12 (2).

Section Amendments with date in force (d/m/y)

Expenses related to work on other lands

40. The amount to be recovered by way of municipal taxes against land or premises under section 38 or 39 shall include all expenses incurred in doing any thing in connection with the land or premises that the Fire Marshal, an assistant to the Fire Marshal or a fire chief was authorized to do under an order or authorization referred to in subsection 38 (1), whether or not the thing was done on the land or premises. 1997, c. 4, s. 40.

PART IX
FIREFIGHTERS: EMPLOYMENT AND LABOUR RELATIONS

Definitions

Definitions

41. (1) In this Part,

"association" means an association of firefighters that is entitled under section 46 to represent and act as the bargaining agent for firefighters in a bargaining unit for the purposes of collective bargaining under this Part; ("association syndicale")

"Board" means the Ontario Labour Relations Board; ("Commission")

"collective agreement" means an agreement in writing between an employer and a bargaining agent that represents firefighters employed by the employer containing provisions respecting terms or conditions of employment or the rights, privileges or duties of the employer, the bargaining agent or the firefighters; ("convention collective")

"employer" means a municipality, person or organization that employs firefighters; ("employeur")

"firefighter" means a person regularly employed on a salaried basis in a fire department and assigned to fire protection services and includes technicians but does not include a volunteer firefighter; ("pompier")

"Minister" means the Minister of Labour; ("ministre")

"trade union" means a trade union as defined in the *Labour Relations Act, 1995*. ("syndicat") 1997, c. 4, s. 41 (1); 2015, c. 34, Sched. 1, s. 2.

Managers not firefighters

(2) For the purposes of this Part, a person shall be deemed not to be a firefighter if,

(a) in the opinion of the Board, he or she exercises managerial functions or is employed in a confidential capacity in matters relating to labour relations; or

(b) he or she is a person designated under subsection 54 (4). 1997, c. 4, s. 41 (2).

Application of *LRA, 1995*

(3) Sections 110 to 112, subsections 114 (1) and (3), sections 116 to 118 and 120 to 123 of the *Labour Relations Act, 1995* apply with necessary modifications to proceedings before the Board under this Act and the Board may exercise the powers under those provisions as if they were part of this Act. 1997, c. 4, s. 41 (3).

Transition

(4) An agreement made under section 5 of the *Fire Departments Act*, or a decision or award made under section 6 of that Act, that is in effect immediately before the day this Part comes into force shall, on and after that day, remain in effect and be deemed to be a collective agreement to which this Part applies. 1997, c. 4, s. 41 (4).

Same

(5) If a request to bargain was made under section 5 of the *Fire Departments Act* before the day this Part comes into force, this Part applies as if notice had been given under section 47 on that day. 1997, c. 4, s. 41 (5).

Section Amendments with date in force (d/m/y)

working conditions

Strike and lock outs

42. (1) No firefighter shall strike and no employer of firefighters shall lock them out.

Definitions

(2) In this section,

"lock-out" and "strike" have the same meaning as in the *Labour Relations Act, 1995*. 1997, c. 4, s. 42.

Hours of work

43. (1) In every municipality having a population of not less than 10,000, the firefighters assigned to firefighting duties shall work according to,

(a) the two-platoon system where the firefighters are divided into two platoons, the hours of work of which shall be,

(i) for each platoon 24 consecutive hours on duty followed immediately by 24 consecutive hours off duty, or

(ii) for one platoon in day-time ten consecutive hours on duty followed immediately by 14 consecutive hours off duty and for the other platoon in night-time 14 consecutive hours on duty followed immediately by 10 consecutive hours off duty,

and the platoons shall alternate at least every two weeks from night work to day work and vice versa;

(b) the three-platoon system where the firefighters are divided into three platoons, the hours of work of which shall be eight consecutive hours on duty followed immediately by 16 consecutive hours off duty, and the platoons shall rotate in their periods of duty and time off as may be arranged for the purpose of changing shifts at least every two weeks; or

(c) any other system of platoons or hours of work under which the maximum hours of work or hours on duty on average in any work week are not more than 48 hours.

Other personnel

(2) Firefighters assigned to duties other than fire-fighting duties shall work such hours as are determined, but in no case shall such hours of work exceed the average work week of the other full-time firefighters.

Maximum hours

(3) No firefighters shall be required to be on duty on average in any work week more than 48 hours.

Weekly day off duty

(4) Every firefighter shall be off duty for one full day of 24 hours in every calendar week, but where a two-platoon system or a three-platoon system is in operation, the 24 hours release at the change of platoons shall not be regarded as a day off duty for the purposes of this section.

Time off duty

(5) Nothing in this Part prohibits any municipality from granting the firefighters more than one day off duty in every calendar week.

Off duty

(6) The hours off duty of firefighters shall be free from fire department duties.

Exception for emergencies

(7) Despite subsections (1) to (6), the fire chief may call in off-duty firefighters if, as a result of a major emergency, the fire department needs the services of more firefighters than are on duty. 1997, c. 4, s. 43.

Termination of employment

44. (1) The employment of a firefighter may be terminated upon seven days' notice. The notice must be accompanied by written reasons for the termination.

Independent review

(2) A firefighter who has received a notice of termination of employment may require a review of the termination to be conducted, unless a collective agreement provides for another review mechanism.

Same

(3) If a review of a termination is required under subsection (2), the municipality in which the firefighter is employed shall appoint a person who is not employed in the fire department to conduct the review.

Review, no hearing

(4) A person appointed to conduct a review shall conduct the review within 10 days after the day the review is required. The person is not required to hold a hearing in conducting a review under this section.

Decision

(5) A person conducting a review of a termination under this section may uphold the termination, order that the firefighter be returned to duties under such conditions as may be specified in the order or make such other order as he or she considers proper.

Probationary period

(6) The employment of a firefighter may be terminated without cause at any time during the first 12 months, unless a collective agreement provides otherwise. Subsections (2) to (5) do not apply with respect to a termination during that period. 1997, c. 4, s. 44.

Establishment of Bargaining Rights by Certification

Bargaining unit

45. (1) The firefighters employed in a fire department constitute a bargaining unit for the purposes of collective bargaining under this Act.

Exclusion

(2) The bargaining unit shall not include persons who are deemed not to be firefighters under subsection 41 (2). 1997, c. 4, s. 45.

Bargaining agent

46. (1) The majority of firefighters in a bargaining unit may request an association of firefighters to represent them and act as their bargaining agent for purposes of collective bargaining under this Part.

Transition

(2) An association of firefighters that, immediately before the day this Part comes into force, was a party to, or bound by, an agreement made under section 5 of the *Fire Departments Act* or was bound by the decision or award of a board of arbitration under section 6 of that Act shall, on and after the day this Part comes into force and until such time as a new bargaining agent is requested under subsection (1), be deemed to be the bargaining agent for the firefighters in the bargaining unit. 1997, c. 4, s. 46.

Unfair Labour Practices

Duty of fair representation by association

46.1 (1) An association shall not act in a manner that is arbitrary, discriminatory or in bad faith in the representation of any of the firefighters in the bargaining unit it represents, whether or not they are members of the association. 2015, c. 34, Sched. 1, s. 3.

Transition

(2) This section does not apply in respect of any conduct or events that occurred before December 1, 2011. 2011, c. 13, s. 1.

Section Amendments with date in force (d/m/y)

Employers not to interfere with associations

46.2 No employer or employers' organization and no person acting on behalf of an employer or an employers' organization shall participate in or interfere with the formation, selection or administration of an association or the representation of firefighters by an association or contribute financial or other support to an association, but nothing in this section shall be deemed to deprive an employer of the employer's freedom to express views so long as the employer does not use coercion, intimidation, threats, promises or undue influence. 2015, c. 34, Sched. 1, s. 4.

Section Amendments with date in force (d/m/y)

Associations not to interfere with employers' organizations

46.3 No association and no person acting on behalf of an association shall participate in or interfere with the formation or administration of an employers' organization or contribute financial or other support to an employers' organization. 2015, c. 34, Sched. 1, s. 4.

Section Amendments with date in force (d/m/y)

Employers not to interfere with firefighters' rights

46.4 No employer, employers' organization or person acting on behalf of an employer or an employers' organization,

(a) shall refuse to employ or to continue to employ a person, or discriminate against a person in regard to employment or any term or condition of employment because the person was or is a member of an association or was or is exercising any other rights under this Part;

(b) shall impose any condition in a contract of employment or propose the imposition of any condition in a contract of employment that seeks to restrain a firefighter or a person seeking employment from becoming a member of a trade union or exercising any other rights under this Part; or

(c) shall seek by threat of dismissal, or by any other kind of threat, or by the imposition of a pecuniary or other penalty, or by any other means to compel a firefighter to become or refrain from becoming or to continue to be or to cease to be a member or officer or representative of an association or to cease to exercise any other rights under this Part. 2015, c. 34, Sched. 1, s. 4.

Section Amendments with date in force (d/m/y)

No interference with bargaining rights

46.5 (1) No employer, employers' organization or person acting on behalf of an employer or an employers' organization shall, so long as an association represents the firefighters in a bargaining unit, bargain with or enter into a collective agreement with any person or another association, trade union or council of trade unions on behalf of or purporting, designed or intended to be binding upon the firefighters in the bargaining unit or any of them. 2015, c. 34, Sched. 1, s. 4.

Same

(2) No person, association, trade union or council of trade unions shall, so long as another association continues to be entitled to represent the firefighters in a bargaining unit, bargain with or enter into a collective agreement with an employer or an employers' organization on behalf of or purporting, designed or intended to be binding upon the firefighters in the bargaining unit or any of them. 2015, c. 34, Sched. 1, s. 4.

Section Amendments with date in force (d/m/y)

Intimidation and coercion

46.6 No person, association or employers' organization shall seek by intimidation or coercion to compel any person to become or refrain from becoming or to continue to be or to cease to be a member of an association or of an employers' organization or to refrain from exercising any other rights under this Part or from performing any obligations under this Part. 2015, c. 34, Sched. 1, s. 4.

Section Amendments with date in force (d/m/y)

Persuasion during working hours

46.7 Nothing in this Part authorizes any person to attempt at the place at which a firefighter works to persuade the firefighter during the firefighter's working hours to become or refrain from becoming or continuing to be a member of an association or a trade union. 2015, c. 34, Sched. 1, s. 4.

Section Amendments with date in force (d/m/y)

Protection of witnesses' rights

46.8 (1) No employer, employers' organization or person acting on behalf of an employer or employers' organization shall,

(a) refuse to employ or continue to employ a person;

(b) threaten dismissal or otherwise threaten a person;

(c) discriminate against a person in regard to employment or a term or condition of employment; or

(d) intimidate or coerce or impose a pecuniary or other penalty on a person,

because of a belief that the person may testify in a proceeding under this Part or because the person has made or is about to make a disclosure that may be required in a proceeding under this Part or because the person has made an application or filed a complaint under this Act or has participated in or is about to participate in a proceeding under this Part. 2015, c. 34, Sched. 1, s. 4.

Same

(2) No association or person acting on behalf of an association shall,

(a) discriminate against a person in regard to employment or a term or condition of employment; or

(b) intimidate or coerce or impose a pecuniary or other penalty on a person,

because of a belief that the person may testify in a proceeding under this Part or because the person has made or is about to make a disclosure that may be required in a proceeding under this Part or because the person has made an application or filed a complaint under this Act or has participated in or is about to participate in a proceeding under this Part. 2015, c. 34, Sched. 1, s. 4.

Section Amendments with date in force (d/m/y)

Removal, etc., of posted notices

46.9 No person shall wilfully destroy, mutilate, obliterate, alter, deface or remove or cause to be destroyed, mutilated, obliterated, altered, defaced or removed any notice that the Board has required to be posted during the period that the notice is required to be posted. 2015, c. 34, Sched. 1, s. 4.

Section Amendments with date in force (d/m/y)

Collective bargaining

Notice of desire to bargain

47. (1) If no collective agreement is in effect, a bargaining agent acting pursuant to subsection 46 (1), shall give written notice to the employer of its desire to bargain with a view to making a collective agreement.

Same

(2) The employer or the bargaining agent may give written notice of its desire to bargain with a view to making a collective agreement within the period of 90 days before the expiry date set out in the collective agreement or, if no expiry date is set out in the agreement, within the period of 90 days before the expiry date referred to in subsection 52 (1). 1997, c. 4, s. 47.

Obligation to bargain

48. (1) The employer and the bargaining agent shall meet within 15 days after the notice is given, or within such longer period as they may agree upon, and they shall bargain in good faith and make every reasonable effort to make a collective agreement.

Parties

(2) The employer and the bargaining agent are the parties to the bargaining. 1997, c. 4, s. 48.

Referral to arbitration

49. Where, after bargaining under section 48, either of the parties is satisfied that an agreement cannot be reached, the party may, by notice in writing to the other party and to the Minister, require all matters remaining in dispute to be decided by arbitration in accordance with this Part. 2016, c. 37, Sched. 9, s. 2.

Section Amendments with date in force (d/m/y)

50. Repealed: 2016, c. 37, Sched. 9, s. 2.

Section Amendments with date in force (d/m/y)

Appointment of single arbitrator

50.1 (1) Where the parties agree to have the matters in dispute between them decided by a single arbitrator, they shall, within the time set out in subsection 50.2 (1), jointly appoint a person who agreed to act.

Single arbitrator's powers

(2) The person appointed under subsection (1) shall constitute the board of arbitration for the purposes of this Part and he or she shall have the powers and duties of the chair of a board of arbitration.

Notice to Minister

(3) As soon as the parties appoint a person to act as a single arbitrator, they shall notify the Minister of the name and address of the person appointed. 1997, c. 21, Sched. A, s. 3 (1).

Section Amendments with date in force (d/m/y)

Appointment of board of arbitration

50.2 (1) Within seven days after the day upon which notice is given under section 49, each of the parties shall appoint to a board of arbitration a member who has agreed to act. 2016, c. 37, Sched. 9, s. 3 (1).

Extension of time

(2) The parties by a mutual agreement in writing may extend the period of seven days mentioned in subsection (1) for one further period of seven days. 1997, c. 21, Sched. A, s. 3 (1).

Failure to appoint member

(3) Where a party fails to appoint a member of a board of arbitration within the period or periods mentioned in subsection (1), the Minister, upon the written request of either of the parties, shall appoint such member. 1997, c. 21, Sched. A, s. 3 (1).

Third member

(4) Within ten days after the day on which the second of the members was appointed, the two members appointed by or on behalf of the parties shall appoint a third member who has agreed to act, and such third member shall be the chair. 1997, c. 21, Sched. A, s. 3 (1).

Failure to appoint third member

(5) Where the two members appointed by or on behalf of the parties fail within ten days after the appointment of the second of them to agree upon the third member, notice of such failure shall be given forthwith to the Minister by the parties, the two members or either of them and the Minister shall appoint as a third member a person who is, in the opinion of the Minister, qualified to act. 1997, c. 21, Sched. A, s. 3 (1).

Notice of appointment by party

(6) As soon as one of the parties appoints a member to a board of arbitration, that party shall notify the other party and the Minister of the name and address of the member appointed. 1997, c. 21, Sched. A, s. 3 (1).

Notice of appointment by members

(7) As soon as the two members appoint a third member, they shall notify the Minister of the name and address of the third member appointed. 1997, c. 21, Sched. A, s. 3 (1).

Selection of method

(8) If the chair of the board of arbitration was appointed by the Minister, subject to subsections (9) to (11), the Minister shall select the method of arbitration and shall advise the chair of the board of arbitration of the selection. 1997, c. 21, Sched. A, s. 3 (1).

Same, mediation-arbitration

(9) The method selected shall be mediation-arbitration unless the Minister is of the view that another method is more appropriate. 1997, c. 21, Sched. A, s. 3 (1).

Same, final offer selection

(10) The method selected shall not be final offer selection without mediation. 1997, c. 21, Sched. A, s. 3 (1).

Same, mediation-final offer selection

(11) The method selected shall not be mediation-final offer selection unless the Minister in his or her sole discretion selects that method because he or she is of the view that it is the most appropriate method having regard to the nature of the dispute. 1997, c. 21, Sched. A, s. 3 (1).

Vacancies

(12) If a person ceases to be a member of a board of arbitration by reason of resignation, death or otherwise before it has completed its work, the Minister shall appoint a member in his or her place after consulting the party whose point of view was represented by such person. 1997, c. 21, Sched. A, s. 3 (1).

Replacement of member

(13) If, in the opinion of the Minister, a member of a board of arbitration has failed to enter on or to carry on his or her duties so as to enable it to render a decision within the time set out in subsection 50.5 (5) or within the time extended under subsection 50.5 (6), the Minister may appoint a member in his or her place after consulting the party whose point of view was represented by such person. 1997, c. 21, Sched. A, s. 3 (1).

Replacement of chair

(14) If the chair of a board of arbitration is unable to enter on or to carry on his or her duties so as to enable it to render a decision within the time set out in subsection 50.5 (5) or within the time extended under subsection 50.5 (6), the Minister may appoint a person to act as chair in his or her place. 1997, c. 21, Sched. A, s. 3 (1).

Where single arbitrator unable to act

(15) If the person appointed jointly by the parties as a single arbitrator dies before completing his or her work or is unable to enter on or to carry on his or her duties so as to enable him or her to render a decision within the time set out in subsection 50.5 (5) or within the time extended under subsection 50.5 (6), the Minister may, upon notice or complaint to him or her by either of the parties and after consulting the parties, inform the parties in writing that the arbitrator is unable to enter on or to carry on his or her duties and the provisions of this section relating to the appointment of a board of arbitration shall thereupon apply with necessary modifications. 1997, c. 21, Sched. A, s. 3 (1).

Time and place of hearings

(16) Subject to subsection (17), the chair of the board of arbitration shall fix the time and place of the first or any subsequent hearing and shall give notice thereof to the Minister and the Minister shall notify the parties and the members of the board of arbitration thereof. 1997, c. 21, Sched. A, s. 3 (1).

When hearings commence

(17) The board of arbitration shall hold the first hearing within 30 days after the last (or only) member of the board is appointed. 1997, c. 21, Sched. A, s. 3 (1).

Exception

(18) If the method of arbitration selected by the Minister under subsection (8) is mediation-arbitration or mediation-final offer selection, the time limit set out in subsection (17) does not apply in respect of the first hearing but applies instead, with necessary modifications, in respect of the commencement of mediation. 1997, c. 21, Sched. A, s. 3 (1); 2016, c. 37, Sched. 9, s. 3 (2).

Failure of member to attend

(19) Where a member of a board of arbitration appointed by a party or by the Minister is unable to attend the first hearing at the time and place fixed by the chair, the party shall, upon the request in writing of the chair, appoint a new member in place of such member and where such appointment is not made within five days of the date of the request, the Minister shall, upon the written request of the chair, appoint a new member in place of such member. 1997, c. 21, Sched. A, s. 3 (1).

Order to expedite proceedings

(20) Where a board of arbitration has been established, the chair shall keep the Minister advised of the progress of the arbitration and where the Minister is advised that the board has failed to render a decision within the time set out in subsection 50.5 (5) or within the time extended under subsection 50.5 (6), the Minister may, after consulting the parties and the board, issue whatever order he or she considers necessary in the circumstances to ensure that a decision will be rendered within a reasonable time. 1997, c. 21, Sched. A, s. 3 (1).

Procedure

(21) Subject to the other provisions of this section, a board of arbitration shall determine its own procedure but shall give full opportunity to the parties to present their evidence and make their submissions. 1997, c. 21, Sched. A, s. 3 (1).

Same

(22) If the members of a board of arbitration are unable to agree among themselves on matters of procedure or as to the admissibility of evidence, the decision of the chair governs. 1997, c. 21, Sched. A, s. 3 (1).

Written submissions

(22.1) The parties shall file written submissions on all matters remaining in dispute with the board of arbitration before the date set by the chair of the board of arbitration. 2016, c. 37, Sched. 9, s. 3 (3).

Same, time

(22.2) The date set by the chair in subsection (22.1) must be before the day the first hearing begins. 2016, c. 37, Sched. 9, s. 3 (3).

Time for submission of information

(23) Subject to subsections (22.1) and (22.2), if the method of arbitration selected by the Minister under subsection (8) is mediation-arbitration or mediation-final offer selection, the chair of the board of

established in accordance with this Part and no application shall be made, taken or heard for judicial review or to question the establishment of the board or the appointment of the member or members, or to review, prohibit or restrain any of its proceedings. 1997, c. 21, Sched. A, s. 3 (1).

Section Amendments with date in force (d/m/y)

Single arbitration of several disputes

50.4 (1) Where there are matters in dispute between parties to be decided by more than one arbitration in accordance with this Part, the parties may agree in writing that the matters in dispute shall be decided by one board of arbitration. 1997, c. 21, Sched. A, s. 3 (1).

Parties

(2) For the purposes of section 50.2, the bargaining agents for or on behalf of any firefighters to whom this Part applies shall be one party and the employers of such firefighters shall be the other party. 1997, c. 21, Sched. A, s. 3 (1).

Powers of board

(3) In an arbitration to which this section applies, the board may, in addition to the powers conferred upon a board of arbitration by this Part,

(a) make a decision on matters of common dispute between all of the parties; and

(b) despite subsections 50.5 (1.1) and (1.2), refer matters of particular dispute to the parties concerned for further bargaining. 1997, c. 21, Sched. A, s. 3 (1); 2016, c. 37, Sched. 9, s. 4.

Same

(4) Where matters of particular dispute are not resolved by further collective bargaining under clause (3) (b), the board shall decide the matters. 1997, c. 21, Sched. A, s. 3 (1).

Section Amendments with date in force (d/m/y)

Duty of board

50.5 (1) The board of arbitration shall examine into and decide on matters that are in dispute and any other matters that appear to the board necessary to be decided in order to conclude a collective agreement between the parties. 1997, c. 21, Sched. A, s. 3 (1).

Same

(1.1) Subject to subsection (1.2), in making its decision, the board of arbitration shall not refer a matter that is in dispute back to the parties for further bargaining. 2016, c. 37, Sched. 9, s. 5.

Same

(1.2) The board of arbitration may refer a matter that is in dispute back to the parties for further bargaining if,

(a) the board of arbitration has not issued its decision; and

(b) the parties agree. 2016, c. 37, Sched. 9, s. 5.

Same

(1.3) For greater certainty, nothing in subsection (1.1) prevents the board of arbitration from referring matters concerning the implementation of its decision back to the parties. 2016, c. 37, Sched. 9, s. 5.

Criteria

(2) In making a decision, the board of arbitration shall take into consideration all factors the board considers relevant, including the following criteria:

1. The employer's ability to pay in light of its fiscal situation.

2. The extent to which services may have to be reduced, in light of the decision, if current funding and taxation levels are not increased.

3. The economic situation in Ontario and in the municipality.

4. A comparison, as between the firefighters and other comparable employees in the public and private sectors, of the terms and conditions of employment and the nature of the work performed.

5. The employer's ability to attract and retain qualified firefighters. 1997, c. 21, Sched. A, s. 3 (1).

Restriction

(3) Nothing in subsection (2) affects the powers of the board of arbitration. 1997, c. 21, Sched. A, s. 3 (1).

Board to remain seized of matters

(4) The board of arbitration shall remain seized of and may deal with all matters in dispute between the parties until a collective agreement is in effect between the parties. 1997, c. 21, Sched. A, s. 3 (1).

Time for decision

(5) The board of arbitration shall give a decision within 90 days after the last (or only) member of the board is appointed. 1997, c. 21, Sched. A, s. 3 (1).

Extension

(6) The parties may agree to extend the time described in subsection (5), either before or after the time has passed. 1997, c. 21, Sched. A, s. 3 (1).

Remuneration and expenses

(7) The remuneration and expenses of the members of a board of arbitration shall be paid as follows:

1. A party shall pay the remuneration and expenses of a member appointed by or on behalf of the party.

2. Each party shall pay one-half of the chair's remuneration and expenses. 1997, c. 21, Sched. A, s. 3 (1).

Enforcement of arbitration decisions

(8) Where a party or firefighter has failed to comply with any of the terms of the decision of an arbitration board, any party or firefighter affected by the decision may file in the Superior Court of Justice a copy of the decision, exclusive of the reasons therefor, whereupon the decision shall be entered in the same way as a judgment or order of that court and is enforceable as such. 1997, c. 21, Sched. A, s. 3 (1); 2002, c. 18, Sched. N, s. 12.

Non-application

(9) The *Arbitration Act, 1991* and the *Statutory Powers Procedure Act* do not apply with respect to an arbitration under this Part. 1997, c. 21, Sched. A, s. 3 (1).

Section Amendments with date in force (d/m/y)

Where agreement reached

50.6 (1) Where, during the bargaining under this Part or during the proceedings before the board of arbitration, the parties agree on all the matters to be included in a collective agreement, they shall put them in writing and shall execute the document, and thereupon it constitutes a collective agreement.

Failure to make agreement

(2) If the parties fail to put the terms of all the matters agreed upon by them in writing or if having put the terms of their agreement in writing either of them fails to execute the document within seven days after it was executed by the other of them, they shall be deemed not to have made a collective agreement and the provisions of sections 49 to 50.5 apply, with necessary modifications.

Decision of board

(3) Where, during the bargaining under this Part or during the proceedings before the board of arbitration, the parties have agreed upon some matters to be included in the collective agreement and have notified the board in writing of the matters agreed upon, the decision of the board shall be confined to the matters not agreed upon by the parties and to such other matters that appear to the board necessary to be decided to conclude a collective agreement between the parties.

Same

(4) Where the parties have not notified the board of arbitration in writing that, during the bargaining under this Part or during the proceedings before the board of arbitration, they have agreed upon some matters to be included in the collective agreement, the board shall decide all matters in dispute and such other matters that appear to the board necessary to be decided to conclude a collective agreement between the parties.

Execution of agreement

(5) Within five days of the date of the decision of the board of arbitration or such longer period as may be agreed upon in writing by the parties, the parties shall prepare and execute a document giving effect to the decision of the board and any agreement of the parties, and the document thereupon constitutes a collective agreement.

Preparation of agreement by board

(6) If the parties fail to prepare and execute a document in the form of a collective agreement giving effect to the decision of the board and any agreement of the parties within the period mentioned in subsection (5), the parties or either of them shall notify the chair of the board in writing forthwith, and the board shall prepare a document in the form of a collective agreement giving effect to the decision of the board and any agreement of the parties and submit the document to the parties for execution.

Failure to execute agreement

(7) If the parties or either of them fail to execute the document prepared by the board within a period of five days from the day of its submission by the board to them, the document shall come into effect as though it had been executed by the parties and the document thereupon constitutes a collective agreement. 1997, c. 21, Sched. A, s. 3 (1).

Section Amendments with date in force (d/m/y)

Delegation

50.7 (1) The Minister may delegate in writing to any person the Minister's power to make an appointment, order or direction under this Act. 1997, c. 21, Sched. A, s. 3 (1); 2002, c. 18, Sched. N, s. 13 (1).

Proof of appointment

(2) An appointment, an order or a direction made under this Act that purports to be signed by or on behalf of the Minister shall be received in evidence in any proceeding as proof, in the absence of evidence to the contrary, of the facts stated in it without proof of the signature or the position of the person appearing to have signed it. 1997, c. 21, Sched. A, s. 3 (1); 2002, c. 18, Sched. N, s. 13 (2).

Section Amendments with date in force (d/m/y)

Existing proceedings discontinued

50.8 (1) Proceedings before a board of arbitration under this Part or a predecessor to this Act in which a hearing was commenced before the date on which subsection 3 (1) of the *Public Sector Dispute Resolution Act, 1997* comes into force are terminated and any decision in such proceedings is void.

Exception, completed proceedings

(2) This section does not apply with respect to proceedings in which a hearing was commenced before June 3, 1997 if,

(a) a final decision is issued on or before June 3, 1997; or

(b) a final decision is issued after June 3, 1997 and the decision is served before the date on which subsection 3 (1) of the *Public Sector Dispute Resolution Act, 1997* comes into force.

Exception, by agreement

(3) This section does not apply if the parties agree in writing after the date on which subsection 3 (1) of the *Public Sector Dispute Resolution Act, 1997* comes into force to continue the proceedings. 1997, c. 21, Sched. A, s. 3 (1).

Section Amendments with date in force (d/m/y)

Transition

Referred to arbitration

50.9 (1) Sections 50, 50.2, 50.4 and 50.5, as they read immediately before the repeal date, continue to apply to parties who were referred to arbitration under section 50 before the repeal date. 2016, c. 37, Sched. 9, s. 6.

Requested appointment of conciliation officer

(2) Sections 49 and 50 and subsection 50.2 (1), as they read immediately before the repeal date, continue to apply to parties if either party made a request for the appointment of a conciliation officer under subsection 49 (1) before the repeal date. 2016, c. 37, Sched. 9, s. 6.

Definition — repeal date

(3) In this section,

"repeal date" means the day that section 6 of Schedule 9 to the *Building Ontario Up for Everyone Act (Budget Measures), 2016* comes into force. 2016, c. 37, Sched. 9, s. 6.

Section Amendments with date in force (d/m/y)

Operation of Collective Agreements

Collective agreement

51. (1) Every collective agreement must be set out in writing.

Binding effect

(2) A collective agreement is binding upon the employer, the bargaining agent and the members of the bargaining unit.

Commencement

(3) A collective agreement comes into effect according to its terms. If the agreement does not provide for its commencement date, it comes into effect at the beginning of the first fiscal period in respect of which the employer budgets for expenditures under the agreement.

Same

(4) Despite subsection (3), if a collective agreement provides that it comes into effect on a specified day and that day occurs before the beginning of the first fiscal period in respect of which the employer can budget for expenditures under the agreement, the agreement shall be deemed to provide that it comes into effect at the beginning of that first fiscal period. 1997, c. 4, s. 51.

Minimum term of collective agreements

52. (1) If a collective agreement does not provide for its term of operation or provides for its operation for an unspecified term or for a term of less than one year, it shall be deemed to provide for its operation for a term of one year from the date that it commenced to operate.

Extension of term of collective agreement

(2) Despite subsection (1), the parties may, in a collective agreement or otherwise and before or after the collective agreement has ceased to operate, agree to continue the operation of the collective agreement or any of its provisions for a period of less than one year while they are bargaining for its renewal with or without modifications or for a new agreement and the continuation of the collective agreement may be terminated by either party upon 30 days notice to the other party.

Early termination of collective agreements

(3) A collective agreement shall not be terminated by the parties before it ceases to operate in accordance with its provisions or this Act without the consent of the Board on the joint application of the parties.

Revision by mutual consent

(4) Nothing in this section prevents the revision by mutual consent of the parties at any time of any provision of a collective agreement other than a provision relating to its term of operation. 1997, c. 4, s. 52.

Deduction and remittance of association dues

52.1 (1) Subject to section 52.3, where an association so requests, there shall be included in the collective agreement between the association and the employer of the firefighters a provision requiring the employer to deduct from the wages of each firefighter in the unit affected by the collective agreement, whether or not the firefighter is a member of the association, the amount of the regular association dues and to remit the amount to the association, forthwith. 2015, c. 34, Sched. 1, s. 5.

Definition

(2) In subsection (1),

"regular association dues" means,

(a) in the case of a firefighter who is a member of an association, the dues uniformly and regularly paid by a member of the association in accordance with the constitution and by-laws of the association, and

(b) in the case of a firefighter who is not a member of an association, the dues referred to in clause (a), excluding any amount in respect of pension, superannuation, sickness insurance or any other benefit available only to members of the association. 2015, c. 34, Sched. 1, s. 5.

Section Amendments with date in force (d/m/y)

Permissive provisions

52.2 (1) Despite anything in this Part, the parties to a collective agreement may include in it provisions,

(a) for requiring, as a condition of employment, membership in the association or granting a preference of employment to members of the association, or requiring the payment of dues or contributions to the association;

(b) for permitting a firefighter who represents the association to attend to the business of the association during working hours without deduction of the time so occupied in the computation of the time worked for the employer and without deduction of wages in respect of the time so occupied; and

(c) for permitting the association the use of the employer's premises for the purposes of the association without payment therefor. 2015, c. 34, Sched. 1, s. 5.

Where non-member firefighter cannot be required to be discharged

(2) No association that is a party to a collective agreement containing a provision mentioned in clause (1) (a) shall require the employer to discharge a firefighter because,

(a) the firefighter has been expelled or suspended from membership in the association; or

(b) membership in the association has been denied to or withheld from the firefighter,

for the reason that the firefighter,

(c) was or is a member of another association or a trade union;

(d) has engaged in activity against the association or on behalf of another association or a trade union;

(e) has engaged in reasonable dissent within the association;

(f) has been discriminated against by the association in the application of its membership rules; or

(g) has refused to pay initiation fees, dues or other assessments to the association which are unreasonable. 2015, c. 34, Sched. 1, s. 5.

Where subs. (2) does not apply

(3) Subsection (2) does not apply to a firefighter who has engaged in unlawful activity against the association mentioned in clause (1) (a) or an officer, official or agent thereof or whose activity against the association or on behalf of another association or trade union has been instigated or procured by the firefighter's employer or any person acting on the employer's behalf or whose employer or a person acting on the employer's behalf has participated in such activity or contributed financial or other support to the firefighter in respect of the activity. 2015, c. 34, Sched. 1, s. 5.

Subs. (1) provisions continued during bargaining

(4) Despite anything in this Part, where the parties to a collective agreement have included in it any of the provisions permitted by subsection (1), any of such provisions may be continued in effect during the period when the parties are bargaining with a view to the renewal, with or without modifications, of the agreement or to the making of a new agreement. 2015, c. 34, Sched. 1, s. 5.

Section Amendments with date in force (d/m/y)

Religious objections

52.3 (1) Where the Board is satisfied that a firefighter because of his or her religious conviction or belief,

(a) objects to joining an association; or

(b) objects to the paying of dues or other assessments to an association,

the Board may order that the provisions of a collective agreement of the type mentioned in clause 52.2 (1) (a) do not apply to the firefighter and that the firefighter is not required to join the association, to be or continue to be a member of the association, or to pay any dues, fees or assessments to the association, provided that amounts equal to any initiation fees, dues or other assessments are paid by the firefighter to or are remitted by the employer to a charitable organization mutually agreed upon by the firefighter and the association, but if the firefighter and the association fail to so agree then to a charitable organization registered as a charitable organization in Canada under Part I of the *Income Tax Act* (Canada) that may be designated by the Board. 2015, c. 34, Sched. 1, s. 5.

Application of subs. (1)

(2) Subsection (1) applies to firefighters in the employ of an employer at the time a collective agreement containing a provision of the kind mentioned in subsection (1) is first entered into with that employer and only during the life of such collective agreement, and does not apply to firefighters whose employment commences after the entering into of the collective agreement. 2015, c. 34, Sched. 1, s. 5.

Section Amendments with date in force (d/m/y)

Arbitration provision required

53. (1) Every collective agreement shall provide for the final and binding settlement by arbitration of all differences between the parties arising from the interpretation, application, administration or alleged violation of the collective agreement, including any question as to whether a matter is arbitrable, by a single arbitrator. 1997, c. 4, s. 53 (1).

Same

(2) If a collective agreement does not contain the provision mentioned in subsection (1), it shall be deemed to contain the following provision:

If a difference arises between the parties relating to the interpretation, application, administration of this agreement, including any question as to whether a matter is arbitrable, or if an allegation is made that this agreement has been violated, either of the parties may, after exhausting any grievance procedure established in this agreement, notify the other party in writing of its desire to submit the difference or allegation to a single arbitrator. 1997, c. 4, s. 53 (2).

Selection of single arbitrator

(3) If a matter is referred to arbitration, the arbitrator shall be selected in accordance with the regulations. 1997, c. 4, s. 53 (3).

Commencement of proceedings

(4) The arbitrator shall begin the arbitration proceedings within 30 days after his or her appointment or within such longer period as the parties may agree upon or as the arbitrator may determine. 1997, c. 4, s. 53 (4).

Time for decision

(5) An arbitrator shall give a decision within 30 days after hearings on the matter submitted to arbitration are concluded. 1997, c. 4, s. 53 (5).

Same

(6) The time described in subsection (5) for giving a decision may be extended,

(a) with the consent of the parties to the arbitration; or

(b) in the discretion of the arbitrator so long as he or she states in the decision the reasons for extending the time. 1997, c. 4, s. 53 (6).

Oral decision

(7) An arbitrator may give an oral decision and, if he or she does so, subsection (5) does not apply and the arbitrator,

(a) shall give the decision promptly after hearings on the matter are concluded;

(b) shall give a written decision, without reasons, promptly upon the request of either party; and

(c) shall give written reasons for the decision within a reasonable period of time upon the request of either party. 1997, c. 4, s. 53 (7).

Orders re decisions

(8) If the arbitrator does not give a decision within the time described in subsection (5) or does not provide written reasons within the time described in subsection (7), the Minister may,

(a) make such orders as he or she considers necessary to ensure that the decision or reasons will be given without undue delay; and

(b) make such orders as he or she considers appropriate respecting the remuneration and expenses of the arbitrator. 1997, c. 4, s. 53 (8).

Powers of arbitrators

(9) An arbitrator has power,

(a) to require any party to furnish particulars before or during a hearing;

(b) to require any party to produce documents or things that may be relevant to the matter and to do so before or during the hearing;

(c) to fix dates for the commencement and continuation of hearings;

(d) to summon and enforce the attendance of witnesses and to compel them to give oral or written evidence on oath in the same manner as a court of record in civil cases;

(e) to administer oaths and affirmations,

(f) to accept the oral or written evidence as the arbitrator in his or her discretion considers proper, whether admissible in a court of law or not;

(g) to enter any premises where work is being done or has been done by the firefighters or in which the employer carries on business or where anything is taking place or has taken place concerning any of the differences submitted to the arbitrator, and inspect and view any work, material, machinery, appliance or article therein, and interrogate any person respecting any such thing or any of such differences;

(h) to authorize any person to do anything that the arbitrator may do under clause (g) and to report to the arbitrator thereon;

(i) to make interim orders concerning procedural matters;

(j) to interpret and apply human rights and other employment-related statutes, despite any conflict between those statutes and the terms of the collective agreement. 1997, c. 4, s. 53 (9).

Restriction re interim orders

(10) An arbitrator shall not make an interim order under clause (9) (i) requiring an employer to reinstate a firefighter in employment.1997, c. 4, s. 53 (10).

Enforcement power

(10.1) An arbitrator or the chair of an arbitration board, as the case may be, may enforce the written settlement of a grievance. 2015, c. 34, Sched. 1, s. 6.

Extension of time

(11) Except where a collective agreement states that this subsection does not apply, an arbitrator may extend the time for the taking of any step in the grievance procedure under a collective agreement, despite the expiration of the time, where the arbitrator is satisfied that there are reasonable grounds for the extension and that the opposite party will not be substantially prejudiced by the extension.1997, c. 4, s. 53 (11).

Substitution of penalty

(12) Where an arbitrator determines that a firefighter has been discharged or otherwise disciplined by an employer for cause and the collective agreement does not contain a specific penalty for the infraction that is the subject-matter of the arbitration, the arbitrator may substitute such other penalty for the discharge or discipline as to the arbitrator seems just and reasonable in all the circumstances. 1997, c. 4, s. 53 (12).

Effect of arbitrator's decision

(13) The decision of an arbitrator is binding upon the parties and the firefighters who are covered by the agreement and affected by the decision.1997, c. 4, s. 53 (13).

Enforcement of arbitration decisions

(13.1) Where a party, employer, association, trade union, firefighter or other person has failed to comply with any of the terms of the decision of an arbitrator or arbitration board, any party, employer, association, trade union, firefighter or other person affected by the decision may file in the Superior Court of Justice a copy of the decision, exclusive of the reasons therefor, in the prescribed form, whereupon the decision shall be entered in the same way as a judgment or order of that court and is enforceable as such. 2015, c. 34, Sched. 1, s. 6.

Costs of arbitration

(14) Each party shall assume its own costs in the arbitration proceedings and pay one-half of the costs of the arbitrator.1997, c. 4, s. 53 (14).

Non-application

(15) The *Arbitration Act, 1991* and the *Statutory Powers Procedure Act* do not apply with respect to an arbitration under this section. 1997, c. 4, s. 53 (15).

Section Amendments with date in force (d/m/y)

Referral of grievances to a single arbitrator

53.0.1 (1) Despite the arbitration provision in a collective agreement or deemed to be included in a collective agreement under section 53, a party to a collective agreement may request the Minister to refer to a single arbitrator, to be appointed by the Minister, any difference between the parties to the collective agreement arising from the interpretation, application, administration or alleged violation of the agreement, including any question as to whether a matter is arbitrable. 2015, c. 34, Sched. 1, s. 7.

Request for references

(2) Subject to subsection (3), a request under subsection (1) may be made by a party to the collective agreement in writing after the grievance procedure under the agreement has been exhausted or after 30 days have elapsed from the time at which the grievance was first brought to the attention of the other party, whichever first occurs, but no such request shall be made beyond the time, if any, stipulated in or permitted under the agreement for referring the grievance to arbitration. 2015, c. 34, Sched. 1, s. 7.

Same

(3) Despite subsection (2), where a difference between the parties to a collective agreement is a difference respecting discharge from or other termination of employment, a request under subsection (1) may be made by a party to the collective agreement in writing after the grievance procedure under the agreement has been exhausted or after 14 days have elapsed from the time at which the grievance was first brought to the attention of the other party, whichever first occurs, but no such request shall be made beyond the time, if any, stipulated in or permitted under the agreement for referring the grievance to arbitration. 2015, c. 34, Sched. 1, s. 7.

Minister to appoint arbitrator

(4) Where a request is received under subsection (1), the Minister shall appoint a single arbitrator who shall have exclusive jurisdiction to hear and determine the matter referred to him or her, including any

question as to whether a matter is arbitrable and any question as to whether the request was timely. 2015, c. 34, Sched. 1, s. 7.

Same

(5) Where a request or more than one request concerns several differences arising under the collective agreement, the Minister may in his or her discretion appoint an arbitrator under subsection (4) to deal with all the differences raised in the request or requests. 2015, c. 34, Sched. 1, s. 7.

Settlement officer

(6) The Minister may appoint a settlement officer to confer with the parties and endeavour to effect a settlement prior to the hearing by an arbitrator appointed under subsection (4). 2015, c. 34, Sched. 1, s. 7.

Powers and duties of arbitrator

(7) An arbitrator appointed under subsection (4) shall commence to hear the matter referred to him or her within 21 days after the receipt of the request by the Minister and the provisions of subsections 53 (5) to (15) apply with all necessary modifications to the arbitrator, the parties and the decision of the arbitrator. 2015, c. 34, Sched. 1, s. 7.

Oral decisions

(8) Upon the agreement of the parties, the arbitrator shall deliver an oral decision forthwith or as soon as practicable without giving his or her reasons in writing therefor. 2015, c. 34, Sched. 1, s. 7.

Payment of arbitrator

(9) Where the Minister has appointed an arbitrator under subsection (4), each of the parties shall pay one-half of the remuneration and expenses of the person appointed. 2015, c. 34, Sched. 1, s. 7.

Section Amendments with date in force (d/m/y)

Mandatory retirement

Application

53.1 (1) This section applies to a firefighter only if the firefighter is regularly assigned to fire suppression duties. 2011, c. 13, s. 2.

Mandatory retirement provision permitted

(2) A collective agreement may contain a provision requiring firefighters to retire at a specified age of 60 or over and, if it does, a firefighter subject to the agreement shall, subject to subsection (4), retire at the specified age. 2011, c. 13, s. 2.

Existing and new collective agreements

(3) Subsection (2) applies to collective agreements that are in operation on the day section 2 of the *Fire Protection and Prevention Amendment Act, 2011* comes into force and to collective agreements that come into force after that day. 2011, c. 13, s. 2.

Deemed mandatory retirement provision

(3.1) If a collective agreement does not contain a provision requiring firefighters to retire at a specified age or if it contains a provision requiring firefighters to retire at an age under 60, the agreement is deemed to contain a provision requiring firefighters to retire at the age of 60 and a firefighter subject to the agreement shall, subject to subsection (4), retire at that age. 2011, c. 13, s. 3.

Reasonable accommodation

(4) A firefighter shall not be required to retire if the firefighter can be accommodated without undue hardship, considering the cost, outside sources of funding, if any, and health and safety requirements, if any. 2011, c. 13, s. 2.

Human Rights Code

(5) This section applies despite the *Human Rights Code*. 2011, c. 13, s. 2.

Section Amendments with date in force (d/m/y)

Managers, etc.

54. (1) An employer may assign a person employed by it to a position which, in the opinion of the employer, involves the exercise of managerial functions or employment in a confidential capacity in matters relating to labour relations, but, subject to subsection (4), the assignment is not conclusive of the question of whether the person does exercise such functions or is employed in such capacity.

Board to decide status

(2) Subject to subsection (4), the Board, on application of an employer, has exclusive jurisdiction to determine any question as to whether a person exercises managerial functions or is employed in a confidential capacity in matters relating to labour relations, and its decision is final and conclusive for all purposes.

Same

(3) Subject to subsection (4), a person shall remain in the bargaining unit until the Board makes a determination under subsection (2), unless the parties otherwise agree.

Designation

(4) Subject to subsections (5) and (8), an employer may, in its sole discretion, designate a person described in subsection (1) as a person who shall for purposes of this Act be conclusively deemed to be exercising managerial functions or acting in a confidential capacity in matters relating to labour relations.

Consent required

(5) An employer shall not designate a person under subsection (4) unless the person consents to the designation.

If no consent

(6) If a person does not consent to a designation under subsection (4), the employer shall assign the person to a position in the bargaining unit. If the position to which a person is assigned has a lower salary than the position held by the person before the assignment, he or she is entitled to be paid the same salary and to receive the same benefits after the assignment as he or she was paid and received before the assignment.

Revocation

(7) A designation under subsection (4) may be revoked by the employer at any time.

Restriction

(8) An employer shall not designate under subsection (4) more than,

(a) two persons, if the employer employs fewer than 25 persons;

(b) three persons, if the employer employs 25 or more but fewer than 150 persons;

(c) four persons, if the employer employs 150 or more but fewer than 300 persons; or

(d) five persons, if the employer employs 300 or more persons. 1997, c. 4, s. 54 (1-8).

Amalgamations

(8.1) If, after the day on which subsection 3 (2) of the *Public Sector Dispute Resolution Act, 1997* comes into force, two or more municipalities that are employers of firefighters amalgamate, the amalgamated municipality is entitled under subsection (4) to designate the number of persons that is equal to the sum of the numbers of persons that each of the amalgamating municipalities would have been able to designate immediately before the amalgamation.

Dissolutions and incorporations

(8.2) If, after the day on which subsection 3 (2) of the *Public Sector Dispute Resolution Act, 1997* comes into force, two or more municipalities that are employers of firefighters are dissolved and the inhabitants of the municipalities are incorporated in a new municipality, subsection (8.1) shall apply as if the dissolved municipalities were amalgamating municipalities and the new municipality was an amalgamated municipality. 1997, c. 21, Sched. A, s. 3 (2).

Calculating number of persons employed

(9) For the purposes of subsection (8), the number of persons employed by the employer is the sum of,

(a) the number of persons employed by the employer who are firefighters; and

(b) the number of persons who are performing or conclusively deemed to be performing managerial functions with respect to firefighters or acting in a confidential capacity in matters relating to labour relations with respect to firefighters. 1997, c. 4, s. 54 (9).

Section Amendments with date in force (d/m/y)

Enforcement of decisions

55. (1) If a person or bargaining agent fails to comply with a decision of an arbitrator under section 53, the person or bargaining agent affected by the decision may file a copy of the decision (excluding the reasons for the decision) with the Superior Court of Justice. 1997, c. 4, s. 55 (1); 2002, c. 18, Sched. N, s. 14.

Same

(2) The decision shall not be filed with the court until 30 days have elapsed after the date the decision was released or after the date specified in the decision for complying with it. 1997, c. 4, s. 55 (2).

Effect of filing

(3) When it is filed with the court, the decision shall be entered in the same way as a judgment or order of the court and is enforceable as such. 1997, c. 4, s. 55 (3).

Section Amendments with date in force (d/m/y)

Working conditions not to be altered

56. (1) If notice has been given under section 47 by a bargaining agent for a unit of firefighters or an employer and no collective agreement is in operation,

(a) the employer shall not, except with the consent of the bargaining agent, alter the rates of wages or any other term or condition of employment or any right, privilege or duty of the employer or the firefighters until the right of the bargaining agent to represent the firefighters has been terminated; and

(b) the bargaining agent shall not, except with the consent of the employer, alter any term or condition of employment or any right, privilege or duty of the employer, the bargaining agent or the firefighters until the right of the bargaining agent to represent the firefighters has been terminated.

Arbitration if no agreement

(2) If notice has been given under subsection 47 (2) and no collective agreement is in operation, any difference between the parties as to whether or not subsection (1) was complied with may be referred to arbitration by either of the parties as if the collective agreement was still in operation and the arbitration shall proceed in accordance with section 53. 1997, c. 4, s. 56.

Inquiry, alleged contravention

56.1 (1) The Board may authorize a labour relations officer to inquire into any complaint alleging a contravention of this Part. 2015, c. 34, Sched. 1, s. 8.

Duties

(2) The labour relations officer shall forthwith inquire into the complaint and endeavour to effect a settlement of the matter complained of. 2015, c. 34, Sched. 1, s. 8.

Report

(3) The labour relations officer shall report the results of his or her inquiry and endeavours to the Board. 2015, c. 34, Sched. 1, s. 8.

Remedy for discrimination

(4) Where a labour relations officer is unable to effect a settlement of the matter complained of or where the Board in its discretion considers it advisable to dispense with an inquiry by a labour relations officer, the Board may inquire into the complaint of a contravention of this Part and where the Board is satisfied that an employer, employers' organization, association, person or firefighter has acted contrary to this Part it shall determine what, if anything, the employer, employers' organization, association, person or firefighter shall do or refrain from doing with respect thereto and such determination, without limiting the generality of the foregoing may include, despite the provisions of any collective agreement, any one or more of,

(a) an order directing the employer, employers' organization, association, firefighter or other person to cease doing the act or acts complained of;

(b) an order directing the employer, employers' organization, association, firefighter or other person to rectify the act or acts complained of; or

(c) an order to reinstate in employment or hire the person or firefighter concerned, with or without compensation, or to compensate instead of hiring or reinstatement for loss of earnings or other employment benefits in an amount that may be assessed by the Board against the employer, employers' organization, association, firefighter or other person jointly or severally. 2015, c. 34, Sched. 1, s. 8.

Burden of proof

(5) On an inquiry by the Board into a complaint under subsection (4) that a person has been refused employment, discharged, discriminated against, threatened, coerced, intimidated or otherwise dealt with contrary to this Part as to the person's employment, opportunity for employment or conditions of employment, the burden of proof that any employer or employers' organization did not act contrary to this Part lies upon the employer or employers' organization. 2015, c. 34, Sched. 1, s. 8.

Filing in court

(6) An association, employer, employers' organization, firefighter or other person affected by the determination may file the determination, excluding the reasons, in the prescribed form in the Superior Court of Justice and it shall be entered in the same way as an order of that court and is enforceable as such. 2015, c. 34, Sched. 1, s. 8.

Effect of settlement

(7) Where a proceeding under this Part has been settled, whether through the endeavours of the labour relations officer or otherwise, and the terms of the settlement have been put in writing and signed by the parties or their representatives, the settlement is binding upon the parties, the association, employer, employers' organization, firefighter or other person who have agreed to the settlement and shall be complied with according to its terms, and a complaint that the association, employer, employers' organization, firefighter or other person who agreed to the settlement has not complied with the terms of the settlement shall be deemed to be a complaint under subsection (1). 2015, c. 34, Sched. 1, s. 8.

Section Amendments with date in force (d/m/y)

"person" defined for purposes of ss. 46.8 and 56.1

56.2 For the purposes of section 46.8 and any complaint made under section 56.1,

"person" includes any person otherwise excluded by subsection 41 (2). 2015, c. 34, Sched. 1, s. 8.

Section Amendments with date in force (d/m/y)

Board power re interim orders

56.3 (1) On application in a pending proceeding, the Board may,

(a) make interim orders concerning procedural matters on such terms as it considers appropriate;

(b) subject to subsections (2) and (3), make interim orders requiring an employer to reinstate a firefighter in employment on such terms as it considers appropriate; and

(c) subject to subsections (2) and (3), make interim orders respecting the terms and conditions of employment of a firefighter whose employment has not been terminated but whose terms and conditions of employment have been altered or who has been subject to reprisal, penalty or discipline by the employer. 2015, c. 34, Sched. 1, s. 8.

Same

(2) The Board may exercise its power under clause (1) (b) or (c) only if the board determines that all of the following conditions are met:

1. The circumstances giving rise to the pending proceeding occurred at a time when a campaign to establish bargaining rights was underway.

2. There is a serious issue to be decided in the pending proceeding.

3. The interim relief is necessary to prevent irreparable harm or is necessary to achieve other significant labour relations objectives.

4. The balance of harm favours the granting of the interim relief pending a decision on the merits in the pending proceeding. 2015, c. 34, Sched. 1, s. 8.

Same

(3) The Board shall not exercise its powers under clause (1) (b) or (c) if it appears to the Board that the alteration of terms and conditions, dismissal, reprisal, penalty or discipline by the employer was unrelated to the exercise of rights under this Part by a firefighter. 2015, c. 34, Sched. 1, s. 8.

Same

(4) Despite subsection 56.1 (5), in an application under this section, the burden of proof lies on the applicant. 2015, c. 34, Sched. 1, s. 8.

Same

(5) With respect to the Board, the power to make interim orders under this section applies instead of the power under subsection 16.1 (1) of the *Statutory Powers Procedure Act*. 2015, c. 34, Sched. 1, s. 8.

Section Amendments with date in force (d/m/y)

Transition rules

56.4 If, on the day the *Employment and Labour Statute Law Amendment Act, 2015* received First Reading, a matter was before the Board or an arbitrator and the Board or arbitrator had not given a decision on the matter, the Board or arbitrator shall decide the matter in accordance with this Act as amended by the *Employment and Labour Statute Law Amendment Act, 2015*, regardless of when the matter in dispute occurred. 2015, c. 34, Sched. 1, s. 8.

Section Amendments with date in force (d/m/y)

regulations

Regulations

57. The Minister may make regulations,

(a) Repealed: 2016, c. 37, Sched. 9, s. 7.

(b) governing the selection of arbitrators under section 53;

(c) prescribing forms for the purposes of subsections 53 (13.1) and 56.1 (6). 1997, c. 21, Sched. A, s. 3 (3); 2011, c. 13, s. 4; 2015, c. 34, Sched. 1, s. 9; 2016, c. 37, Sched. 9, s. 7.

Section Amendments with date in force (d/m/y)

PART X
FIRE SAFETY COMMISSION

Fire Safety Commission

58. (1) The Fire Code Commission is continued under the name the Fire Safety Commission in English and Commission de la sécurité-incendie in French and is composed of such number of members as is determined by the Lieutenant Governor in Council. 1997, c. 4, s. 58 (1).

Appointment of members

(2) The Lieutenant Governor in Council shall appoint the members to the Commission, and may designate one of the members as chair and one or more of the members as vice-chair. 2006, c. 35, Sched. C, s. 44 (1).

Ineligibility

(2.1) A person is not eligible to be a member of the Commission if the person is,

(a) a deputy minister of a ministry;

(b) a public servant employed under Part III of the *Public Service of Ontario Act, 2006*; or

(c) an employee of a municipality. 2006, c. 35, Sched. C, s. 44 (1).

Remuneration

(3) The members of the Commission shall receive such remuneration and expenses as the Lieutenant Governor in Council may determine. 1997, c. 4, s. 58 (3).

Quorum

(4) Three members of the Commission constitute a quorum. 1997, c. 4, s. 58 (4).

Section Amendments with date in force (d/m/y)

PART XI
FIRE MARSHAL'S PUBLIC FIRE SAFETY COUNCIL

Definition: "Council"

59. In this Part,

"Council" means the Fire Marshal's Public Fire Safety Council. 1997, c. 4, s. 59.

Council established

60. (1) A corporation without share capital is hereby constituted to be known in English as the Fire Marshal's Public Fire Safety Council and in French as Conseil public du commissaire des incendies sur la sécurité-incendie. 1997, c. 4, s. 60 (1).

Membership

(2) The Council shall consist of its board of directors and such other persons who are appointed as members of the Council by the Fire Marshal. 1997, c. 4, s. 60 (2).

Non-application of corporate Acts

(3) The *Corporations Act* and *Corporations Information Act* do not apply to the Council. 1997, c. 4, s. 60 (3).

Note: On a day to be named by proclamation of the Lieutenant Governor, subsection (3) is amended by striking out "The *Corporations Act*" at the beginning and substituting "The *Not-for-Profit Corporations Act, 2010*". See: 2010, c. 15, ss. 227, 249.

Conflict of interest

(4) Section 132 of the *Business Corporations Act* applies to the Council and to its directors and officers. 1997, c. 4, s. 60 (4).

Section Amendments with date in force (d/m/y)

Objects

61. The objects of the Council are,

(a) to promote fire safety throughout the province;

(b) to produce and distribute materials for public education with respect to fire safety;

(c) to provide or endorse training, education and fire prevention activities;

(d) to facilitate and co-ordinate the public exchange of information and ideas on matters of fire safety;

(e) to solicit, receive, manage and distribute money and other property to support the objects described in clauses (a), (b), (c) and (d);

(f) to enter into partnerships and agreements with persons or organizations in the private sector or with public bodies or organizations to further the objects described in clauses (a), (b), (c), (d) and (e); and

(g) to advise the Fire Marshal on matters of fire safety. 1997, c. 4, s. 61.

Board

62. (1) The affairs of the Council shall be managed by its board of directors.

Composition

(2) The board shall be composed of the Fire Marshal, or if he or she is absent or unable to act, the Deputy Fire Marshal, and at least six directors appointed from among the members by the Minister on the recommendation of the Fire Marshal.

Term of office

(3) A director is appointed for a term not exceeding three years, and may be reappointed for successive terms not exceeding three years each.

Chair

(4) The Fire Marshal, or if he or she is absent or unable to act, the Deputy Fire Marshal, is chair of the board.

Vice-chairs

(5) The Fire Marshal shall designate one or more other directors to be vice-chairs.

Same

(6) If the Fire Marshal or Deputy Fire Marshal is absent from a meeting of the board or is unable to act, a vice-chair shall act as and have all the powers of the chair.

Quorum

(7) A majority of the directors constitutes a quorum.

Vacancies

(8) If a director's position becomes vacant, the Minister may appoint another person to the board for the remainder of his or her term.

Remuneration

(9) The appointed directors shall receive such remuneration and reimbursement for reasonable expenses as may be determined by the Council. 1997, c. 4, s. 62.

Powers of Council

63. (1) The Council has the capacity and the rights, powers and privileges of a natural person, subject to the limitations set out in this Act, for the purpose of carrying out its objects.

Same

(2) Without limiting the generality of subsection (1), the board of directors of the Council may,

(a) enter into agreements with any organization with objects similar to or consistent with those of the Council;

(b) authorize any person or organization to use the Council's logo to indicate the Council's endorsement of a product, service, training course, education course or activity;

(c) otherwise endorse any product, service, training course, education course or activity;

(d) solicit, receive, manage, invest, transfer, use and distribute money and other property to support the objects of the Council.

Logo

(3) The board of directors shall by by-law adopt a logo for the Council. 1997, c. 4, s. 63.

Borrowing powers

64. (1) The board of directors of the Council may borrow money on the credit of the Council for the purposes of the Council and may use any money or property of the Council as security for such borrowing.

Limitation on borrowing powers

(2) The amount that may be borrowed under subsection (1), together with the total of any previous borrowing that remains unpaid, shall not exceed $50,000 at any one time without the approval of the Minister, but no lender shall be required to inquire into the board's compliance with this section and all loans to the Council shall be deemed to have been lawfully made under the authority of this section despite any non-compliance of the board. 1997, c. 4, s. 64.

By-laws

65. The board of directors of the Council may pass by-laws,

(a) regulating its proceedings;

(b) establishing the fiscal year for the Council;

(c) specifying the powers, duties and remuneration of its officers and employees;

(d) establishing an executive committee and other committees and delegating powers of the board to such committees;

(e) providing for membership in the Council, establishing classes of membership and prescribing the qualifications, conditions and rights of membership, the fees, if any, to be paid for membership and providing for and regulating members' meetings;

(f) generally for the management of the Council. 1997, c. 4, s. 65.

Council's property to be dedicated to objects

66. (1) All the property of the Council and all its income, revenue and profits shall be devoted and applied solely to carrying out the objects of the Council.

Investment

(2) Any funds of the Council that are not immediately required for promoting and carrying out its objects, and the proceeds of any property of the Council, subject to any trust affecting them, not immediately required for such purpose, may be invested and reinvested as the board of directors considers proper.

Money vests in Council

(3) All amounts in the Consolidated Revenue Fund credited, immediately before this section comes into force, to an advisory committee that was established under the *Fire Marshals Act*, being chapter F.17 of the Revised Statutes of Ontario, 1990, are hereby vested in the Council. 1997, c. 4, s. 66.

Employees

67. (1) The board of directors of the Council may employ or contract for the services of such persons, including any persons who are appointed directors, as it considers necessary for the functioning of the Council. 1997, c. 4, s. 67 (1).

Not an employee of the Crown

(2) A person who is employed or whose services are contracted under subsection (1) is not and shall not be deemed to be an employee of the Crown. 2006, c. 35, Sched. C, s. 44 (2).

Section Amendments with date in force (d/m/y)

Ministry support

68. The Office of the Fire Marshal may, on request, provide administrative, technical or expert advice or assistance to the Council. 1997, c. 4, s. 68.

Protection from personal liability

69. (1) No action or other proceeding for damages may be instituted against a director or a member of the Council or any employee of the Council for any act done in good faith in the execution or intended execution of the person's power or duty or for any alleged neglect or default in the execution in good faith of the person's power or duty.

Same

(2) Despite subsections 5 (2) and (4) of the *Proceedings Against the Crown Act*, subsection (1) does not relieve the Crown of liability in respect of a tort committed by a person mentioned in subsection (1) to which it would otherwise be subject.

Indemnification for legal costs

(3) With the approval of the Minister, a person described in subsection (1) or a former director, member or employee of the Council shall be indemnified by the Crown in right of Ontario for his or her reasonable legal costs in respect of any proceeding in which the person's execution in good faith of his or her duties is in issue, if the person acted in good faith. 1997, c. 4, s. 69.

Auditors

70. The board of directors of the Council shall appoint one or more auditors licensed under the *Public Accounting Act, 2004* to audit the accounts and transactions of the Council for each fiscal year. 1997, c. 4, s. 70; 2004, c. 8, s. 46.

Section Amendments with date in force (d/m/y)

Annual and other reports

71. The board of directors of the Council shall submit an annual report to the Minister on the affairs and transactions of the Council in the preceding fiscal year and shall submit such other reports as the Minister may request. 1997, c. 4, s. 71.

Winding-up

72. Upon the winding-up or dissolution of the Council, all its assets, after discharging all outstanding liabilities, shall vest in the Crown. 1997, c. 4, s. 72.

Review

73. The Minister shall, five years after this Part comes into force, undertake a review of the activities of the Council and submit to the Lieutenant Governor in Council a report that recommends the continuation, amendment or repeal of this Part. 1997, c. 4, s. 73.

PART XII
MISCELLANEOUS

Protection from personal liability

74. (1) No action or other proceeding for damages shall be instituted against a firefighter, a fire co-ordinator, a community fire safety officer, a member or employee of the Fire Safety Commission, an assistant to the Fire Marshal, the Deputy Fire Marshal, the Fire Marshal, or a person acting under his or her authority, for any act done in good faith in the execution or intended execution of his or her power or duty or for any alleged neglect or default in the execution in good faith of his or her power or duty.

Crown, municipality not relieved of liability

(2) Despite subsections 5 (2) and (4) of the *Proceedings Against the Crown Act*, subsection (1) does not relieve the Crown or a municipal corporation of liability in respect of a tort committed by a person referred to in subsection (1) to which they would otherwise be subject. 1997, c. 4, s. 74.

Indemnification

75. (1) A firefighter, a fire co-ordinator, a community fire safety officer, a member or employee of the Fire Safety Commission, an assistant to the Fire Marshal, the Deputy Fire Marshal, the Fire Marshal or a person acting under his or her authority shall be indemnified for reasonable legal costs incurred,

(a) in the defence of a civil action, if the person is not found to be liable;

(b) in the defence of a criminal prosecution, if the person is found not guilty;

(c) in respect of any other proceeding in which the person's execution of his or her duties is an issue, if the person acted in good faith.

Same

(2) Indemnification under subsection (1) shall be made by,

(a) in the case of a firefighter, community fire safety officer or assistant to the Fire Marshal who is employed by a municipality, the municipal corporation;

(b) in the case of a firefighter, community fire safety officer or assistant to the Fire Marshal who is working under an agreement with the Crown or in the case of a fire co-ordinator, a member or employee of the Fire Safety Commission, the Deputy Fire Marshal, the Fire Marshal or a person acting under his or her authority, the Crown.

Effect of collective agreement

(3) A collective agreement made under Part IX or a decision under section 53 may provide for indemnification of the legal costs of firefighters, except the legal costs of a firefighter who is found guilty of a criminal offence, and if such an agreement exists, the municipal corporation shall indemnify the firefighters in accordance with the agreement and subsections (1) and (2) shall not apply. 1997, c. 4, s. 75.

No action for damages from accidental fire

76. No action shall be brought against any person in whose house or building or on whose land any fire accidentally begins, nor shall any recompense be made by that person for any damage suffered thereby; but no agreement between a landlord and tenant is defeated or made void by this Act. 1997, c. 4, s. 76.

Manner of service

77. (1) Where a copy of an order or notice is required to be given to, or served on, a person under this Act, the copy may be served personally, by regular letter mail, by electronic transmission, by telephone transmission of a facsimile or by some other method that allows proof of receipt.

Deemed receipt

(2) Service by regular letter mail under subsection (1) shall be deemed to be received by the person on the fifth day after mailing unless the person establishes that the person did not, acting in good faith, through absence, accident, illness or other cause beyond the person's control receive a copy until a later date than the deemed date of receipt.

Same

(3) Service by electronic transmission or by telephone transmission of a facsimile under subsection (1) shall be deemed to be received the day after it is sent or, if that day is a Saturday or holiday, on the next day that is not a Saturday or holiday, unless the person establishes that the person did not, acting in good faith, through absence, accident, illness or other cause beyond the person's control receive a copy until a later date than the deemed date of receipt. 1997, c. 4, s. 77.

Regulations

78. (1) The Minister may make regulations,

(a) respecting the operation and administration of fire departments and community fire safety teams established or appointed by an agreement made under section 3 and respecting the functions of community fire safety officers appointed by such an agreement;

(b) prescribing persons or organizations for the purposes of subsections 3 (1) and 4 (2);

(c) prescribing powers and duties that a fire chief may delegate in addition to those mentioned in subsection 6 (6);

(d) prescribing limitations, restrictions, or conditions that apply to a delegation of powers or duties of a fire chief under subsection 6 (6), including restricting the type of power or duty that may be delegated or the class of person to whom the power or duty may be delegated;

(e) respecting the records and returns to be used, kept and made by fire chiefs in respect of their inspections of any class of premises or premises used for any specified purpose;

(f) requiring any person to furnish such statistical and other information to the Fire Marshal as he or she considers necessary;

(g) requiring the following persons or entities to report to the Fire Marshal the particulars of any insurance loss or claim,

(i) a fire insurance company authorized to transact business in Ontario,

(ii) a person adjusting a claim against a fire insurance company, whether the insurance company is licensed to transact business in Ontario or not and whether the adjuster represents the company or the claimant, or

(iii) a person sustaining or claiming to have sustained a loss by fire on property in Ontario insured wholly or partially by an insurance company that is not licensed or registered under the Insurance Act;

(h) defining "regularly employed" for the purposes of the definition of "firefighter" in subsection 41 (1) and "activity allowance" for the purposes of the definition of "volunteer firefighter" in subsection 1 (1);

(i) respecting standards for fire protection devices, equipment and systems;

(j) providing for licensing and regulating the manufacture, sale, installation, servicing, maintenance, testing and repairing of fire protection devices, equipment and systems;

(k) respecting practices and standards for fire protection services and certification and training of firefighters, including full-time, volunteer and part-time firefighters;

(l) prescribing fees and allowances for services and training provided by or on behalf of the Province or municipalities and respecting the person or body to whom the fees or allowances shall be paid;

(m) governing the inspection of hotels;

(n) respecting any matter necessary or advisable to carry out effectively the intent and purpose of this Act.

Same

(2) A regulation made under this section may be general or specific in its application. 1997, c. 4, s. 78.

Municipal by-laws superseded

79. A regulation, including the fire code, supersedes all municipal by-laws respecting standards for land and premises, as those standards relate to fire safety or the risk created by the presence of unsafe levels of carbon monoxide. 2013, c. 14, s. 5.

Section Amendments with date in force (d/m/y)

2013, c. 14, s. 5 - 15/10/2014

80.-**93.** OMITTED (AMENDS OR REPEALS OTHER ACTS). 1997, c. 4, ss. 80-93.

94. OMITTED (PROVIDES FOR COMING INTO FORCE OF PROVISIONS OF THIS ACT). 1997, c. 4, s. 94.

95. OMITTED (ENACTS SHORT TITLE OF THIS ACT). 1997, c. 4, s. 95.

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TOWN OF DEEP RIVER

Water and Wastewater Plant

10 Year Capital Plan

August 2015

ONTARIO CLEAN WATER AGENCY
AGENCE ONTARIENNE DES EAUX

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1 Introduction

In the spring of 2015, the Ontario Clean Water Agency (OCWA) undertook the preparation of a 10 Year Capital Plan for the Town of Deep River for both its water and wastewater treatment facilities. The project scope included a walk-though review of both plant sites, a high level review of the capacity of the various treatment components, identification of necessary improvements, and the preparation of a 10 Year Capital Plan.

OCWA Engineering Services (ES) visited the two treatment facilities on July 7, 2015 and obtained additional information from OCWA Operations to complete the assignment.

2 Facility Descriptions

2.1 Deep River WWTP

The Deep River Wastewater Treatment Plant (WWTP) is a Sequencing Batch Reactor (SBR) activated sludge facility. The facility has an average daily design flow of 2,727 m^3/day. The facility does not have flow equalization, but there is an aerobic digester for sludge stabilization and treatment. **Table 1** outlines the effluent objective and compliance limits for this facility.

Table 1 Deep River WWTP Certificate of Approval Effluent Objectives and Limits (MOE, 2009)

Parameter	Annual Average Concentration Limit (mg/L)	Annual Average Concentration Objective (mg/L)	Annual Average Loading Limit (kg/d)
BOD_5	25.0	15.0	68.2
TSS	25.0	15.0	68.2
TP	1.0	0.8	2.7
Total Ammonia Nitrogen	25.0 (Nov to Apr) 20.0 (May) 15.0 (June) 10.0 (Jul to Sep) 15.0 (Oct)	10.0 (Nov to May) 5.0 (Jun to Oct)	68.2 (Nov to Apr) 54.5 (May) 40.9 (June) 27.3 (Jul to Sep) 40.9 (Oct)
E. Coli, Monthly Geometric Mean	200 counts/100 mL	150 organisms/100 mL	

Raw sewage is pumped from a pumping station located just outside the treatment plant to the Deep River WWTP. The raw sewage flows through two in-line sewage grinders and a pressurized vortex grit removal system. The influent then flows into one of three SBRs. The liquid from the SBRs flows into an equalization tank and then into a UV system for disinfection before it is discharged to the outfall flowing into the Ottawa River.

Waste activated sludge (WAS) from the SBRs is sent to the aerobic digester for sludge stabilization and treatment. Supernatant from the aerobic digester is decanted back to

the SBR process on a daily basis. Sludge from the aerobic digester is stored in dedicated sludge storage tank. Air is supplied to the plant by four blowers (three duty and one standby).

2.2 Deep River WTP

The Deep River Water Treatment Plant (WTP) is a surface water treatment facility with a rated capacity of 13,638 m^3/day. The current average daily treated flow is 2,550 m^3/day and the current maximum month average daily treated flow is 6,595 m^3/day.

Raw water is drawn from the Ottawa River through a 750 mm diameter intake that extends 91 m into the river and draws water from a depth of approximately 9 m. The raw water is pumped from a wet well via two low lift vertical turbine pumps and an additional submersible pump with a capacity of 83.1 L/s.

There is one static mixer followed by three package Actiflo units, each rated at 4,773 m^3/day. Each unit contains a rapid mixing basin, an injection chamber, a maturation chamber and a high rate ballasted settling basin, as well as scrapers and inclined tube settlers. The effluent from the Actiflo units feeds into three dual media sand anthracite filters.

From the filters, the treated water enters two clearwells with a total volume of 2,871 m^3. Four vertical turbine high lift pumps pump water from two wet wells to a 1,513 m^3 elevated water tower and out into the distribution system.

A gas chlorination system provides chlorine disinfection, injecting chlorine into the filter outlet header and upstream the high lift header.

Residual management includes two filter backwash wastewater surge tanks, each 113 m^3 and two transfer pumps. It also incorporates a tube settler clarifier and a sludge thickener tank with two sludge pumps conveying residual to a dewatering centrifuge.

3 Capacity Assessment

3.1 Deep River WWTP

As part of our capital planning exercise, a capacity assessment was completed on the Deep River WWTP with the following objectives:

- To review the performance and capacity of the Deep River WWTP and identify any capacity limitations related to the design or operation of the facility and the individual process components
- To determine the need for a more detailed capacity assessment study at a later date

3.1.1 Facility Assessment

The capacity assessment was based on the most current three full calendar years of data (January 2012 to December 2014). The annual average daily influent flow at the Deep River WWTP for the 3-year period was 2,580 m^3/day, which represents 95% of the rated design capacity of the plant. Throughout the 3-year period, several of the recorded average daily influent values exceed the rated plant capacity of 2,727 m^3/day by 20% to 30% (i.e. 3,200 to 3,500 m^3/day).

The average final effluent BOD_5 concentration was typically below 10 mg/L, final effluent total suspended solids (TSS) concentration was 17 mg/L, final effluent total ammonia nitrogen (TAN) concentration was 4 mg/L, and the final effluent total phosphorus (TP) concentration was 0.5 mg/L, which was below the Environmental Compliance Approval (ECA) annual average effluent requirements. Over the three year period, the facility was consistently below the final effluent BOD_5, TAN, and TP limits; however, the final effluent average TSS was above the ECA effluent limits for three of the 12 months for a particular operating year. This is not unexpected since the average influent flow is within 5% of the rated design capacity and exceeds the rated plant capacity for several months of the year.

Also, since the plant does not have adequate screening and grit removal capabilities, the jet aerators become clogged over time leading to low oxygen transfer rates and poor settleability of the activated sludge. This in turn leads to deteriorated final effluent quality as indicated by the measured plant performance data with respect to solids.

Due to design constraints, the vortex grit removal system cannot adequately screen out inorganic material (i.e. rags, hairballs, grit sediment, etc.). This inorganic material then enters and accumulates in the downstream SBRs and the aerobic digester and limits plant performance (i.e. lower oxygen transfer efficiency due to plugged jet aerators, poor sludge settleability, and lower system hydraulic retention time (HRT) due to sediment accumulation.)

Biological treatment was designed for BOD_5 removal, partial nitrification and chemical phosphorus removal using alum addition. The biological process consists of three sequencing batch reactor tanks, which are equipped with jet aerators. The jet aeration system functions at a sub-optimal level due to clogging from excessive inorganic material in the reactors. Under normal operation, each SBR performs a total of four to five cycles per day and each cycle is 4.8 to six hours in duration. Under wet weather operation, each SBR can perform a total of six cycles per day and each cycle is four hours in duration.

3.1.2 Performance Assessment

The Deep River WWTP ECA Effluent Objectives and Limits are shown below in **Table 2**.

Table 2 Deep River WWTP Environmental Compliance Approval Effluent Objectives and Limits

Parameter	Annual Average Concentration Limit (mg/L)	Annual Average Concentration Objective (mg/L)	Average Annual Sampling Results (mg/L)
BOD_5	25.0	15.0	4
TSS	25.0	15.0	17
TAN	25.0 (Nov 1 to Apr 30) 20.0 (May 1 to May 31) 15.0 (Jun 1 to Jun 30) 10.0 (Jul 1 to Sep 30) 15.0 (Oct 1 to Oct 31)	10.0 (Nov 1 to May 31) 5.1 (Jun 1 to Oct 31)	4
TP	1.0	0.8	0.5
E. Coli, Monthly Geometric Mean	200 counts/100 mL	N/A	16

A number of key process parameters were calculated for the Deep River WWTP and compared to values for SBR activated sludge facilities as reported in literature. This information is shown in **Table 3**.

Table 3 Key Process Parameter Evaluation Results for the Deep River WWTP

Parameter	Units	Deep River WWTP	Typical*
SBR Organic Loading Rate	kg $BOD_5/m^3/d$	0.08	<= 0.24
SBR MLSS	mg/L	1,800 – 2,500	1,500 – 5,000
SBR F/M Ratio	kg BOD_5 per kg MLVSS	0.05	0.05– 0.1
SBR SRT	D	35	> 4 at 20 deg C > 10 at 5 deg C
Aerobic Digester HRT	D	16.7	> 45 days

From the results in **Table 3**, the following can be said:

- Operating parameters such as the SBR organic loading rate (kg $BOD_5/m^3/d$), SBR mixed liquor suspended solids (MLSS, mg/L) concentration, SBR food to microorganism (F/M) ratio, and SBR Solids Retention Time (SRT, D) were within the typical ranges for a SBR activated sludge process.
- A more detailed process optimization study could be completed to optimize the seasonal SRT targets for the Deep River WWTP and potentially improve plant performance.
- The aerobic digester hydraulic retention time (HRT) was much lower than the recommended HRT of at least 45 days.

3.1.3 Major Unit Process Evaluation

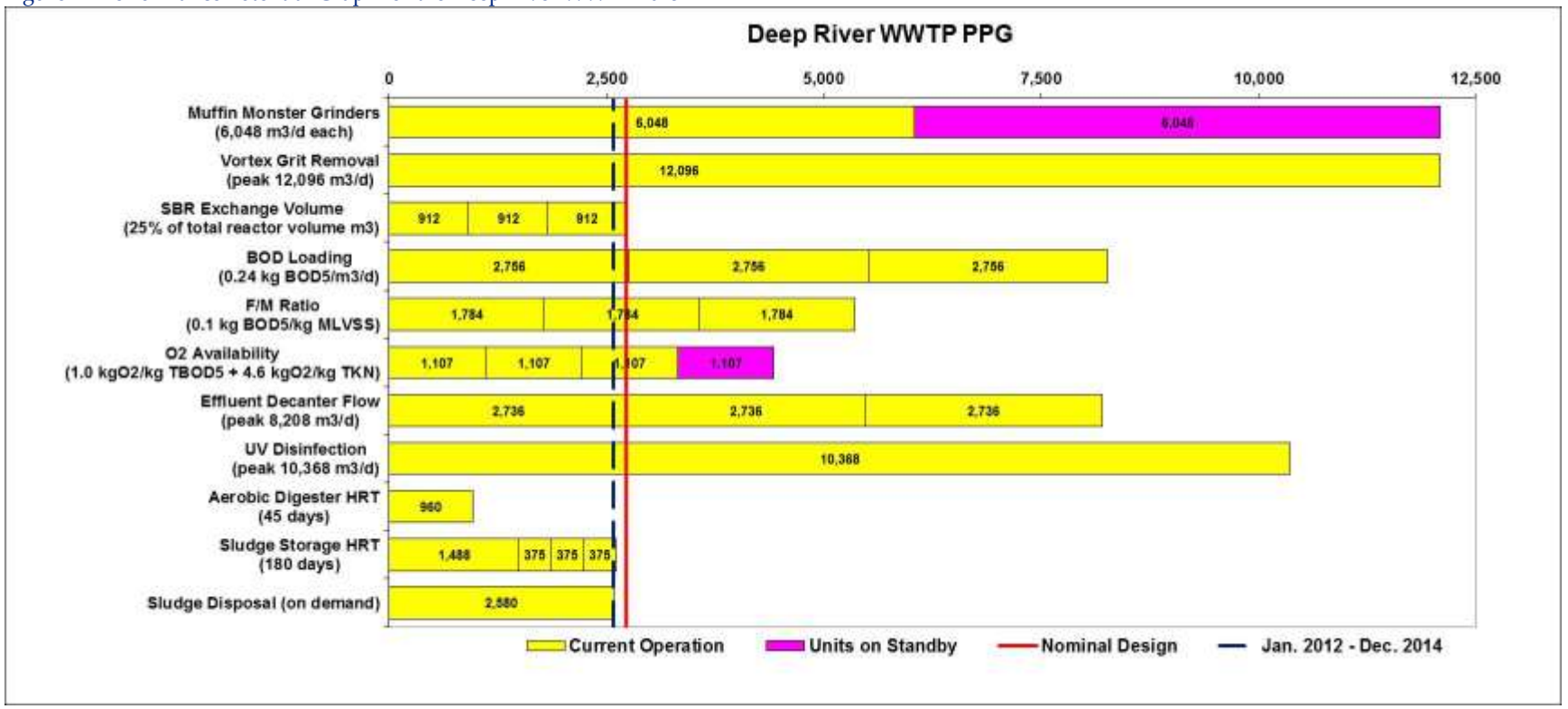
The capability of the existing wastewater process trains to meet the effluent requirements can be determined through the major unit process evaluation. The evaluation was based on information collected during the previous steps of the Comprehensive Performance Evaluation and is summarized in **Table 4**.

Table 4 Data and Criteria for Deep River WWTP Major Unit Process Evaluation

Parameter	Basis
Type	Sequencing batch reactor activated sludge plant with nitrification, with a nominal design flow of 2,727 m^3/d and alum addition for phosphorous removal, UV disinfection, aerobic sludge digestion
Loading	Average annual flow = 2,580 m^3/d Raw BOD_5 = 70 mg/L Raw TSS = 110 mg/L Raw TKN = 22 mg/L Raw TP = 3.2 mg/L
Receiver	Ottawa River
Liquid Treatment System	
Sequencing Batch Reactor Tanks	3 tanks: 19.67 m x 7.6 m x 6.1 m deep, volume 912 m^3 per tank at TWL, 19.67 m x 7.6 m x 5.3 m, volume 792 m^3 per tank at BWL
Aeration System	3 duty blowers @ 20 HP, 1 standby blower @ 20 HP Plant elevation: 116 m Temperature: 25°C (assumed worst case) Type: Jet aeration Depth of diffusers = 5.3 m
Effluent Decanter System	Maximum decant flow is dictated by process sequence timing. The 3 sequencing batch reactors can process a maximum of 8,208 m^3/d (i.e. 3 SBR reactors @ 2,736 m^3/d each)
Disinfection	Type: UV disinfection Capacity: rated for peak flow of 10,368 m^3/d
Sludge Volumes	Average WAS flow to aerobic digester: 25 m^3/d
Aerobic Digestion	1 aerobic digester: volume 427 m^3
Sludge Storage	1 Sludge storage tank: volume 1,585 m^3 3 Decommissioned Imhoff Tanks: volume 400 m^3 each
Sludge Disposal	Sludge currently hauled to farms during specified land application period

Figure 1 displays the results of the major unit process evaluation in the form of a Performance Potential Graph (PPG). The major unit processes are shown along the vertical (y-axis) of the PPG. The evaluation criteria used to assess the capability of each unit process are shown in brackets below. For each major unit process, the horizontal bar represents the total estimated capacity of the unit process. The numbers within the rectangular boxes are the flow treatment capacity limits for each of the individual unit processes. For example, under the unit process SBR Exchange Volume, the individual 912 horizontal bars represent each of the three (3) sequencing batch reactor tanks having an individual capability to treat 912 m^3/d for a total of 2,736 m^3/d. The blue dashed vertical line shows the current average flow of 2,580 m^3/d and the solid red vertical line marks the nominal design flow of 2,727 m^3/d.

Figure 1 Performance Potential Graph for the Deep River WWTP 2015



A process is judged "capable" if the projected capacity exceeds the current flow rate (i.e. the associated horizontal bar for that unit process is to the right of the 2,580 m^3/d dashed line). A process is "marginal" if the capacity is 80 to 100 percent of current flow, (i.e. 2,070 m^3/d to 2,580 m^3/d). A process is "not capable" if its capacity is less than 80% of current flow (i.e. less than 2,070 m^3/d). The shortest bars determine the overall plant rating as "capable", "marginal", or "not capable".

The evaluation criteria for the Performance Potential Graph for the Deep River WWTP were obtained from "The Ontario Composite Correction Program Manual for Optimization of Sewage Treatment Plants" (WTC and PAI, 1996) and other references on the design of activated sludge plants (WEF 2005; WEF 2010); and the Ministry of Environment and Climate Change (MOECC) "Design Guideline for Sewage Works, 2008". The capability of each of the major unit process at the Deep River WWTP to fulfill its requirements will be discussed below.

Muffin Monster Grinders

Each in-line sewage grinder is sized to handle 75% of the peak flow (i.e. 6,048 m^3/d each). The in-line grinder units are rated as **capable** (from a capacity perspective) at current flows. It should be noted that the grinders experience excessive plugging and are not able to operate as intended, so in effect they are **not capable**.

Pressurized Vortex Grit Removal Unit

The existing vortex grit removal unit is designed for a peak flow rate of 12,096 m^3/d. A vortex grit removal system functions best when the flow to the plant is continuous (i.e. the vortex takes time to develop when the flow starts and stops.) However, the influent flow to the Deep River WWTP is non-continuous and this unit does not perform very well. The pressurized vortex grit removal unit is rated as **not capable** at the current flow conditions.

Sequencing Batch Reactors

The bioreactors are rated based on the SBR exchange volume, the BOD_5 loading rate, the food to microorganism (F/M) ratio and the ability of the aeration system to supply oxygen to the system. Using a design criterium of 25% of the total reactor volume for the SBR exchange volume, the rated total hydraulic capacity of the aeration tanks is 2,736 m^3/d (3 tanks x 912 m^3/d per tank).

BOD_5 loading rate to the aeration basin is expressed as kg of BOD_5/d per unit of aeration basin volume and a typical value of 0.24 kg BOD_5/m^3/d was used to rate the capacity of the sequencing batch reactors (see **Table 3**). The total low level volume of the SBRs is 2,376 m^3 with three reactors in service and an annual average raw influent BOD_5 concentration of 70 mg/L was used in the calculation. The capacity based on BOD_5 loading is 8,268 m^3/d based on the raw BOD_5 concentration of 70 mg/L, which is much lower than the original design BOD_5 concentration for the facility. The raw influent

BOD_5 concentration is most likely diluted due to inflow and infiltration in the collection system.

Food to Microorganism (F/M) ratio to the aeration basin is expressed as kg of BOD_5/kg of Mixed Liquor Volatile Suspended Solids (MLVSS) and a value of 0.1 kg BOD_5/kg MLVSS was used to rate the capacity of the sequencing batch reactors. The capacity based on F/M ratio is 5,353 m^3/d based on a raw sewage BOD_5 concentration of 70 mg/L and a MLVSS concentration of 1,550 mg/L.

The existing jet aeration system was evaluated for its ability to provide 1 kg O_2 per kg of total oxygen demand. The total oxygen demand was calculated as the sum of the oxygen demand exerted by total BOD_5 and TKN in the raw influent. Each kg of total BOD_5 required 1 kg of dissolved oxygen, whereas each kg of TKN exerts a demand of 4.57 kg of dissolved oxygen. Oxygen availability is rated at 4,427 m^3/d, assuming three 20 HP duty blowers and one 20 HP blower on standby (i.e. as operated during the evaluation).

The sequencing batch reactors are rated as **capable** for SBR exchange volume, BOD_5 loading, food to microorganism (F/M) ratio and oxygen availability at current flows. Discussions with the plant operators and on-site observations indicated that DO levels do fall below 2 mg/L under certain conditions suggesting that oxygen availability may be a concern; however, the low oxygen residual is likely due to lower than typical oxygen transfer efficiency due to clogged jet aerators.

Although the SBRs are being rated as capable, they are currently operating at or near capacity. There is no redundancy that would allow the operations staff to perform routine maintenance or inspection of the tanks.

SBR Effluent Decant Mechanisms

The maximum effluent decant flow is dictated by the process sequence timing. The three SBRs can process a maximum of 8,208 m^3/d (i.e. three SBRs rated at 2,736 m^3/d each) so effluent decant mechanisms are rated as **capable** at current flows.

UV Disinfection

The UV disinfection system was designed to treat a peak flow of 10,368 m^3/d, which is more than adequate. The UV disinfection system is, therefore, rated **capable** at current flows.

Aerobic Sludge Digestion

The capacity of the aerobic digester was estimated based on the volume of the aerobic digester (427 m^3) and a HRT evaluation criteria of 45 days. WAS from the SBRs is sent to the aerobic digester for sludge stabilization and treatment. Supernatant from the aerobic digester is decanted back to the SBR process on an intermittent basis. Based on the current average WAS flow rate of 25 m^3/day, the rated capacity of the aerobic digesters is 960 m^3/d and the aerobic digester hydraulic retention time (HRT) is only 16.7 days. At this rated capacity, the aerobic digester is considered to be **not capable** at current flows.

Sludge digestion capacity can also be further reduced over time due to grit/sediment accumulation in the digesters. The digester should be cleaned periodically to remove unwanted grit/sediment and maximize digester capacity and performance.

Sludge Storage and Disposal

Sludge from the aerobic digester is currently stored in one on-site storage tank and three decommissioned Imhoff tanks that have been converted to digested sludge storage tanks. Based on current operation the plant can achieve 180 days of sludge storage; however, the sludge storage capacity is at 100% at current plant flow rates and consideration should be given to expand the sludge storage capacity in the near/ immediate future. However, since the 180 day storage capacity can currently be achieved, the process was rated as **capable** at the current flow of 2,580 m^3/d, as per the Comprehensive Performance Evaluation (CPE) protocol.

Summary

The Deep River SBR activated sludge treatment system was rated as **capable** based on the design guidelines that were used to evaluate the capacity of the facility (i.e. Type 1 according to the CPE protocol) under the current flow conditions. However, the design guidelines do not account for the fact that due to a lack of preliminary screening and inadequately designed grinders and pressurized vortex grit removal system, the system cannot adequately remove inorganic material (i.e. rags, hairballs, grit sediment, etc.) from the influent wastewater stream. This inorganic material enters the downstream SBR tanks and aerobic digester, negatively impacting the plant performance (i.e. lower oxygen transfer efficiency due to plugged jet aerators, poor sludge settleability and lower system HRT due to sediment accumulation.)

The Performance Potential Graph (PPG) in **Figure 1** shows that the SBR exchange volume and oxygen availability are the most limiting factors of the existing SBR facility based on typical design parameters/guidelines. This is due to elevated influent flow conditions compared to the rated design capacity of the facility. The annual average daily influent flow at the Deep River WWTP for the three year period was 2,580 m^3/day, which represents 95% of the rated design capacity of the plant. Throughout the three year period, several of the recorded average daily influent values exceed the rated plant capacity of 2,727 m^3/day by 20% to 30% (i.e. 3,200 to 3,500 m^3/day). Consideration should be given to add an additional SBR train in the near/immediate future to alleviate the hydraulic bottleneck issues at the facility.

The capacity of the aerobic digester was estimated based on the volume of the aerobic digester (427 m^3) and a HRT evaluation criteria of 45 days. WAS from the SBRs is sent to the aerobic digester for sludge stabilization and treatment. Supernatant from the aerobic digester is decanted back to the SBR process on an intermittent basis. Based on the current average WAS flow rate of 25 m^3/day, the rated capacity of the aerobic digesters is 960 m^3/d and the aerobic digester hydraulic retention time (HRT) is only 16.7 days. At this rated capacity, the aerobic digester is considered to be **not capable** at current flows.

Sludge from the aerobic digester is currently stored in one on-site storage tank and three decommissioned Imhoff tanks that have been converted to digested sludge storage tanks. Based on current operation the plant can achieve 180 days of sludge storage; however, the sludge storage capacity is at 100% at current plant flow rates and consideration should be given to expand the sludge storage capacity in the near/ immediate future.

3.2 Deep River WTP

The capacity assessment on the Deep River WTP was completed with the following objectives:

- To review the performance and capacity of the Deep River WTP and identify any capacity limitations related to the design or operation of the facility or the individual process components.
- To determine the need for a more detailed capacity assessment study at a later date.

3.2.1 Facility Overview and Performance Assessment

Based on the July 7, 2015 site visit and assessment, there are no major capacity issues with the Deep River WTP. As a result, an abbreviated summary of the capacity of the individual unit processes within the facility will be provided in this report. The capacity assessment was based on the most current three full calendar years of data (January 2012 - December 2014).

The Deep River WTP is a surface water treatment plant with a rated capacity of 13,638 m^3/day. The current average daily treated flow is 2,550 m^3/day and the current maximum month average daily treated flow is 6,595 m^3/day.

Raw water is drawn from the Ottawa River through a 750 mm diameter intake that extends 91 m into the river and draws water from a depth of 9 m. The raw water is pumped from a wet well via two low lift vertical turbine pumps with capacities of 71 L/s and 141 L/s, respectively. There is one (1) additional submersible pump with a capacity of 83.1 L/s at a total dynamic head (TDH) of 25 m.

There is one static mixer followed by three package Actiflo units, each rated at 4,773 m^3/day. The units each contain a rapid mixing basin, an injection chamber, a maturation chamber and a high rate ballasted settling basin, as well as scrapers and inclined tube settlers. The units share four sand recirculation pumps, three hydrocyclones and all electrical/mechanical equipment. The water feeds into three dual media sand anthracite filters. Backwashing is achieved with two 18.6 kW air scour blowers and two 236 L/s filter backwash pumps (one duty, on standby).

From the filters, the treated water enters two clearwells with a total volume of 2,871 m^3. Four vertical turbine high lift pumps each rated at 87 L/s at a TDH of 82 m pump water from two wet wells to a 1,513 m^3 elevated water tower and the distribution system.

A gas chlorination system provides chlorine disinfection, consisting of two banks of four 68 kg chlorine cylinders, injecting chlorine into the filter outlet header and upstream the high lift header.

Chemical usage at the plant includes the use of:

- A primary coagulant
- Caustic soda for pH and alkalinity adjustment
- A coagulant aid for the water treatment clarifiers in the package plant injection chambers
- A wastewater coagulant aid for the wastewater clarifier (to the hydrocyclone reject pipe and surge tank pump discharge pipe) and dewatering centrifuge
- Dechlorination at the wastewater clarifier supernatant discharge pipe

Residual management includes two filter backwash wastewater surge tanks, each 113 m^3 and two transfer pumps. It also incorporates a tube settler clarifier and a sludge thickener tank with two sludge pumps conveying the residuals to a dewatering centrifuge. The WTP also contains all instrumentation, controls, and analyzers required at the facility.

The WTP performs well and currently has adequate capacity to meet the water demand of the Town of Deep River for the foreseeable future.

3.2.2 Major Unit Process Evaluation

The capabilities of the existing design to meet the effluent requirements will be determined through the major unit process evaluation. The evaluation was based on information collected during our site visit and is summarized in **Table 5**. **Figure 2** displays the results of the major unit process evaluation in the form of a Performance Potential Graph (PPG). The major unit processes are shown along the vertical (y-axis) of the PPG. The evaluation criteria used to assess the capability of each unit process are shown in brackets below. For each major unit process, the horizontal bar represents the total estimated capacity of the unit process.

The numbers within the rectangular boxes are the flow treatment capacity limits for each of the individual unit processes. For example, under the unit process Actiflo Flocculation and Sedimentation, the individual 4,773 horizontal bars represent each of the three Actiflo units having an individual capability to treat 4,773 m^3/d for a total of 14,319 m^3/d. The blue dashed vertical line shows the current maximum month average daily treated flow of 6,595 m^3/d and the solid red vertical line marks the rated capacity of 13,638 m^3/d.

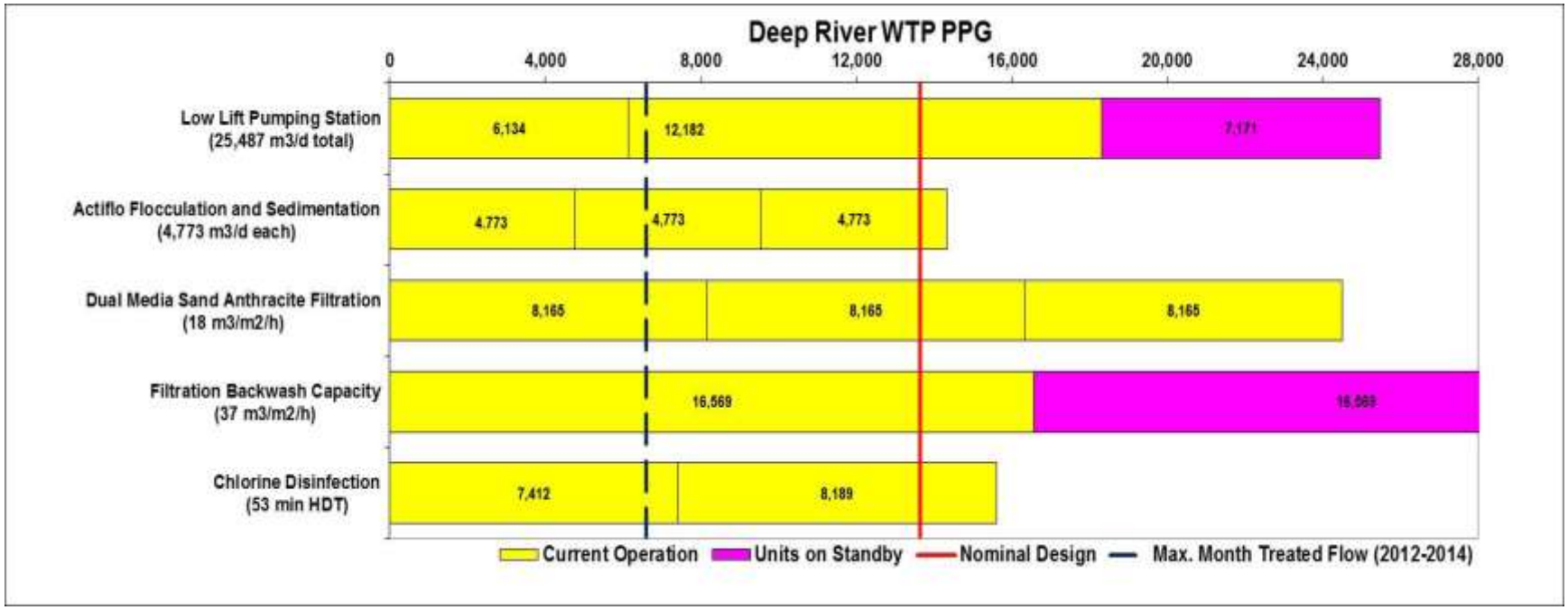
A process is judged "capable" if the projected capacity exceeds the current flow rate (i.e. the associated horizontal bar for that unit process is to the right of the 6,595 m^3/d dashed line.) A process is "marginal" if the capacity is 80 to 100 percent of current flow, (i.e. 5,280 m^3/d to 6,595 m^3/d). A process is "not capable" if its capacity is less than 80% of current flow (i.e. less than 5,280 m^3/d). The shortest bars determine the overall plant rating as "capable", "marginal", or "not capable".

Table 5 Data and Criteria for Deep River WTP Major Unit Process Evaluation

Parameter	Basis
Type	Conventional surface water treatment facility (i.e. flocculation, sedimentation, filtration) with a rated capacity of 13,638 m^3/d and caustic soda for pH and alkalinity adjustment, chlorine disinfection, de-chlorination chemical feed system
Treated Water Flow	Average annual flow = 2,550 m^3/d Maximum month average flow = 6,595 m^3/d
Source Water	Ottawa River
Low Lift Pumping Station	2 vertical turbine pumps: 71 L/s and 141 L/s nominal capacity 1 submersible pump: 83.1 L/s nominal capacity
Liquid Treatment System	
Actiflo Flocculation and Sedimentation	3 Actiflo units: rated capacity of 4,773 m^3/d each
Dual Media Sand Anthracite Filtration	3 Filters with a Surface Area of 18.9 m^2 each Total Surface Area: 56.7 m^2
Backwash Pumps	2 variable speed vertical turbine pumps (one duty, one standby): 236 L/s nominal capacity
Disinfection and Treated Water Storage	1 clearwell with a volume of 1,364 m^3 1 clearwell with a volume of 1,507 m^3

The evaluation criteria for the Performance Potential Graph for the Deep River WTP were obtained from "The Ontario Composite Correction Program Manual for Optimization of Sewage Treatment Plants" (WTC and PAI, 1996) and other references on the design of activated sludge plants (WEF 2005; WEF 2010); and the Ministry of Environment and Climate Change (MOECC) "Optimization Guidance Manual for Drinking Water Systems, 2014". The capacity of each of the major unit process at the Deep River WTP will be discussed in detail.

Figure 2 Performance Potential Graph for the Deep River WTP 2015 – Current Operation



Low Lift Pumping Station

The low lift pump station has two vertical turbine pumps rated at 6,134 m^3/d and 12,182 m^3/d respectively. There is also a submersible pump rated at 7,171 m^3/d. The low lift pumping station is rated as **capable** at current treated water flows.

Actiflo Flocculation and Sedimentation

The plant contains 3 Actiflo rapid mix, flocculation and sedimentation units, each rated at 4,773 m^3/d. The Actiflo units are rated as **capable** at current treated water flows.

Dual Media Sand Anthracite Filtration

The plant contains three dual media sand anthracite filters with a surface area of 18.9 m^2 each. According to the MOECC Optimization Guidance Manual for Drinking Water Systems, the maximum filtration rate for dual/mixed media filter is 18 $m^3/m^2/h$ (typical range is 7-18 $m^3/m^2/h$). Based on this maximum filtration rate, the total rated capacity of the filters is 24,495 m^3/d with three filters in operation (i.e. three dual media filters rated at 8,165 m^3/d each). The filters are rated as **capable** at current treated water flows. However, throughout the continuous use and life of the filters, the pores in the filter bed can gradually become clogged and the media progressively collects sediment deposits. As a result, the actual capacity of the filters can decrease over time.

The filters are backwashed by two variable speed pumps (one duty, one standby) rated at 236 L/s (i.e. 849.6 m^3/hour). Based on the MOECC Optimization Guidance Manual, the minimum backwash rate for a dual/mixed media filter is 37 $m^3/m^2/h$ (typical range is 37-50 $m^3/m^2/h$). Based on this minimum backwash rate, the total rated capacity of the filters is 16,569 m^3/d with one backwash pump in operation. The backwash pumps are rated as **capable** at current treated water flows.

Chlorine Disinfection

According to the MOECC Optimization Guidance Manual, an appropriate hydraulic detention time to achieve the desired level of disinfection can be determined using the C_T tables in the manual. Based on a 4.0 log total log reduction, 2.5 log by removal and 1.5 log by disinfection and conservatively assuming a pH of eight and a water temperature of 5°C, and the maximum acceptable free residual chlorine concentration of 2.4 mg/L, the required C_T is 127 mg-min/L, which requires a 53-minute hydraulic detention time for chlorine contact. Assuming that 20% of clearwell volume is effectively used for chlorine contact due to the unbaffled condition, the rated capacity of the chlorine disinfection system is 15,601 m^3/d (i.e. 7,412 m^3/d and 8,189 m^3/d for each of the individual clearwells). The chlorine disinfection system is rated **capable** at current treated water flows. The gas chlorination system consists of two banks (one duty, one standby) of four 68 kg chlorine cylinders. Based on discussions with plant operations staff, it was noted that the gas chlorination system has more than enough capacity for the foreseeable future.

Sludge Residuals Management:

The residual management facility consists of two 113 m^3 filter backwash wastewater surge tanks, two backwash transfer pumps, one wastewater tube settler clarifier, one sludge thickener tank, two sludge transfer pumps, and one dewatering centrifuge. The dewatering centrifuge is currently operated approximately four hours per day. Based on discussions with plant operations staff, the two sludge transfer pumps that convey the sludge to the dewatering are too small and larger pumps would facilitate more efficient transfer of sludge to the centrifuge. The residual management facility is rated as **capable** at current treated water flows.

Summary

The Deep River WTP was rated as **capable** based on the design guidelines that were used to evaluate the capacity of the facility (i.e. Type 1 according to the CPE protocol) under the current treated water flow conditions. The Performance Potential Graph (PPG) in **Figure 2** shows that the Actiflo flocculation and sedimentation system are the most limiting factors of the existing WTP facility based on typical design parameters/ guidelines, although the capacity of all the individual unit processes exceed the maximum month average flow of 6,595 m^3/d and the rated capacity of 13,638 m^3/d for the facility. The WTP performs well and currently has adequate capacity to meet the water demand of the Town of Deep River for the foreseeable future.

4 Capital Plan

The 10 year capital plans for both facilities were developed based on the current sewage flow rates and water demand being experience at both facilities and the assumption that the annual growth rate within the services areas will be minimal. All the estimated costs listed in the capital plan are in 2016 dollars and do not include HST. The capital expenditures anticipated in the next 10 years are outlined along with the rationale.

The Capital Plan spreadsheets are appended to this report in **Appendix A**.

4.1 WWTP Capital Plan

4.1.1 Headworks

The existing headworks consist of two grinders (Muffin Monsters) each having a capacity of 70 L/s. The grinders are immediately followed by one 140 L/s capacity pressurized vortex grit removal unit, including a grit pump and a grit classifier/ dewatering unit.

The operation of these units has historically been problematic resulting in minimal solids being removed and continual operating and maintenance costs. In recent years the problems with the grinders have gotten to the point where the operations staff are

unable to keep the grinders from continually plugging. As such, the grinders are now being continuously by-passed with the flow going directly into the vortex grit removal unit.

The vortex grit removal unit is also not functioning properly and is only removing a small fraction of the solids entering the plant.

We are recommending that these units be decommissioned and removed. In their stead a proper standalone screening/grit removal facility in its own building should be constructed, located somewhere at the head of the plant.

To commence the pre-design work on this facility we have allocated $60,000 in 2016. We anticipate the total project cost of a new headworks facility will be approximately $2.0M and will most likely be expended over two years in 2017 and 2018. The commissioning of the new headworks is anticipated to occur late in 2018.

As part of the headworks project, we would recommend that a refurbishment of the main pumping station be undertaken. By installing a new headworks the hydraulic profile in the plant might be affected and there might be a need to change out the existing pumps at the station to reflect the new hydraulic grade line and headworks capacity. The required changes and modifications to the main pumping station should be reviewed as part of the pre-design work.

OCWA operations is currently taking out about one bin of solids every four months. In the past when the headworks were working properly, one bin of solids was removed each month. This means that the current system is removing less than 25% of the solids entering the plant. The installation of a new headworks building with properly operating screening and grit removal facilities would essentially remove a significant portion of the solids currently entering the SBRs and the equalization tank, thereby improving plant performance and reducing the frequency that these tanks need to be taken out of service and cleaned. It would also reduce the wear and tear of the downstream equipment caused by the grit and other solids.

4.1.2 Sequencing Batch Reactor

Given that the existing sewage flows are at or in excess of the rated capacity of the three SBR units, a fourth unit is desperately needed. Our operations staff are currently unable to take any of the existing SBR units off-line to undertake routine maintenance or inspect the tanks. A catastrophic failure in one of the SBRs would result in a major non-compliance event.

Adding a fourth SBR unit will effectively increase the capacity of the WWTP and as such will require that a Class EA be undertaken (most likely as a Schedule C activity).

We have allocated a total of $150,000 over 2017 and 2018 to undertake a Schedule C Class EA. What is unknown at this time is whether or not the MOECC will require the Town to undertake an assimilative study on the receiver. Given the receiver is the Ottawa River, we do not anticipate the MOECC requiring such a study to be

undertaken. Based on this assumption, we did not include an allocation for an assimilative study in the capital plan. In off chance that the MOECC does require one, such a study could cost as much as $50,000.

Regardless of whether or not an assimilative study is required, it is highly likely that the MOECC will require the expanded facility to meet more stringent effluent criteria. There is a good chance that the stricter effluent criteria will necessitate an additional upgrade to include tertiary treatment.

We have estimated that the cost of adding an additional SBR unit, including the concrete tankage, SBR equipment and associated piping to be approximately $1,900,000.

The existing SBR tanks and related equipment have not been taken out of service and refurbished in recent memory, due to the high flow rates being experienced. Once the new SBR has been commissioned and put into service, the operators will have the ability to take each SBR out of service during low flow periods to undertake a complete refurbishment.

In similar facilities we have found that in some instances the concrete was deteriorating and in bad condition. The concrete that is failing or in poor condition should be removed, the tanks repaired and then subsequently recoated. At the same time the SBR equipment can be inspected with the worn components either replaced and/or repaired. Without being able to drain the individual tanks to undertake a detailed inspection, it is difficult to know how much concrete and/or equipment repair will be required for each existing SBR. For the capital plan we estimated a total of $100,000 per each SBR and that one SBR will be refurbished each year after the new SBR is put into service.

4.1.3 Tertiary Treatment

As discussed above, there is good chance that as part of the plant expansion, the provision of tertiary treatment will be required. This requirement will be determined in discussions with the MOECC as part of the Class EA process. To achieve consistent phosphorus removal below 0.5 mg/l would require some form of filtration. We have found that disk filters are the most cost-effective technology for this purpose and have based our estimated cost based on using this technology.

The cost to add tertiary treatment in the form of tertiary disk filters (including building addition) is estimated to be $1,600,000.

Although we have shown the addition of tertiary treatment as a separate item, this work should be included as part of the SBR project.

4.1.4 Aerobic Digester and Sludge Storage

The existing aerobic digester is significantly undersized even for the current rated plant capacity. As part of the plant expansion project, we recommend that additional sludge digestion capacity along with additional storage capacity be constructed.

One potential option would be to convert the existing 1,585 m^3 sludge storage tank into a second aerobic digester and then construct a brand new sludge storage facility adjacent to the existing plant. One of the most cost-effective ways of providing additional sludge storage is with covered above ground glass fused steel tanks. Based on our desk top review, to achieve 180 days of sludge storage for the expanded plant a total storage volume of approximately 4,800 m^3 would be required. Constructing two new 2,400 m^3 storage tanks would allow the Town to also decommission the three original tanks currently being used for sludge storage. These three tanks are very old and predate the existing plant. It is likely that these tanks are in poor condition and past their useful lives. We would recommend that as part of the Class EA process a more in-depth investigation be undertaken to determine their condition. Should they still be serviceable, a single tank of 3,600 m^3 (or two tanks of 1,800 m^3 each) would only be required.

The estimated cost of providing two 2,400 m^3 tanks complete with the associated mixing and decanting systems and converting the existing the sludge storage into a digester is estimated at approximately $2,200,000. It should be noted that the volume of sludge produced for the size of this facility is on the high side. We would recommend that the sludge generation volumes be reviewed to see if there is a potential to optimize this part of the process. Conversely, rather than building sludge storage facilities sufficient for six months of storage, it might be more economical to look at sludge dewatering options and reducing the size of the storage tanks.

While the aeration system in the existing digester tank is in fair condition, there are continuing maintenance problems with the main header. Operations staff have also identified the need to have two dedicated aerations lines and controls for digester and storage tanks. The separate dedicated aeration lines with the ability to control the air supply in each line should be included as part of the sludge storage project. While such an arrangement would provide operational flexibility, it would also be more energy efficient.

We have included a capital cost of $50,000 for the replacement of the aeration system in the existing digester tank. This work could be done after the plant expansion, once the new digester has been put into service.

4.1.5 SCADA and Control Systems

The SCADA and PLC control system needs to be replaced immediately. Some of the original equipment is no longer being supported. In addition there was a lot of proprietary programming installed during the last expansion and this is causing a lot of problems as our operations staff do not have access to the programming logic. The entire SCADA and PLC control system needs to be replaced. Based on similar replacements at other facilities, we estimate the cost to be in the order of $300,000.

4.1.6 Chemical Feed Systems

The chemical feed systems are in good condition and although no work is forecasted within the 10 year capital planning window, we recommend that the condition of the chemical feed systems be reviewed as part of the plant expansion project.

4.1.7 Pumps and Blowers

The pumps and blowers have periodically been refurbished over the years and thus are in good working order. They should last until the WWTP expansion at which time a review of their condition should be undertaken. An allowance has been included as part of major maintenance to cover periodic repairs and refurbishments.

4.1.8 UV Disinfection System

The current UV equipment is about 15 years old. From a capacity standpoint, the UV facilities will have sufficient capacity to handle the addition of one more SBR unit. While currently in good operating condition, by the end of the ten year capital planning window, the UV system will be approximately 25 years old and nearing the end of its useful life. Assuming that no refurbishment or replacement of the UV equipment will be undertaken as part of the plant expansion, the Town should consider a major refurbishment or full replacement in 2025. The cost of the UV equipment replacement is estimated at $500,000.

4.1.9 Plant Outfall Sewer

The existing outfall pipe was built in the 1940s as part of the original plant construction. An inspection was undertaken in 2015 with no problems observed. The next inspection should be done in five years.

4.1.10 Standby Power Facility

Since the 350 kW diesel standby generator was just reconditioned in 2015, we do not anticipate anything needing to be done within the next 10 years.

4.1.11 Building and Other Components

The existing building envelop is in reasonably good condition with the exception of the roof issues. The sloped steel roof causes accumulated snow and ice to periodically slide off, causing damage to the SBR equipment and the tank railings. Since the ice comes down near the SBR access walkway this also poses a significant health and safety issue for operations staff. While ice guards were installed a few years ago, they only seemed to have partially solved the problem. Due to the sheer volume of snow and ice experienced over the last few years, the ice and snow tends to flow over top of the ice

guards. Some further work to address this problem is required. We recommend that this issue be addressed at as part of the plant expansion work (if not sooner).

All the other building components including the HVAC systems are in good enough condition that no other major work is anticipated within the 10 year capital planning window.

4.2 WTP Capital Plan

There are plans currently to extend water service to the AECL facility in Chalk River. As part of this extension, a number of capital works improvements are being designed for the WTP and the associated Low Lift Pump House.

These works include:

1. Chemical room upgrades that include the relocation of chemical storage tanks and improved liquid coagulant feed systems
2. New building addition to house waste sludge handling facilities including centrifuge room modifications
3. New centrifuge feed pumps and new recirculation pump
4. Modifications to the Low Lift Pump House including the installation of two new submersible pumps

Given that there is ample capacity in the existing treatment plant to supply future water demand, once these plant improvements are implemented there will be very little that will need to be done over the next 10 years from a major capital works perspective.

There are still a few minor improvements or studies that would need to be undertaken over the next 10 years, which should be accounted for in a capital plan.

4.2.1 Chlorine Residual Analyser

Currently there is a chlorine residual analyser at the back end of the of the treated water clearwells that measures the chlorine residual of the treated water leaving the plant. It is proposed that an additional chlorine analyser be installed at the front end of the clearwells to measure the chlorine residual entering clearwells. This additional analyser will be able to detect chlorine residual fluctuations in the incoming water and adjust the chlorine dosage well in advance of the water being pumped into the distribution system. This additional analyser will assist operations staff in ensuring that the distribution chlorine residual levels are constant and in full regulatory compliance. The cost of installing the additional analyser and the necessary programming to allow for automated chlorine dosage adjustment is estimated at $9,000.

4.2.2 SCADA and Process Control

The existing SCADA, process control equipment and software are somewhat problematic and a full replacement and upgrade is recommended. We estimate that the cost of such a replacement would be approximately $150,000.

4.2.3 THM Study

The THM levels in the treated water leaving the plant are relatively high and out in the distribution system the levels are in danger of exceeding the regulatory limit of 100 µg/L. In 2014, the highest THM concentration out in the distribution system was measured at 113 µg/L. The longer period of time that chlorinated water sits in a distribution system, the more THMs are formed. THMs levels are normally a function of water age.

With the construction of the long watermain supplying Chalk River, the water age at the end of this line could be double or triple what is normally experienced within Deep River's existing distribution system. There is a distinct probability that the THM levels in the water reaching Chalk River will exceed the compliance limits. We, therefore, recommend that a study be undertaken to review this issue and if a potential problem exists, to identify potential solutions. We have allocated $30,000 for such a review.

4.2.4 HVAC Boilers

The existing boilers have never worked properly and should ultimately be replaced. We have included $120,000 for this item.

4.3 Capital Plan Summary

The 10 year capital plan outlines the foreseeable required capital expenditures based on a very minimal growth rate within the Town service areas. The resulting recommended expenditures for the 10 years covered by this Capital Plan are of $9.37M for the wastewater plant and only $582,500 for the water plant. Please note that all capital costs are in 2016 dollars (excluding HST) and include a contingency of 15%.

The major capital projects that are not listed in the Capital Plan as either refurbishments, minor improvements or maintenance of existing equipment are:

- Installation of a new headworks (screening/grit removal) facility in 2016/2018
- Expansion of the WWTP, including the construction of an additional SBR, possible tertiary filtration facility, and additional sludge digestion and storage capacity. It is anticipated that this capital work will be undertaken in 2019/2020 although the related Class EA work should commence at least two years prior.

One area that was not addressed as part of this Capital Plan is work required to be undertaken in the collection and distribution systems. Since our scope was limited to the two treatment facilities, the Capital Plan should be expanded in the future to cover

the Town's horizontal assets. One area that was obvious from our review of the WWTP was the fact that there is excessive extraneous flow. We would recommend that some type of flow monitoring and I/I investigative work be undertaken. Further discussion on how to approach this work should be undertaken with our Operation staff.

The Capital Plan should be updated about every five years to reflect the actual work undertaken, adjusted to reflect changes in the projected growth rates and flows and unexpected changes to the condition of various capital assets. Capital plans are produced based on many variables. If the area's growth increases or decreases, the capital plan may not adequately predict the unforeseen costs. We have allocated a total of $20,000 ($10,000 for the WTP and $10,000 for the WWTP) every five years for the Town to update this Capital Plan.

Note:

The costs presented in this Capital Plan are a Preliminary Level Opinion of Probable Cost based upon available information and visual condition of facility at time of site visit. Variance range of the cost prediction is +50%/-35% which is the industry standard for Class 4 Cost Estimates in accordance with AACE Guidelines.

Appendix A
Capital Plan

Category	Asset	Asset Description	Description of Work	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Wastewater Treatment Plant (WWTP)														
Process	Pumping station	3.0m diameter wet well w/ two variable speed submersible sewage pumps (one as standby), each having a rated capacity of 140 L/s	To be refurbished as part of plant expansion project											$ -
	Inlet Works	two (2) 70 L/s capacity sewage grinders	Rebuild 1 grinder every 5 years at $2,500 each - no longer required with new headworks											$ -
	Grit removal System	One (1) 140L/s capacity pressurized vortex grit removal unit, (1) grit pump and one (1) grit classifier/dewatering unit	Will be removed as part of new head works											$ -
	S.B.R (Sequencing Batch Reactors)	three (3) sequencing batch reactors, each approximately 19.67m X 7.6m X 6.1m S.W.D. and equipped with a jet aeration system, and a decanter system, a mixing pump and a sludge pump.												$ -
	Air Blowers	four (4) air blowers (one standby), each having a capacity of 425 m^3/d												$ -
	Phosphorus removal system	two (2) 18,900L capacity chemical storage tanks and two (2) metering pumps (one as a standby), each capable of a pumping rate of 53L/h with chemical addition points downstream of the grit removal unit.												$ -
	Effluent Disinfection System	a 306m^3 capacity effluent storage tank and a UV disinfection system having a peak flow rate of 120 L/s	Equalization tank clean out annually until new headworks and plant expansion is complete then once every 3 years	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500			$ 1,500			**$ 9,000**
Electrical	Diesel standby generator	350kW with two (2) 1,136L capacity fuel storage tanks												$ -
Electrical / Instrumentation	Control panels, MCC, SCADA	all other controls, electrical equipment, instrumentation and associated works						$ 5,000					$ 5,000	**$ 10,000**
Process	Outfall sewer		Inspection of outfall pipe once every 5 years					$ 10,000					$ 10,000	**$ 20,000**
HVAC	Heating, ventilation and air conditioning	Gas furnace, AC unit and ventilation system and associated works	Inspect annually	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 5,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 5,000	**$ 18,000**
Buildings and Grounds		General asset protection		$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	**$ 20,000**
Sub-total - Major Maintenance and Minor Capital Costs				**$ 4,500**	**$ 4,500**	**$ 4,500**	**$ 4,500**	**$ 23,500**	**$ 3,000**	**$ 3,000**	**$ 4,500**	**$ 3,000**	**$ 22,000**	**$ 77,000**

Category	Asset	Asset Description	Description of Work	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Capital														
Process	Miscellaneous capital		Replace worn out impellers (as required)			$ 7,500			$ 7,500			$ 7,500		**$ 22,500**
Process	Sludge digestion and storage system	A 1,585m^3 capacity digested sludge storage tank with decanting device, piping and a sludge recirculating/loading pump.	Periodic service and repair mixers		$ 12,000					$ 12,000				**$ 24,000**
Process	S.B.R (Sequencing Batch Reactors)	three (3) SBRs, equipped with a jet aeration system, a decanter system, a mixing pump and a sludge pump.	Periodic replacement of pumps				$ 10,000					$ 10,000		**$ 20,000**
Process	Miscellaneous capital		various parts to maintain rotork valves throughout the facility			$ 2,000			$ 2,000			$ 2,000		**$ 6,000**
Major Capital														
	SCADA and Process Control		Replace and upgrade the SCADA and process control system	$ 300,000										**$ 300,000**
	Pumping station		Refurbish PS (as part of Headworks upgrades)			$ 100,000								**$ 100,000**
	New Headworks		Pre-design to look at headwork layouts and equipment preselection	$ 50,000										**$ 50,000**
			New standalone headworks building w/screening and grit removal equipment including removal of existing grinders and vortex grit removal equipment		$ 800,000	$ 1,200,000								**$ 2,000,000**
	Additional SBR		Class EA for plant expansion to add one more SBR unit and other plant improvements		$ 75,000	$ 75,000								**$ 150,000**
			Plant expansion project - add one more SBR unit				1,000,000	900,000						**$ 1,900,000**
	Tertiary treatment		Plant expansion project - add tertiary filtration units (if req'd by MOECC)				800,000	800,000						**$ 1,600,000**
	Sludge Handling/Storage Facilities		Plant expansion project - additional aerobic digestion tankage and sludge storage				1,100,000	1,100,000						**$ 2,200,000**
	UV Disinfection system		UV replacement (if not included as part of plant expansion work)										$ 500,000	**$ 500,000**
	Miscellaneous improvements		Lifting equipment improvements					$ 25,000						**$ 25,000**
			Wash water supply improvements					$ 10,000						**$ 10,000**
			Upgrade aeration lines in EQ tank						$ 100,000					**$ 100,000**
			Refurbish existing SBR units (one unit per year)						$ 75,000	$ 75,000	$ 75,000			**$ 225,000**
			Update O&M manual including SOPs						$ 40,000					**$ 40,000**
			Update Capital Plan for WWTP					$ 10,000					$ 10,000	**$ 20,000**
Sub-total - Major Capital				**$ 350,000**	**$ 887,000**	**$ 1,384,500**	**$ 2,910,000**	**$ 2,845,000**	**$ 224,500**	**$ 87,000**	**$ 75,000**	**$ 19,500**	**$ 510,000**	**$ 9,292,500**
Total Capital Expenditures Costs for the Wastewater System				**$ 354,500**	**$ 891,500**	**$ 1,389,000**	**$ 2,914,500**	**$ 2,868,500**	**$ 227,500**	**$ 90,000**	**$ 79,500**	**$ 22,500**	**$ 532,000**	**$ 9,369,500**

Note:
1. Cost estimates includes cost to acquire and install asset (including material and labour) and any necessary engineering, testing, and inspection cost
2. Cost estimates do not include HST
3. Costs are in 2016 dollars
4. The costs provided are Preliminary Level Opinion of Probable Cost based upon available information and visual condition of facility at time of site visit. Variance range of the cost prediction is +50%/-35% which is the industry standard for Class 4 Cost Estimates in accordance with

Category	Asset	Asset Description	Description of Work	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Deep River Water Treatment Plant (WTP)														
Process	Intake Works	A 750 mm diameter intake extending approximately 91 meters into the Ottawa River terminating at a depth of approximately 9 meters below the surface	Intake Inspection every 5 years	$ 5,000					$ 5,000					**$ 10,000**
	Rapid sand filters 1,2 and 3	Three dual media sand and anthracite filters each with a surface area of 18.9m^2 for a total area of 56.7m^2	Top up filter media annually	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	**$ 35,000**
	Chemical storage and feed systems	pH/Alkalinity Adjustment (caustic soda)	Replacement of chemical feed system outside 10 year window											**$ -**
	Chemical storage and feed systems	Primary Coagulant feed system (Alum)	Allowance for replacement of chemical feed system		$ 10,000									**$ 10,000**
	Chemical storage and feed systems	Coagulant aid (poly)	Allowance for replacement of feed system			$ 10,000								**$ 10,000**
	Treated Water Storage (Clearwells)	2 clearwells, 1,364m^2 and 1,507m^2	Allowance for inspection and minor repairs			$ 6,000					$ 6,000			**$ 12,000**
	Residue Management facility	Two backwash surge tanks, tube settler clarifier and sludge thickener (Centrifuge)	Allowance for tube replacement					$ 10,000						**$ 10,000**
	Chemical storage and feed systems	Coagulant aid (poly) residual management	Allowance for chemical feed replacement				$ 10,000							**$ 10,000**
	Residue Management facility	Two backwash surge tanks, tube settler clarifier and sludge thickener (Centrifuge)	Drain and clean every 3 years	$ 3,000			$ 3,000			$ 3,000			$ 3,000	**$ 12,000**
Electrical	Control panels, MCC, SCADA,	All associated piping, electrical and mechanical equipment, ventilation, monitoring, control, metering, alarm systems, and instrumentation and SCADA system connected to all project PLC's with supervising PC	Allowance for annual maintenance / lump sum every 5 years for upgrades	$ 5,000	$ 5,000	$ 5,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 5,000	$ 2,000	$ 2,000	**$ 32,000**
Instrumentation	pH meters	6 meters at various locations within the process	Allowance for replacement within 10 years										$ 5,000	**$ 5,000**
	Flow meter	For raw water/ treated water	Replacement of flow meter outside of 10 year window											**$ -**
	Turbidimeters	9 meters at various location within the process	Allowance for replacement (one per year)	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000				**$ 28,000**
	Fluoride ion meter	1 on the treated water	Allowance for replacement	$ 7,500										**$ 7,500**
	Chlorine residual analyzer	2 analyzers for pre and post chlorination on the treated water	Allowance for replacement			$ 4,000		$ 4,000						**$ 8,000**
	Sulfite ion meter	1 located on the supernatant discharge pipe	Replacement outside of 10 year window											**$ -**
Electrical	Diesel standby generator	600kW diesel generator complete with fuel storage tank to run the generator for 24 hours under full load	Generator refurbishment									$ 10,000		**$ 10,000**
HVAC	Heating and Ventilation		Annual inspection and periodic maintenance	$ 5,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 5,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	**$ 18,000**
Buildings and Grounds	Plant building	Building Components	General asset protection	$ 2,500	$ 2,500	$ 2,500	$ 2,500	$ 2,500	$ 2,500	$ 2,500	$ 2,500	$ 2,500	$ 2,500	**$ 25,000**
	Water Storage (Tower)	1,513m^3 storage	Inspection of coatings, cathodic protection system, mixing system, every 5 years.	$ 5,000					$ 5,000					**$ 10,000**
	Water Storage (Tower)	1,513m^3 storage	Recoating work usually every 10 to 20 years											**$ -**
Sub-total - Major Maintenance and Minor Capital Costs				**$ 40,500**	**$ 26,000**	**$ 36,000**	**$ 26,000**	**$ 27,000**	**$ 27,000**	**$ 16,000**	**$ 18,000**	**$ 19,000**	**$ 17,000**	**$ 252,500**

Category	Asset	Asset Description	Description of Work	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Major Capital														
Process	Process control	Chlorine feed and control system for secondary disinfection	Install chlorine analyzer at head of clearwell	$ 9,000										**$ 9,000**
	Process control	SCADA and process controls	Upgrade computers and SCADA/process controls			$ 150,000								**$ 150,000**
	Water treatment process	Chlorine and water chemistry	Study to review water age and THM formation		$ 30,000									**$ 30,000**
HVAC	HVAC	Boilers	Replace boilers						$ 120,000					**$ 120,000**
Other		Asset management and planning	Update Capital Plan for WTP					$ 10,000					$ 10,000	**$ 20,000**
Sub-total - Capital				**$ 9,000**	**$ 30,000**	**$ 150,000**	**$ -**	**$ 10,000**	**$ 120,000**	**$ -**	**$ -**	**$ -**	**$ 10,000**	**$ 329,000**
Total Capital Expenditures for the Water System				**$ 49,500**	**$ 56,000**	**$ 186,000**	**$ 26,000**	**$ 37,000**	**$ 147,000**	**$ 16,000**	**$ 18,000**	**$ 19,000**	**$ 27,000**	**$ 581,500**

Notes:

1. Cost estimates includes cost to acquire and install asset (including material and labour) and any necessary engineering, testing, and inspection cost
2. Cost estimates do not include HST
3. Costs are in 2016 dollars

The cost provided are Preliminary Level Opinion of Probable Cost based upon available information and visual condition of facility at time of site visit. Variance range of the cost prediction is +50%/-35% which is the industry standard for Class 4 Cost Estimates in accordance with AACE Guidelines