“Radioactive Waste Got You Down? A Little Grout and Grief is Gone.”

a submission to the

Canadian Nuclear Safety Commission

from the

Canadian Coalition for Nuclear Responsibility

on the draft EIS for the proposed

“In-Situ Decommissioning” of the WR-1 Reactor

by Gordon Edwards, PhD, CCNR President

Montreal, Quebec
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Preamble:

AECL is Atomic Energy of Canada Ltd., a crown corporation wholly owned by the Government of Canada, whose workforce has been reduced from 3400 to 40 in the last few years. CNL is Canadian Nuclear Laboratories, a private consortium of five multinational corporations, receiving billion of dollars of federal taxpayers' dollars to deal with the radioactive waste and decommissioning problems that are the property and the sole responsibility of the federal government, through AECL.

The WR-1 Reactor

AECL's WR-1 research reactor is located at the Whiteshell Nuclear Research Establishment at Pinawa on the Winnipeg River in Manitoba. Shut down in 1985, WR-1 was a non-electricity-generating reactor originally intended to be the precursor of an "organically cooled" CANDU power reactor. WR-1 generated 60 megawatts of heat at full power.

WR-1 had vertical fuel assemblies made of uranium carbide rather than uranium oxide. The reactor used heavy water as a moderator, but employed an organic oil as a coolant (rather than water) to cut down on corrosion and to allow for hotter operating temperatures. Since the oil does not boil even at very high operating temperatures, there is much less pressure in the primary cooling system.

"In-situ" Decommissioning

This document is a supplementary submission opposing CNL's plan to bury the radioactive reactor vessel, radioactive piping, and other radioactive components of the "WR-1" nuclear research reactor beside the Winnipeg River in Manitoba, instead of carrying out AECL's plan that was previously proposed and approved — to dismantle every part of the reactor, and package all the radioactive and other toxic wastes for removal from the site, eventually to be placed in an approved radioactive waste repository.

Instead, after removing the irradiated fuel and draining the contaminated liquids (for separate treatment), CNL wants to dump all the remaining radioactive waste material into the sub-basement of the reactor building, infuse every nook and cranny of the entire underground structure with grout, monitor it for a limited period of time and finally abandon it right beside the river. CNL acknowledges that many of these radioactive wastes will still be active in 500,000 years.

CNL plans to do the same thing – "in-situ decommissioning" -- with the equally powerful NPD electricity-producing power reactor located on the Ottawa River at Rolphton, just northwest of the Chalk River Nuclear Research Establishment.

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Supplementary Comments on Draft Environmental Impact Statement:
In Situ Decommissioning of the WR-1 Reactor
(CEA Registry Number 80124)

To: Canadian Nuclear Safety Commission (CNSC)
From: Canadian Coalition for Nuclear Responsibility (CCNR)
Date: January 15, 2018

Part 1. As stated on page 1-7 of the Draft EIS :

"The approved decommissioning approach for the WR-1 Building involved the complete removal and remediation of the building (Licence No. NRTEDL-W5-8.04/2018). Prior to demolition of the WR-1 Complex, all activated and contaminated components would have been removed, packaged and dispositioned at off-site facilities (AECL 2001). The facility structure would be decontaminated and then demolished to achieve unrestricted release criteria. The dismantling and remediation activities previously approved for WR-1 Complex included:

- *removal of reactor vault components;*
- *removal of process piping and equipment;*
- *transfer of radioactive waste to off-site facilities;*
- *decontamination of the building structure;*
- *demolition of the above-grade building structure; and*
- *remediation of the site to a 'natural state'."*

The proposed in-situ decommissioning of the WR-1 reactor is radically different from the previously approved plans (summarized above) to remove all radioactive materials from the site and return the site to "green field" status. The proposal is now in effect a proposal to make WR-1 a permanent repository for radioactive materials created during the fission process, including fission products (such as strontium-90, iodine-129 and cesium-137), transuranic actinides (such as neptunium, plutonium and americium), and activation products (like cobalt-60, iron-59 and nickel-63).

The draft EIS is inadequate in its attempt to address the long-term implications of abandoning long-lived radionuclides that will remain a potential hazard for periods of time that dwarf the span of recorded human history. On page 6-310 we read :

"The maximum dose [of ionizing radiation] was assessed at a single point in time, corresponding to the peak loading rate from groundwater to the Winnipeg River. However, to assess the total radiation dose for each identified human receptor over the groundwater modelling timeframe, the modelling timeframe was split into five time windows based on inspecting the time of peak loading rates (0 to 60 years, 60 to 40,000 years, 40,000 to 175,000 years, 175,000 to 300,000 years and 300,000 to 500,000 years)."

Where are the detailed hydrological and geological studies over periods of hundreds of thousands of years that would justify the bold assurances given by CNL regarding the fate of a multitude of buried radionuclides over such enormously long time periods? The Egyptian pyramids are only 5,000 years old – they would fit only into the first two time intervals identified in the passage above. Indeed the Great Lakes themselves did not exist 15,000 years ago – their entire existence, too, would fall into the first two time periods. How does CNL presume to know the fate of buried and abandoned radionuclides for the next 175,000 to 500,000 years?

The CNL's in-situ decommissioning proposal for the WR-1 reactor must include all of the detailed studies covering a period of at least 500,000 years that would normally be required to establish the security of a permanent radioactive waste repository on the WR-1 site, so close to the Winnipeg River, taking into account the effects of geological and hydrological changes, including the effects of climate change, and the geochemical evolution of subterranean wastes over that enormous time period.

The radionuclides of concern are currently lodged in the WR-1 reactor vessel (calandria, fuel channels, thermal shield, biological shield), primary heat transport system (feeder pipes, pumps, heat exchangers) and other contaminated systems (heavy water and helium systems, fuel transfer flask, etc.) but these material structures will be pulverized by the ravages of time leaving those radionuclides free to recombine and migrate in hundreds of unforeseen ways.

Every underground repository for radioactive wastes that has so far been tried for more than a decade has suffered major setbacks within a few decades of coming into service.

In Germany, two underground repositories for low and intermediate level radioactive wastes have failed dramatically. The German government is now paying a lot of money to have radioactive waste removed from the Asse-2 Salt Mine, which has been collapsing and leaking for decades. The dangerous and difficult job of extracting radioactive waste from the failed repository will take at least 30 years. Another German radioactive waste repository, at Morsleben, is undergoing collapse as well. Remedial measures costing 2.2 billion euros are underway at Morsleben.

Radioactive elements such as plutonium possess a bewildering variety of valence states meaning that they can recombine in very complex ways with other ions yielding compounds with unexpected properties. It is a well-known property of radioactivity that it creates ions randomly thereby causing a great many chemical reactions to occur, such as the reactions that led to the explosion of a drum of radioactive waste buried 750 metres below ground in the WIPP radwaste repository in 2014.

At Carlsbad New Mexico, low and intermediate level waste stored in a drum 750 metres below the surface exploded in 2014, creating a "flame-thrower" effect and sending plutonium-contaminated dust vertically upwards to the surface where 22 workers were contaminated. The plutonium drifted downwind to the City of Carlsbad where it left a light dusting. Long-term clean-up costs at WIPP could top $2 billion, approximating the cost of clean-up after the 1979 Three Mile Island reactor meltdown in Harrisburg.

The EIS must include an exhaustive study of possible chemical reactions that could lead to the production of explosive and/or non-condensible gases that might seriously compromise the safety and security of the buried entrails of the WR-1 reactor over a period of many centuries and millennia.

Since the government of Canada has not yet articulated a federal policy on the long-term management of post-fission radioactive waste materials other than irradiated nuclear fuel, CCNR urges that this EA be suspended until the Government has elaborated such a policy.

Part 2. Since the secure containment of radioactive waste materials, preventing them from escaping into the environment for millennia, is of great concern to this and to future generations of Canadians including First Nations, and since failure of containment has the potential to contaminate water and food supplies on or adjacent to indigenous lands, and to pose dangers to this and future generations of Canadians, there is a need for broad consultation with Canadians, including First Nations, on the principles that should be applied vis-a-vis the long-term management of such post-fission radioactive wastes (other than irradiated nuclear fuel).

Never before in the history of Canada has permission been given to abandon a plethora of human-made radioactive materials, all byproducts of nuclear fission, in a permanent and irretrievable fashion. The CNSC, as the only federal agency charged with serving the public interest in the nuclear domain, has a responsibility to ensure that Canadians are cognizant of the challenge of keeping such materials out of the environment of living things for many hundreds of thousands of years to come.

Indeed, for the first 30 years of the nuclear program in Canada (from 1944 to 1974) there was no explicit acknowledgement by nuclear proponents or by the nuclear regulator or by the government that highly dangerous, long-lived, and indestructible nuclear wastes generated by nuclear fission even existed. Nuclear power was invariably described as clean and safe, which implied to most sensible people that it produced no toxic waste materials and was incapable of threatening the health and well-being of a community. The existence of radioactive wastes and the possibility of catastrophic accidents (meltdowns) releasing those radioactive wastes were both denied. In those early decades, decision-makers were asked to approve multi-billion dollar nuclear projects without any warning of the radioactive waste legacy of the nuclear age that must one day be confronted.

After the truth about radioactive wastes created through nuclear fission emerged into the public spotlight in the mid-1970s, the Government of Canada and the Government of Ontario entered into an agreement in 1978 to finance a $700 million research effort, aimed at "validating" the Deep Geological Disposal concept of Atomic Energy of Canada Limited (AECL). The idea was to sequester irradiated nuclear fuel in underground chambers carved out of granite plutons. After years of research in the Underground

Research Laboratory (URL) near Lac du Bonnet, Manitoba, AECL produced a multi-volume EIS.

This EIS led to a ten-year environmental review process (the Seaborn Commission), with public hearings in five provinces. When the Nuclear Waste Management Organization (NWMO) was formed under the terms of the Nuclear Fuel Waste Act (NFWA), another three years of public meetings in many locations followed, including meetings with First Nations, Inuit, Métis and non-status Indians.

But all of these – the AECL EIS, the URL, the NFWA, the NWMO – only dealt with one type of post-fission nuclear wastes: irradiated nuclear fuel. There was a lot of opportunity for the public to learn about irradiated nuclear fuel, but not about the large volumes of radioactive waste in the form of activated and contaminated materials, ranging from ion-exchange resins (radioactive filters) to gigantic steam generators (each weighing 100 to 300 tonnes). The idea that the structural materials surrounding the reactor core and the entire primary heat transport system would become radioactive waste is not something that many Canadians comprehend.

So for the first 30 years of the nuclear age (1944-1974), the public did not know that radioactive waste from nuclear plants existed, and for the following 40 years (1974-2014) the public was led to believe that irradiated nuclear fuel is the ONLY significant radioactive waste routinely created inside all nuclear reactors.

CNSC is the sole federal authority established to serve the public interest in the nuclear domain. As such, CNSC has an obligation to do everything in its power to ensure that the Canadian public is given the opportunity to learn about the nature of post-fission wastes other than irradiated nuclear fuel, and to help formulate principles that should be applied to the long-term management of such radioactive wastes. It should not be left to the private consortium of multinational corporations that own and operate CNL to decide what's best on the basis of what is most convenient and profitable for them. The Age of Nuclear Waste is a new era. It is one of great and growing societal concern. It is not comparable to the Age of Nuclear Power. **There is a need for broad consultation with Canadians, including First Nations, on basic principles to be applied vis-à-vis the long-term management of post-fission radioactive wastes (other than irradiated nuclear fuel).**

For example, a Joint Declaration of the Anishinabek Nation and the Iroquois Caucus in Ontario, released in May 2017, lists five principles that are not embodied in the draft EIS for the in-situ decommissioning of the WR-1 reactor:

“For the long-term management of radioactive wastes, the five principles that were all agreed upon are:

*“1) **No Abandonment**: Radioactive waste materials are damaging to living things. Many of these materials remain dangerous for tens of thousands of years or even longer. They must be kept out of the food we eat, the water we drink, the air we breathe, and the land we live on for many generations to come. The forces of Mother Earth are powerful and unpredictable and no human-made structures can be counted on to resist those forces forever. Such dangerous materials cannot be abandoned and forgotten.*

*“2) **Monitored and Retrievable Storage**: Continuous guardianship of nuclear waste material is needed. This means long-term monitoring and retrievable storage. Information and resources must be passed on from one generation to the next so that our grandchildren’s grandchildren will be able to detect any signs of leakage of radioactive waste materials and protect themselves. They need to know how to fix such leaks as soon as they happen.*

*“3) **Better Containment, More Packaging**: Cost and profit must never be the basis for long-term radioactive waste management. Paying a higher price for better containment today will help prevent much greater costs in the future when containment fails. Such failure will include irreparable environmental damage and radiation-induced diseases. The right kinds of packaging should be designed to make it easier to monitor, retrieve, and repackage insecure portions of the waste inventory as needed, for centuries to come.*

*“4) **Away from Major Water Bodies**: Rivers and lakes are the blood and the lungs of Mother Earth. When we contaminate our waterways, we are poisoning life itself. That is why radioactive waste must not be stored beside major water bodies for the long-term. Yet this is exactly what is being planned at five locations in Canada: Kincardine on Lake Huron, Port Hope near Lake Ontario, Pinawa beside the Winnipeg River, and Chalk River and Rolphton beside the Ottawa River.*

*"5) **No Imports or Exports**: The import and export of nuclear wastes over public roads and bridges should be forbidden except in truly exceptional cases after full consultation with all whose lands and waters are being put at risk. In particular, the planned shipment of highly radioactive liquid from Chalk River to South Carolina should not be allowed because it can be down-blended and solidified on site at Chalk River. Transport of nuclear waste should be strictly limited and decided on a case-by-case basis with full consultation with all those affected."*

See http://ccnr.org/Joint_Declaration_2017.pdf .

Part 3. CNL is owned by a consortium of private profit-oriented corporations that are operating under a time-limited contract to AECL, a crown agency.

According to the Auditor General's March 2017 Report to the Board of Directors of AECL, "September 2015 marked the completion of a restructuring process that implemented [AECL's] new role and reduced its workforce from approximately 3,400 employees to 40." As AECL emerged from the transition, the AG Report notes, the Privy Council Office (PCO) couldn't fill vacant positions at the Crown corporation's helm, hobbling the latter's ability to make good long-term choices.

For example, AECL did not have a chairperson for its board for eight months in 2016 and had an interim one for the 10 months after that. It was without any board directors throughout all of 2016 and most of 2017, and remains without a full roster of seven directors today. AECL had no president and CEO for a 21-month stretch between April 2015 and February 2017, and it currently only has one person serving in that role on an interim basis for a year.

Nevertheless, AECL "retains ownership of all lands, facilities, intellectual property, other assets, and liabilities." In addition, AECL's staff of about 40 people "monitors the contractor's operations under the GoCo arrangement at eight sites across Canada." The monitoring of the GoCo arrangement involves engaging with the contractor so that AECL can achieve a number of tasks, including approving long-term (5- and 10-year) strategic plans, reviewing and approving annual work plans, negotiating annual performance incentives, and ensuring compliance with the GoCo arrangement.

The AG Report says "AECL's Federal funding for the 2016–17 fiscal year was set at $969 million, to be used toward the contractor's operating expenses and [AECL's] operations. The amount consisted of $530 million for decommissioning and waste management, and $439 million for nuclear science and technology (including $160 million for capital investments)." In the following fiscal year the federal funding for AECL was also nearly a billion dollars, for a total of almost two billion dollars in just two years. Evidently, the lion's share of this money has gone to pay for the consortium's operating expenses.

AECL channels hundreds of millions of dollars of Canadian taxpayers' money into the coffers of CNL to allow the consortium to prepare and carry out its proposals, including the in-situ decommissioning of the WR-1 reactor, the in-situ decommissioning of the NPD reactor, and the Near Surface Disposal Facility (a surface mound of up to one million cubic metres of radioactive waste piled several stories high less than one kilometre from the Ottawa River) at Chalk River, Ontario.

CCNR believes that the decommissioning of the WR-1 reactor should be designated as an AECL proposal and not a CNL proposal, even if CNL carries out the work under the direction of AECL. When billions of dollars of public money are being spent on projects of vital importance to the health and safety of Canadian citizens and the environment for millennia, it is important that a crown agency that is wholly owned by and accountable to the Canadian government be in the driver's seat.

Part 4. CCNR objects to the unseemly haste in dealing with three draft EIS reports in overlapping time periods dealing with three unprecedented proposals for the long-term management of post-fission radioactive wastes (other than used nuclear fuel), namely the WR-1 in-situ decommissioning proposal, NPD in-situ decommissioning proposal, and Chalk River NSDF. These problems of radioactive waste management have existed for many decades, and the proposals themselves have implications for hundreds of thousands of years, yet there is now a mad rush to deal with all of these proposals simultaneously in a matter of months.

This undue haste puts an unfair strain on competent NGO's wishing to intervene in a coherent and constructive manner on all three proposals.

Each of these proposals is technically complex, involving a multitude of significantly ratiotoxic elements, each having its own unique biochemical pathways through the environment and through the human body.

Instead of ensuring that the Canadian public has ample opportunity to become educated on the issues and to weigh the options at hand so that a satisfactory societal consensus can be developed, the EA process seems to be highjacked by the commercial interests of the private proponent CNL, eager to quickly clear the decks of nuisance materials in order to embark upon an ambitious plan to host the development and participate in the deployment of an entire new generation of "Small Modular Reactors" in order to hasten the profitable business of marketing these new reactors worldwide.

CCNR believes that it is a disservice to Canadians, whose taxes are funding these very expensive radioactive waste management schemes, for federal authorities such as CNSC and CEAA to collude with the industry to foreshorten the time allotted for sober deliberation. These are not decisions for 20 or 30 or 40 years, they are decisions for eternity.

Part 5. Some of the radioactive materials in the WR-1 core and radioactive structural materials are very long-lived. Nickel-59 has a half-life of 76,000 years. Plutonium-239 has a half-life of 24,000 years, but it will take almost a quarter of a million years for 99.9% of the Pu-239 atoms to disintegrate. And when those plutonium atoms do disintegrate, they do not disappear, but are transmuted into new radioactive atoms having a half-life of 700 million years. This fact is nowhere indicated in the draft EIS.

The draft EIS makes scant mention of the actual inventory of radionuclides that are to be interred if CNL has its way, and when it does, there is no information about the half-life, total activity in becquerels, mode of decay, radioactive progeny, or any other pertinent data. Consider Table 7.2.1-1 :

Table 7.2.1-1: Radionuclides Associated with Main Systems and Components of WR-1

System/Component	Radionuclide
Reactor Core	Carbon-14, Iron-55, Cobalt-60, Nickel-59, Nickel-63, Niobium-94
Primary Heat Transport	Cesium-137, Strontium-90, Cobalt-60, (small amounts of Niobium-94, Zirconium-95, Antimony-125, Europium-152, Radon-226, Americium-241), Isotopic Plutonium, Technetium-99, Iodine-129, Curium-244
Biological Shield	Carbon-14, Chlorine-36, Calcium-41, Nickel-63, Cobalt-60, Europium-152
Heavy Water and Helium System	Tritium, Carbon-14
Corrosion products	Carbon-14, Chlorine-36, Iron-55, Nickel-63, Nickel-59, Cobalt-60, Niobium-94
Surface contamination	Cesium-137, Strontium-90, Isotopic Plutonium, Americium-241

There is one obvious error in the table, as Radon-226 does not exist; presumably the radionuclide intended is Radium-226, with a half-life of 1600 years. The phrase "Isotopic Plutonium" presumably indicates a mixture of Plutonium-239, Plutonium-240, and Plutonium-241, with half-lives of 24,100 years, 6,560 years, and 18.1 years.

Here are the half-lives of the radionuclides mentioned in Table 7.2.1-1 :

Radionuclide	Half-Life	
Hydrogen-3 (Tritium),	12.3 years	
Carbon-14,		5 730 years
Chlorine-36,		301 000 years
Calcium-41,		102 000 years
Iron-55,	2.73 years	
Nickel-59,		76 000 years
Nickel-63,		101 years
Cobalt-60,	5.26 years	
Strontium-90,	28.8 years	
Niobium-94		20 300 years
Zirconium-95,	64.0 days	
Technetium-99,		120 000 years
Antimony-125,	2.76 years	
Iodine-129,		15 700 000 years
Cesium-137,	30.2 years	
Europium-152,	13.5 years	
"Radon-226" (Radium-226),		1 600 years
Plutonium-239,		24 100 years
Plutonium-240,		6 560 years
Plutonium-241,	14.4 years	
Americium-241,		432 years
Curium-244,	18.1 years	

Of the 22 radionuclides indicated in Table 7.2.1-1, eleven of them have half-lives of over 100 years, nine of them have half-lives over 1,500 years, seven of them half half-lives over 15,000 years, four of them half half-lives over 100,000 years, and one of them has a half-life over 15 million years.

The half-life is the time required for half of the radioactive atoms to disintegrate. If you double that period of time, there will be only ONE QUARTER of the original amount remaining. If you triple that time period, only ONE EIGHTH of the original amount will remain. It will take TEN HALF-LIVES for 99.9 percent of the radioactive atoms to be gone, so that only ONE THOUSANDTH of the original amount remains.

If you multiply all those years listed on the previous page (as half-lives) by a factor of 10, you can see just how long that will take!

Radionuclide	Half-Life		Ten Half-Lives
Nickel-59,	76,000 years	x 10 =	760,000 years
Nickel-63,	101,000 years	x 10 =	1,010,000 years
Niobium-94,	20,300 years	x 10 =	203,000 years
Plutonium-239,	24,000 years	x 10 =	240,000 years
Technetium-99,	120,000 years	x 10 =	1,200,000 years
Iodine-129,	15,700,000 years	x 10 =	157,000,000 years
Chlorine-36,	301,000 years.	x 10 =	3,010,000 years
Calcium-41,	102,000 years	x 10 =	1,020,000 years

The longevity of these radioactive materials is measured not just in hundreds of thousands of years, but in millions of years. It is simply folly to abandon such materials beside a river in a subterranean grouted mausoleum– a structure that was never designed to outlast the Egyptian pyramids by hundreds or thousands of millennia. Indeed, who knows how long it will take for the grout itself to break down and disintegrate?

The EIS should provide a detailed and realistic description of the expected breakdown of the WR-1 subterranean structures over the centuries and millennia to come. Moreover a complete and detailed inventory of all radionuclides should be provided, with half-lives, total activity (in becquerels), mode of decay (alpha, beta, gamma), and radioactive progeny.

Part 6. Nuclear reactors are dangerous to the community only if the radioactive waste materials created inside the reactor are released into the environment. Such a radioactive release occurs to the greatest degree when the core of a reactor melts down and the containment is breached. To prevent such catastrophic releases the CNSC requires that large sums of money be invested by licensees in sophisticated and expensive safety systems including emergency core cooling systems, redundant fast shutdown systems, and elaborate containment technologies, including a separate containment building and/or a filtered venting system.

Such catastrophic releases are not a realistic concern with the WR-1 entombment project, but the same radioactive materials are still present in smaller amounts, and chronic leakage over a period of centuries can spread contamination and cause subsequent health effects. The CNSC frequently asserts, "We will never compromise safety." That is the mark of a dedicated regulator. In the case of an operating nuclear reactor quick and cheap "solutions" are not tolerated by the CNSC if those approaches represent a degradation of containment aspirations.

The Canadian Coalition for Nuclear Responsibility (CCNR) expects that CNSC must adopt a similarly uncompromising attitude toward the long-term management of radioactive wastes produced by nuclear fission technology. To abandon these wastes beside major bodies of water is not, in our view, a responsible approach to radioactive waste management.

In the draft EIS, CNL argues that the only two options for decommissioning the WR-1 reactor are total removal of all radioactive materials from the site and emplacement of those materials in an approved repository for low and intermediate level wastes, or in-situ decommissioning. However, as there is no such approved repository at the present time, in-situ decommissioning is the only alternative. This argument ignores the evident fact that in-situ decommissioning requires making the reactor site itself into an approved repository for low and intermediate-level wastes, thereby constituting a circular and facile argument.

Evidently another alternative that must be fully explored in the EIS is the dismantling and careful packaging of all the radioactive waste from the WR-1 reactor, ensuring that each package is robust, transportable, and accompanied with a detailed inventory of the radioactive contents of each individual package.

Part 7. CCNR is aware that some of the corporations that are members of the coalition owning CNL have been accused of fraudulent practices, and that some of the very difficult radioactive waste management schemes that they have been involved in have not yielded satisfactory results from the point of view of the long-term health and safety of persons and the environment or the wise expenditure of huge sums of public money.

SNC-Lavalin is a member of the coalition running CNL. It was embroiled in a scandal surrounding improper payments the company may have made to secure construction contracts in North African nations including Libya under Moammar Gadhafi.

In 2013 the company's former CEO, Pierre Duhaime, was arrested and charged with fraud in connection with the contract to build the McGill University Superhospital in Montreal.

And a top executive with the company admitted to dubious political donations while testifying at the Charbonneau commission, which was looking into corruption in Quebec's construction industry.

As a result, SNC Lavalin has been banned for ten years by the World Bank from bidding on any international projects funded by the World Bank.

See http://www.cbc.ca/news/business/snc-lavalin-agrees-to-10-year-ban-from-world-bank-projects-1.1316719

Fluor is another corporate member of the CNL consortium. In October of this year the Financial Times reported that the UK Nuclear Decommissioning Authority is set to terminate the outsourcing of nuclear decommissioning projects to private companies *"after the collapse of a £6.2 billion outsourcing contract that exposed 'fundamental failures' at the organisation".*

"Such an outcome would bring an end to an embarrassing episode in which Greg Clark, business secretary, in March cancelled a deal with Cavendish Fluor Partnership, a joint venture between UK-based Babcock International and Fluor of the US, at a cost of £122m to British taxpayers…. Interim findings revealed a catalogue of human errors and systemic failings..."

See https://www.ft.com/content/b83c5ada-b014-11e7-beba-5521c713abf4

Earlier, in January 2015, another outsourced decommissioning project in the UK – Sellafield – was taken out of private hands. Although this project did not involve members of the CNL consortium, it again highlights the dangers of outsourcing such decommissioning projects to private profit-motivated corporations.

"The Public Accounts Committee (PAC) said clean-up costs at the complex had risen from £67.5bn in 2013 to an "astonishing" £70bn.

"The report said progress had been "poor" and targets had been missed.

"The consortium in charge of the clean-up said the challenges at Sellafield had been "unprecedented".

"The report by the committee of MPs made a series of recommendations, calling on the Nuclear Decommissioning Authority (NDA) to terminate the contract of the private consortium Nuclear Management Partners (NMP) if its performance did not improve."

See http://www.telegraph.co.uk/finance/newsbysector/energy/11340733/Sellafield-nuclear-clean-up-firms-to-be-stripped-of-20bn-contract.html

As the Financial Times article of 2017 stated:

"The failure of two large and strategically important nuclear decommissioning contracts in the space of two years has damaged the NDA's reputation and highlighted the large financial costs and risks involved in clearing up the UK nuclear legacy." By the way, the estimated cost of cleaning up the UK's nuclear waste and decommissioning legacy has now reached the astounding sum of £160 billion (US $220 billion). See http://www.independent.co.uk/news/business/news/true-price-of-uks-nuclear-legacy-163160bn-6104903.html

On another matter, CCNR has observed that CNL is inclined to misrepresent the acceptability of the waste management approaches that it is advocating here in Canada, as these approaches are not at all the "best practice" models that are claimed by CNL.

For example, the only instances of in-situ decommissioning of small nuclear reactors that CCNR is aware of are located on military sites such as the Hanford Reservation in Washington DC, the Savannah River Site in South Carolina, and the Idaho National Laboratory, all of them highly secure sites associated with the military-industrial complex that are not freely accessible to the general public, all of them maintained and policed under the jurisdiction of the US Department of Energy.

This is a far cry from the WR-1 site at Pinawa, which is a civilian research facility that has been totally closed down for many years, and that will become completely deserted in the foreseeable future.

The EIS should provide a detailed description of all non-military examples of in-situ decommissioning of nuclear reactors. Moreover, the EIS should provide background on all nuclear decommissioning and radioactive waste management projects undertaken by any of the consortium members, either alone or in partnership with others, over the last fifteen years.

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