

Background - www.ccnr.org/request_plute_nov_24_2021.pdf

November 30 2021

The latest of three open letters to Prime Minister Justin Trudeau from US non-proliferation experts is copied below. The previous two letters are linked in footnotes #1 and #2.

In these three letters, a group of nine distinguished nuclear policy experts are asking for a top-level Canadian government review of the nuclear weapons proliferation dangers associated with the planned reprocessing of Canadian used nuclear fuel to recover the plutonium for use in a proposed new reactor in New Brunswick.

These nine experts have worked under six U.S. presidents: John F. Kennedy, Lyndon B. Johnson, Richard Nixon, George H.W. Bush, Bill Clinton, and Barack Obama; and hold professorships at the Harvard Kennedy School, University of Maryland, Georgetown University, University of Texas at Austin, George Washington University, and Princeton University.

The letter copied below is written by Frank von Hippel, one of the nine. He questions the claim made by the proponent, Moltex, that its plutonium separation technology is “proliferation resistant” because the plutonium remains mixed with a few other elements and is therefore not immediately weapons-usable material. The letter cites several US studies that have examined this claim in connection with a very similar technology, and rejected it as simplistic. It appears that bomb-makers would have little difficulty in adapting the material produced by the Moltex process for weapons use.

CCNR believes that Canadian government support for plutonium separation (\$50.5 million was given to Moltex earlier this year) sets a terrible example and sends a dangerous signal to other countries around the world who may be tempted to acquire nuclear weapons clandestinely. Canada should be wary, having had a rather chequered history with regard to plutonium and its use in bombs. The Moltex project, if successful, would be marketed around the world — and therein lies the main danger. See [www.ccnr.org/Plutonium Book Review 2020.pdf](http://www.ccnr.org/Plutonium_Book_Review_2020.pdf) .

Plutonium is used as the primary nuclear explosive in most nuclear weapons. The very first nuclear reactors were built to produce plutonium for bombs. This was true in the five official “nuclear weapons states” that are recognized as such in the Non-Proliferation Treaty: USA, UK, France, Russia and China. It was also true in Canada. For 20 years after the end of World War II, Canada sold plutonium produced in its nuclear research reactors at Chalk River, Ontario, to the US military. See www.ccnr.org/DOE.html .

Plutonium is not found in nature. It is a derivative of uranium, which is a naturally occurring radioactive heavy metal. Inside a nuclear reactor, many of the heaviest atoms of uranium (uranium-238) absorb stray neutrons to become even heavier (“transuranic”). Some of them transmute into plutonium atoms (plutonium-239, -240, -241, and -242, -243). Existing stocks of used nuclear fuel from CANDU reactors in Ontario, Quebec and New Brunswick, contain enough plutonium for about 23,000 Nagasaki-type atomic bombs. Since plutonium-239 has a 24,000 year half-life, the potential for weapons use will endure for over 100,000 years.

Plutonium extraction technology is the key requirement. See [www.ccnr.org/Peaceful Atom.html](http://www.ccnr.org/Peaceful_Atom.html) .

The postwar Chalk River facility was devoted mainly to peaceful nuclear research. Nevertheless, just one month after the atomic bombing of Hiroshima and Nagasaki, a Soviet cipher clerk in Ottawa named Igor Gouzenko revealed the existence of significant Soviet nuclear spy activity in

Canada, including scientists who worked in the secret wartime Montreal Nuclear Laboratory that focussed on matters of plutonium production and separation. It soon emerged that Russia obtained some of its earliest intelligence about plutonium from their Canadian contacts, including a minute sample of the previously unknown human-made element. See www.ccnr.org/myth_1.html .

Meanwhile, British scientists carried out all of their necessary pilot work on plutonium production at Chalk River; they used that information in designing their own plutonium production facilities at Windscale in Northern England. Indeed, the very first sample of plutonium available to the British military came from the Chalk River NRX reactor just months before the first British A-Bomb test in the Monte Bello Islands off the coast of Australia. See www.ccnr.org/canada_britain.html .

French nuclear scientists working at the Montreal laboratory during the war had assisted in the design of the NRX reactor, They later assisted Israel in the design of their Dimona reactor, a facility that is remarkably similar to the NRX. Israel used the Dimona reactor to produce plutonium for its own nuclear arsenal.

Canada gave India a copy of the NRX, called the CIRUS reactor. Years later, India used plutonium produced in that Canadian research reactor to build its first A-Bomb. It was detonated in the Rajasthan Desert in 1964. Pakistan (another Canadian nuclear customer) developed its own nuclear arsenal to “deter” India. The Carter administration recognized the dangers of plutonium separation and in 1977 banned it in the USA. That was the very year that Atomic Energy of Canada conducted a day-long seminar for senior civil servants in Ottawa, pushing the idea of commercializing plutonium reprocessing in Canada. Prime Minister Pierre Elliot Trudeau nixed AECL's plutonium ambitions. See www.ccnr.org/AECL_plute.html & www.ccnr.org/aecl_plute_seminar.html .

Following the Indian atomic test, the American CIA discovered that South Korea (a Canadian nuclear customer) was in the process of clandestinely acquiring plutonium from spent nuclear fuel, as was Taiwan (to whom Canada had sold yet another copy of the NRX reactor). These plans were squelched by the US government, using the leverage the Americans had over those two countries due to their reliance on the economic, military, and poetical support from Washington. See www.ccnr.org/myth_1.html .

Meanwhile Argentina, who had recently purchased a CANDU power reactor from Canada, was ruled by a military regime that was well advanced (with German assistance) in plutonium separation technology. This development alarmed the Brazilian military who urged their own government to follow suit.

Canada has never built a nuclear weapon. Canadian scientists do not have access to the body of classified information regarding the design and construction of nuclear weapons. The US, on the other hand, has built tens of thousands of nuclear weapons of all kinds. Official government agencies with access to such information are unanimous in their warnings about plutonium separation in general, and in their conclusion that for all practical purposes, the end product from the proposed Moltex technology is not essentially different from that of other types of reprocessing technologies in terms of the proliferation of nuclear weapons.

The least Canada can do is to refrain from promoting any such technology until a full independent government review of the proliferation implications has been carried out.

Request: proliferation assessment of proposal to separate plutonium from CANDU fuel

Gordon Edwards.

Letter from Frank von Hippel to Justin Trudeau, November 24, 2021:

November 24, 2021

Dear Prime Minister Trudeau,

Congratulations on your re-election.

Out of concern that the issue may have been lost during the transition to your new government, I am writing to remind you and to inform relevant members of your new cabinet of the request made on May 25 in an open letter to you and your previous cabinet by a group of senior US nonproliferation experts. [1]

We asked for a proliferation assessment of the \$50.5 million funding your government provided to support Moltex, a startup that proposes to reprocess spent fuel from the Point Lepreau CANDU power reactor in New Brunswick to recover plutonium to fuel a molten-salt cooled fast neutron reactor it proposes to build on the same site. An overlapping group of nonproliferation experts sent a letter to the Biden Administration on June 20 asking for a proliferation assessment of funding the US Department of Energy began to provide for spent fuel reprocessing R&D during the Trump Administration. [2]

Our letters expressed concern that the Canadian and US governments have forgotten the important lessons both countries learned 50 years ago when their Atoms for Peace assistance facilitated the launch of India's nuclear-weapon program. That experience led the administrations of US President Carter and Canadian Prime Minister P.E. Trudeau to oppose the separation of plutonium from spent fuel.

That policy was reinforced by an assessment by the Carter Administration that exotic fast neutron reactors such as the one Moltex proposes could not compete with water cooled reactors and that fuel made with reactor-grade but weapon-usable plutonium recovered by the chemical "reprocessing" of power-reactor spent fuel would cost far more than the non-weapon-usable low enriched uranium fuel that it replaced. That judgement was subsequently confirmed when fast neutron reactor programs failed in the UK, Germany, France and Japan, and plutonium fuel (mixed oxide fuel, called MOX) recycled in conventional reactors in France and Japan was found to cost ten times more than the low-enriched uranium fuel it replaced. This history suggests strongly that, in addition to undermining the global nonproliferation regime, the Moltex project would be a waste of precious time and funds in the global efforts to combat climate change.

On June 23, we received a response to our letter from your office informing us that the matter had been referred to the offices of then Foreign Minister Marc Garneau and Minister of Natural Resources O'Regan. But we did not receive any communications from those Ministers prior to their departures from your cabinet.

In the meantime, Moltex responded to our public letter by posting an article on the internet claiming that, since the process it was proposing to use to separate plutonium from CANDU spent fuel would produce impure plutonium, a multi-billion dollar "conventional reprocessing facility" would be required to further purify it for weapons use. We therefore sent you, Mr. Prime Minister, a follow-on letter on July 27 explaining that a conventional reprocessing facility would

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not be required by a potential proliferator, as the radiation level would be quite low from the impure product produced by pyroprocessing CANDU fuel and pure plutonium could be extracted from the product in a low-cost "hot cell" – the same type of facility that Moltex would require to fabricate the material into fuel. [3] Terrorists willing to accept a small increase in their lifetime cancer risk would not require a hot cell.

Since we sent those letters, you have appointed a new Minister of Foreign Affairs, Mélanie Joly, and a new Minister of Natural Resources, Jonathan Wilkinson. I am therefore copying them in this letter.

I am also copying your new Minister of Environment and Climate Change, Steven Guilbeault, because of refuted environmental claims by Moltex for its reprocessing technology that should also be considered in your government's expert review. As detailed in our letter to you of 27 July, the claim repeated by Moltex that the radioactive waste from its reprocessing of CANDU fuel would pose a hazard of significantly lesser longevity than that of the original CANDU fuel has been refuted by comprehensive studies by the US National Academies and SKB the company responsible for Sweden's spent fuel repository. We note also that the Idaho National Laboratory, which developed the pyroprocessing technology that Moltex proposes to use, has, after decades of effort, yet to demonstrate the conversion of the radioactive salt waste into a stable form suitable for disposal. [4]

I hope to hear from your government on this matter. If requested, our group can provide additional relevant background information. For example, I co-authored a proliferation assessment of pyroprocessing in 2005. [5] Its conclusion was confirmed in 2009 by a joint assessment by experts from six US national laboratories. [6] I have also recently co-authored an overview book on the issues involved in plutonium recycle. [7] Some of my co-signatories have also done significant work on the subject. Two are no longer available as independent analysts because one has joined the State Department and another a national nuclear laboratory.

Given the gravity of the issues involved, this is a public letter, as were the 25 May and 27 July letters to you from our group. I will share this follow-up with my co-signatories on those previous letters as well as any responses received from your government.

Sincerely,

Frank N. von Hippel, Professor of Public and International Affairs, emeritus
Program on Science and Global Security, Princeton University (for identification only)

cc.

Mélanie Joly, Minister of Foreign Affairs,
Jonathan Wilkinson, Minister of Natural Resources,
Steven Guilbeault, Minister of Environment and Climate Change.

Footnotes:

- [1] “US experts concerned that Canadian support for extracting plutonium from spent nuclear fuel is undermining the global nuclear-weapons nonproliferation regime,” 25 May 2021, <https://sgs.princeton.edu/sites/default/files/202106/Open-Letter-to-Prime-Minister-Letter-Trudeau-May-2021.pdf>.
- [2] “13 US Nonproliferation Experts Request a Review of the Department of Energy’s Promotion of Civilian Plutonium Separation,” 20 June 2021, <https://sgs.princeton.edu/sites/default/files/2021-11/letter-to-biden.pdf>.
- [3] “Re: US experts concerned that Canadian support for extracting plutonium from spent nuclear fuel is undermining the global nuclear-weapons nonproliferation regime,” 27 July 2021, <https://sgs.princeton.edu/sites/default/files/2021-11/second-letter-to-trudeau.pdf>.
- [4] Michael Patterson, “Update on EBR-II Used Fuel Treatment,” presentation to the National Academy of Sciences Committee on Merits and Viability of Different Nuclear Fuel Cycles and Technology Options and the Waste Aspects of Advanced Nuclear Reactors, 29 Sept 2021, slides 14 & 17, <https://www.nationalacademies.org/event/09-28-2021/merits-and-viability-of-different-nuclear-fuel-cycles-and-technology-options-and-the-waste-aspects-of-advanced-nuclear-reactors-meeting-10-september-28-29-2021-publicsessions>.
- [5] Jungmin Kang and Frank von Hippel, “Limited Proliferation-Resistance Benefits from Recycling Unseparated Transuranics and Lanthanides from Light-Water Reactor Spent Fuel,” *Science & Global Security*, Vol. 13:169–181, 2005, <https://scienceandglobalsecurity.org/archive/sgs13kang.pdf>.
- [6] R. Bari et al, “Proliferation Risk Reduction Study of Alternative Spent Fuel Processing,” Brookhaven National Laboratory, BNL-90264-2009-CP, 2009, <https://www.bnl.gov/isd/documents/70289.pdf>.
- [7] Frank von Hippel, Masafumi Takubo and Jungmin Kang, *Plutonium: How Nuclear Power’s Dream Fuel Became a Nightmare* (Springer, 2019) <https://link.springer.com/book/10.1007/978-981-13-9901-5>.