

OPEN LETTER TO PRIME MINISTER JUSTIN TRUDEAU

May 25, 2021

Prime Minister Justin Trudeau
Office of the Prime Minister
80 Wellington Street Ottawa, ON K1A 0A2
justin.trudeau@parl.gc.ca

Re: US experts concerned that Canadian support for extracting plutonium from spent nuclear fuel is undermining the global nuclear-weapons nonproliferation regime

Dear Prime Minister Trudeau,

We write as US nonproliferation experts and former government officials and advisors with related responsibilities to express our concern about your government's financial support of Moltex – a startup company that proposes to reprocess CANDU spent fuel to recover its contained plutonium for use in molten-salt-cooled reactors.¹

We understand your government's motivation to support nuclear power and to reduce fossil fuel use but *saving the world from climate disaster need not be in conflict with saving it from nuclear weapons*. Also, like other reprocessing efforts, Moltex, even in the R&D stage, would create a costly legacy of contaminated facilities and radioactive waste streams and require substantial additional government funding for cleanup and stabilization prior to disposal.

Our main concern is that, by backing spent-fuel reprocessing and plutonium extraction, the government of Canada will undermine the global nuclear weapons nonproliferation regime that Canada has done so much to strengthen. Canada is a founding member of the Nuclear Suppliers Group, which was established in 1974 in response to India's misuse of a Canada-supplied research reactor and US-supplied reprocessing technology to acquire the plutonium needed for its first nuclear weapons.² Today, Japan is the only non-nuclear-armed state that reprocesses spent nuclear fuel, causing both domestic and international controversy. Other countries could point to Canada's support of the Moltex program to help justify their own reprocessing R&D.

The fuel cycle Moltex proposes appears to be based on pyroprocessing, a technology developed by the US Argonne National Laboratory. Moltex echoes the Argonne developers in calling this technology "proliferation resistant." A 2009 review by nonproliferation experts from six US national laboratories including Argonne concluded, however, that pyroprocessing is about as susceptible to misuse for proliferation as PUREX, the standard reprocessing technology used worldwide in both nuclear-weapon and civilian plutonium programs.³ Pyroprocessing is being used at the US Idaho National Laboratory to process fuel from the shutdown US Experimental Breeder Reactor EBR-2 for disposal but has proved to be extremely costly and unreliable and has not produced stable forms of radioactive waste suitable for deep underground disposal.⁴ In contrast, CANDU spent fuel is a stable waste form suitable for disposal.⁵

Fifty years ago, the US Atomic Energy Commission was promoting reprocessing worldwide as essential to the future of nuclear power, which it saw as requiring a rapid shift to plutonium breeder reactors. In 1974, however, India tested its first nuclear weapon design using plutonium produced with technologies and materials that Canada and the United States had provided exclusively for peaceful use by India's breeder reactor program. The US subsequently discovered that Brazil, Pakistan, South Korea and Taiwan – all under military governments at the time – were going down the same dangerous path. Fortunately, it was possible to derail all those other reprocessing efforts, although Pakistan did acquire nuclear weapons via uranium enrichment.

This experience inspired a White-House-led review of the case for breeder reactors and plutonium fuels that found they were not needed and unlikely to be competitive with reactors operating on a once-through fuel cycle. President Carter announced in 1977 that the US would indefinitely defer reprocessing and breeder commercialization.⁶ This conclusion has been confirmed by the failure to date of all breeder commercialization programs worldwide.

Moltex claims that the removal of plutonium and other long-lived transuranic elements from CANDU spent fuel would reduce the long-term risk from a deep underground radioactive waste repository. That claim has been discredited repeatedly, starting with an in-depth review by the US National Academy of Sciences published in 1996.⁷ Plutonium and other transuranic oxides are relatively insoluble in deep underground anoxic water and poorly absorbed by both plants and animals including humans through the gut wall. As a result, the risk from leakage from underground repositories would likely be dominated by more mobile and absorbable long-lived radioisotopes such as the 17-million-year half-life fission product, iodine-129, which, if not released to the environment during reprocessing, would remain in the radioactive waste.

Before Canada makes any further commitments in support of reprocessing, we urge you to convene high-level reviews of both the nonproliferation and environmental implications of Moltex's reprocessing proposal including independent international experts. We believe such reviews will find reprocessing to be counterproductive on both fronts.

Signatories to this letter on the following page with affiliations and former US government positions. Contact: Frank N. von Hippel, Princeton University.

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Signatories

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Thomas Countryman, Former US Assistant Secretary of State for Nonproliferation (2011-17).

Steve Fetter, Professor of Public Policy, University of Maryland,* former principal assistant director, Office of Science and Technology Policy, The White House (2009-12, 2015-17)

Robert L. Gallucci, Distinguished Professor in the Practice of Diplomacy, Georgetown University,* Former Ambassador at Large and Assistant Secretary of State for Political-Military Affairs (1992-2001).

Richard L. Garwin, IBM Fellow Emeritus, IBM Thomas J. Watson Research Center,* member U.S. President's Science Advisory Committee from 1962–65, 1969–72.

Alan J. Kuperman, Associate Professor, LBJ School of Public Affairs, Coordinator, Nuclear Proliferation Prevention Project (www.NPPP.org), University of Texas at Austin,* former Congressional staff (1989-93).

Henry Sokolski, Executive Director, Nonproliferation Policy Education Center,* Deputy for Nonproliferation Policy, Office of the Secretary of Defense (1989-93)

Sharon Squassoni, Research Professor, Elliott School of International Affairs, George Washington University,* former nonproliferation specialist with the US State Department and Congressional Research Service.

Frank von Hippel, Senior Research Physicist and Professor of Public and International Affairs emeritus, Program on Science and Global Security, Princeton University,* Assistant Director for National Security, Office of Science and Technology Policy, The White House (1993-4).

*For identification only

¹ Presentations by Moltex's leadership, the Associate Deputy Minister of Canada's Department of Natural Resources, and New Brunswick's Minister of Energy and Natural Resources Development at the 11 May 2021 celebration of a \$50.5 million grant from Natural Resources to Moltex hosted by the Organization of Canadian Nuclear Industries https://www.youtube.com/watch?v=b0Tg_Sh1NFY&t=102s.

² Nuclear Suppliers Group, <https://www.nuclearsuppliersgroup.org/en/>.

³ R. Bari et al, "Proliferation Risk Reduction Study of Alternative Spent Fuel Processing," Brookhaven National Laboratory, 2009, <https://www.bnl.gov/isd/documents/70289.pdf>.

⁴ Ed Lyman, "The pyroprocessing files," 12 August 2017, <https://allthingsnuclear.org/elyman/the-pyroprocessing-files/>

⁵ See also Canadian Nuclear Laboratories, *A Feasibility Study on the Recycling of Used CANDU Fuel*, 2016, https://web.archive.org/web/20180927080537/http://ontarioenergyreport.ca/pdfs/MOE%20-%20Feasibility%20Study_Used%20Fuel%20Recycling%20-%20June%202016.pdf

⁶ "Statement by the President [Carter] on His Decisions Following a Review of U.S. Policy." April 7, 1977, <https://www.nrc.gov/docs/ML1209/ML120960615.pdf>.

⁷ *Nuclear Wastes: Technologies for Separations and Transmutation* (National Academies Press, 1996), <https://www.nap.edu/catalog/4912/nuclear-wastes-technologies-for-separations-and-transmutation>.