

Canada and the Bomb – Past and Future

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The Canadian Connection

On the day that Hiroshima was blown away by the first Atomic Bomb, killing 100,000 Japanese men women and children, the Honourable C.D. Howe issued a statement: “It is a distinct pleasure for me to announce that Canadian scientists have played an intimate part, and have been associated in an effective way, with this great scientific achievement.”

For the first time, Canadians learned that uranium from the Northwest Territories and scientists working in a Montreal laboratory had taken part in the WWII Atomic Bomb Project – the largest secret project in history.

Hiroshima and the Uranium Connection

The British learned in 1940 that an A-Bomb can be made from uranium only through a very slow “enrichment” process; once uranium is highly enriched, it becomes a powerful nuclear explosive. They communicated this information to the Americans, who years later made the Hiroshima bomb using highly enriched uranium (HEU).

At that time, Canada had the only readily available supply of uranium at Port Hope, Ontario. Radium ore from Great Bear Lake had been refined there in the 1930s, leaving tonnes of uranium-bearing wastes behind. The UK and US began buying Canada’s uranium in 1941.

This loose tripartite cooperation was formalized in August 1943 when Roosevelt and Churchill, guests of Prime Minister Mackenzie King, signed the Quebec Agreement, a secret pledge for the three countries to work together to build the world’s first Atomic Bombs. To oversee uranium supplies for the Bomb Project, a Combined Policy Committee was created, with three Americans, two Brits, and one Canadian, meeting in Washington DC.

Nagasaki and the Plutonium Connection

On August 9, 1945, three days after Hiroshima, another A-Bomb was dropped on Nagasaki – and another 70,000 non-combatants were killed. Japan promptly surrendered. The second Bomb used plutonium, a man-made element derived from uranium.

By then Roosevelt was dead and Churchill was out. Truman and Attlee, their successors, knew nothing about A-Bombs before coming to power. But Mackenzie King was still Prime Minister of Canada, and he knew full well; under the Quebec Agreement, all three countries had to give consent before the Bombs were dropped.

On October 11, 1945, King wrote in his diary: "How strange it is that I should find myself at the very centre of the problem, through Canada possessing uranium, having contributed to the production of the bomb, being recognized as one of the three countries to hold most of the secrets."

But those secrets were already getting out when those words were written. Bertrand Goldschmidt, father of the French A-Bomb, learned everything he needed to know about plutonium in 1943-44 while working in a secret lab on the slopes of Mount Royal. The lab was hosted by Canada as part of the Quebec Agreement.

Plutonium is a more powerful nuclear explosive than HEU. It doesn't need enrichment, so it's easier to acquire. Almost all modern nuclear weapons use plutonium as the primary nuclear explosive.

Plutonium does not exist in nature – there are no plutonium mines – but it is created whenever uranium is used as fuel in a nuclear reactor. Some of the uranium atoms split, releasing energy, but some are transmuted into plutonium atoms. The first reactors were built to produce plutonium for bombs. Electricity production came much later.

The Heavy Water Connection

For technical reasons, reactors that use heavy water are the best for producing plutonium. In April 1940, just before the Nazis invaded Denmark, a French diplomat conveyed the world's only supply of heavy water from Oslo to Paris. When Paris fell in June, the precious cargo was shipped to England along with the French nuclear scientists who were guarding it.

The British/French "heavy water team" needed a place away from the bombs of the Luftwaffe to conduct their plutonium research. Canada agreed to bring the entire team, and the heavy water, to Montreal. Under the Quebec Agreement, the US government reluctantly agreed to give the team of European and Canadian scientists some plutonium to work with.

The Chalk River Connection

In December 1944, in Washington DC, the Combined Policy Committee gave the go-ahead to build a heavy-water-moderated reactor called NRX at Chalk River, Ontario. It was a war-time decision, intended to allow the Montreal team to demonstrate the superiority of

heavy water reactors for plutonium production. Due to US security concerns, however, the French scientists were not allowed to work at Chalk River, so they returned to France.

NRX proved to be one of the best reactors in the world for producing plutonium and other radioisotopes. All the pilot work for the Sellafield reprocessing plant in Northern England was carried out by the British at Chalk River. They built and operated a small reprocessing plant there to extract plutonium from NRX spent fuel in the 1940s and 1950s.

In 1956, a clone of NRX named CIRUS was given to India as a gift from Canada. India later used it to produce the plutonium needed for its first A-Bomb Test in 1974.

The Dimona reactor, the source of plutonium for Israel's nuclear weapons, bears a close resemblance to NRX. French scientists who worked on the design of the Israeli reactor drew freely on NRX details that were well known from their Montreal lab experience.

The Canadian NRX reactor started up in 1946, but a simpler prototype started up just a month after the Hiroshima bombing. A plaque at the Chalk River Visitors' Centre reads:

A nuclear chain reaction was first initiated in Canada on September 5, 1945, when the ZEEP reactor went into operation here at Chalk River. Originally part of an effort to produce plutonium for nuclear weapons, the reactor was designed by a team of Canadian, British and French scientists . . .

Multinational Fallout

On September 6, 1945, the day after ZEEP was launched, a cipher clerk in the office of the Soviet Military Attaché in Ottawa defected. Igor Gouzenko revealed the existence of an extensive Soviet spy network in Canada, whose mission included obtaining information about the A-Bomb. Two scientists in the Montreal team had sent information to Russia, along with a speck of plutonium.

The secrets King mentioned in October were no longer secret. Russia exploded its first A-Bomb in 1949, followed by Britain in 1952 and France in 1960. India followed suit in 1974, Pakistan in 1998. All of them had profited from their contacts in Canada; India and Pakistan were both Canadian clients, buying early-model CANDUs in the 1960s. Indian and Pakistani nuclear scientists visited Chalk River on numerous occasions.

The Abolition of Nuclear Weapons

People had been horrified by the vision of entire cities and their inhabitants being so easily incinerated by this "great scientific achievement" – the Atomic Bomb. Clearly, if a war were fought with such weapons, nothing would remain but radioactive rubble. A terrible fear was implanted in the minds of an entire generation – the fear of a nuclear Armageddon.

Three months after Hiroshima, on November 15, 1945, the three countries involved in the Atom Bomb project – the USA, the UK and Canada – issued a Joint Declaration containing three prophetic insights:

that nuclear weapons provide *"a means of destruction hitherto unknown, against which there can be no adequate military defence"*;

that *"no system of safeguards will of itself provide an effective guarantee against the production of atomic weapons"*;

that atom bombs are weapons *"in the employment of which no single nation can, in fact, have a monopoly."*

The message was clear. Unless nuclear weapons are abolished, every country will acquire them, and nuclear war will eventually occur. Without any adequate defence, total devastation will ensue. Human civilization will be obliterated.

Accordingly, the Joint Declaration urged the United Nations to find a way of *"entirely eliminating the use of atomic energy for destructive purposes and promoting its use for industrial and humanitarian purposes."* It was a double-edged plea for abolishing nuclear weapons, while expanding the peaceful uses of nuclear energy. These objectives were not seen as incompatible.

The appeal was echoed – weakly – in President Eisenhower's 1953 "Atoms For Peace" speech at the UN General Assembly, and again in 1956 when the International Atomic Energy Agency (IAEA) was mandated to promote nuclear power around the world while ensuring *"in so far as it is able"* that it not be used *"to further any military purpose"*.

The Abolition of War

British Prime Minister Attlee's reflections went further: with the advent of nuclear weapons, warfare loses all meaning, because nobody can possibly win. It has been said that war doesn't determine who's right, only who's left – but what if nobody is left?

As Attlee mused, while people can easily understand

... that rivers as strategic frontiers have been obsolete since the advent of air power, it is infinitely harder for people to realize that even the modern conception of war is now completely out of date. The only course which seems to offer a reasonable hope of staving off imminent disaster for the world is joint action by the U.S.A., U.K. and Russia based upon stark reality. We should declare that this invention has made it essential to end wars.

Thus the challenge is to eliminate not just nuclear weapons but war itself. Enlightened individuals may have argued for the abolition of war on moral grounds, based on spiritual

or humanitarian values, but this is different. This is pragmatism. Elimination of war is the only choice, if the human race is to survive. Practicality and morality coincide.

On October 24, 1945, the United Nations came into existence. It was created to put an end to war. In January 1946 the UN General Assembly met for the first time; and the main item on the agenda was elimination of nuclear weapons. Conflicting proposals were put forward by the USA and USSR, and no resolution was found. The moment passed.

Six months later the US detonated a nuclear device at Bikini Atoll. The post-war nuclear arms race was on. Since that time over 2000 nuclear test explosions have taken place, and over 40,000 nuclear weapons have been constructed – mostly by the USA and Russia. Despite deep cuts in recent decades, 16,000 nuclear weapons are still operational, and about 2,000 of them can be launched within minutes.

For two decades Canada fuelled the arms race by selling uranium and plutonium for Bombs. When the military contracts dried up in 1965, Prime Minister Pearson declared that Canada's uranium would henceforth be sold for peaceful purposes only.

The Non-Proliferation Treaty

The Non-Proliferation Treaty (NPT) entered into force in 1970. It is an agreement between the nuclear “have” nations and the nuclear “have-nots”. Those without nuclear weapons promise not to acquire them, while those having such weapons promise to get rid of them.

The NPT was never intended to be a permanent Treaty. It is a transitional agreement to bring about a world without nuclear weapons. Once nuclear weapons are abolished, the text of the NPT is no longer meaningful, for the nuclear “haves” will no longer exist.

The Preamble makes it clear that not just nuclear disarmament, but general and complete disarmament is the goal. Article VI makes that a treaty obligation, binding on all parties:

Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date, and to nuclear disarmament, and on a Treaty on general and complete disarmament under strict and effective international control.

The Nuclear Dilemma

When India detonated its A-Bomb in 1974 using plutonium from a Canadian reactor, the fine line between Atoms for Peace and Atoms for War all but disappeared.

Yes, uranium can be used for peaceful purposes, but such use automatically creates plutonium. This man-made material has a 24,000 year half-life. Some regime thousands of years hence can locate the nuclear wastes, extract plutonium, and use it to build a nuclear arsenal of enormously destructive potential.

We are sowing the seeds of our own destruction when we build reactors all over the world. We are creating plutonium repositories – everlasting caches of nuclear explosive materials. That's why the Nobel Peace Prize-winning organization, International Physicians for the Prevention of Nuclear War, has – since 2010 – called for a ban on uranium mining worldwide. Uranium can be earmarked for energy production instead of bombs, but someone can always use the byproducts for bombs later – much later. In the world of uranium, all roads eventually lead to weapons.

Peaceful Nuclear Explosives

Consider this. For years, it was thought that nuclear explosives could be used for peaceful purposes. Both the USA and USSR had projects to utilize Peaceful Nuclear Explosives (PNEs).

But it's a slippery slope. When Canada expressed outrage that India had built a Bomb using Canadian technology, the Indians replied that it was not a Bomb but a PNE.

PNEs are actually allowed by the NPT. Article V states that Non-Nuclear Weapon States who are parties to the Treaty are entitled to benefit from PNEs, and stipulates that the suppliers shall not peg the cost of such nuclear explosives too high.

But this is madness. Everyone now recognizes that PNEs cannot be a permissible option. It would be impossible to abolish nuclear weapons if countries were entitled to have PNEs.

Highly Enriched Uranium

HEU has been widely used for peaceful purposes. In Canada, HEU was used as fuel for research reactors, both large and small. HEU is still used at Chalk River as a target material to produce medical isotopes, but this use will terminate in 2016.

The problem is that HEU is immediately weapons-usable material. HEU was the explosive in the Hiroshima bomb – a bomb so simple in design that it needed no testing. If HEU were widely available, abolishing nuclear weapons would not be feasible, because anyone with HEU can build A-Bombs so easily.

Under the Obama administration, civilian use of HEU is being eliminated. Such material is being “denatured” – rendered unusable for weapons – by blending it with unenriched uranium. Ideally, in a few years time, there will be no more HEU in civilian circulation.

Plutonium

We have come to realize that PNEs and the civilian use of HEU cannot be tolerated if a nuclear weapons free world is to remain a viable objective. By the same token, we have to realize that producing and maintaining stocks of plutonium cannot be tolerated either.

If every country can maintain its own stash of plutonium, a nuclear weapons free world will be unrealizable. All grades of reactor-produced plutonium can be used to construct highly effective nuclear weapons at all levels of technical sophistication. And once plutonium exists in a separated form (separated from other radioactive contaminants) Bombs can be assembled quite quickly.

Conclusion

Nuclear weapons pose the greatest single threat to human survival. They can wipe out civilization in a matter of hours. Yet political leaders seldom ever mention this existential dilemma. The most urgent problem facing humanity is simply not being addressed.

The five “official” nuclear weapons states – USA, Russia, UK, France, and China – have a legal obligation to eliminate their nuclear arsenals. Under Article VI, Canada – like all other signatories to the NPT – has an obligation to continually remind them of that duty.

Ordinary citizens can assume a leadership role by insisting that the elimination of nuclear weapons be kept upfront on the political agenda as an urgent and achievable goal.

Short-sighted decisions to expand nuclear power and uranium mining, or to reprocess spent nuclear fuel in order to extract plutonium, should be resisted; they risk making the abolition of nuclear weapons more difficult or even impossible.