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working
paper

Canada and nuclear weapons: Canadian policies related to, and connections to, nuclear weapons

By Bill Robinson

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About this Paper

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About the Author

Bill Robinson has been writing about nuclear weapons, arms control, and defence and security policy issues since 1982. From 1986 to 2001 he was a member of the staff of Project Ploughshares. He currently works part-time, researching and writing on nuclear weapons issues and other topics for a variety of Canadian peace and social justice organizations.

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By Bill Robinson

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Nearly sixty years after the advent of the nuclear age, Canada still maintains a fundamentally ambiguous policy toward nuclear weapons. The Canadian government rules out acquiring its own nuclear weapons, opposes nuclear proliferation, and asserts that “the only sustainable strategy for the future is the elimination of nuclear weapons entirely.”² But it also supports the continued possession of nuclear weapons by its allies, participates in a nuclear-armed alliance, and endorses NATO’s plan to retain nuclear weapons “for the foreseeable future.”³ The Canadian government continues to state that the defence of Canada must rely on the “nuclear umbrella” that the United States and other NATO allies have unfurled above this country, and it continues to provide both physical and political support for those weapons in a variety of ways. In short, while the Canadian government condemns any reliance on nuclear weapons by non-allied countries, it continues to treat those same weapons as a useful – even necessary – element of Canada’s defences and those of its allies.

The purpose of this paper is to describe recent developments in Canadian policies on nuclear weapons and to outline Canada’s major known connections to the nuclear arsenals of its allies.

Policy statements

The Canadian government has focused considerable attention on its non-proliferation, arms control, and disarmament policies related to nuclear weapons during the past four years, most notably in the December 1998 report of the Standing Committee on Foreign Affairs and International Trade, *Canada and the Nuclear Challenge*,⁴ and the April 1999 reply of the government, which came in the form of a policy

statement and a separate response to the specific recommendations of the committee.⁵

The tensions in Canadian nuclear policy were manifest in the April 1999 statements, which coincided with and were heavily influenced by the adoption by NATO states (including Canada) of the alliance’s new *Strategic Concept*.⁶ While the April 1999 policy made it clear that the Canadian government favoured a reduction in the role ascribed to nuclear forces by NATO members and other countries, the government stopped short of directly contradicting existing NATO nuclear policy, describing the result as “an appropriate balance” between Canada’s disarmament objectives and its security requirements.⁷

Thus, for example, the Canadian government expressed its view that “the only function of nuclear weapons is to deter the use by others of nuclear weapons,” but it declined to call on NATO to renounce the option to be first to use nuclear weapons in a conflict. Likewise, as noted above, it described the elimination of nuclear weapons as “the only sustainable strategy for the future,” but it simultaneously endorsed a NATO strategy explicitly based on the retention of nuclear weapons “for the foreseeable future.” Only in areas where allied policy was less fixed did the government evidently feel it had more flexibility; thus, for example, it was willing to advocate the de-alerting and de-mating of nuclear arsenals “to the maximum extent possible.”⁸ Canada also was able to extract from its NATO allies a commitment to conduct a review of alliance nuclear and arms control policy (the so-called “Paragraph 32” review).

A similar effort to promote disarmament progress within the constraints of alliance solidarity unfolded at the United Nations in the fall of

1998, when Canada and most of the other non-nuclear members of NATO abstained on a disarmament resolution (the “New Agenda Coalition” resolution) that was vehemently opposed by the nuclear members of NATO, thus sending a message of support for the substance of the resolution without directly confronting their allies by voting in favour of it.⁹ This small-scale but nonetheless important revolt was repeated at the 1999 session of the United Nations, and the New Agenda Coalition countries were subsequently successful in embedding support for 13 “practical steps” toward nuclear disarmament in the Final Document of the 2000 Review Conference of the Non-Proliferation Treaty.¹⁰ At the subsequent 2000 session of the United Nations, Canada and 17 of the other 18 NATO members voted in favour of a revised New Agenda resolution that built upon the language of the Final Document. (France, the only NATO member that did not vote in favour, abstained.)

These two efforts, at the UN and within NATO, came together in NATO’s “Paragraph 32” review, completed in December 2000, which declared the alliance’s collective support for the 13 “practical steps” agreed at the 2000 Review Conference.¹¹ In most other respects, however, the review was a disappointment, endorsing existing alliance nuclear policy, again with Canadian acquiescence. Further discussions within the alliance about the future of the nuclear-armed aircraft assigned to NATO are reportedly underway currently.¹²

Subsequent moves by the current US administration to expand the role of nuclear weapons, renounce support for the Comprehensive Test Ban Treaty, and withdraw from the Anti-Ballistic Missile Treaty amount to a unilateral US decision to ignore the NATO consensus on several of the 13 steps.¹³ Evidently, some countries feel less constrained by NATO policy decisions than does Canada.

The new US nuclear posture represents a profound challenge to the nuclear arms control and disarmament policies of Canada and, indeed, most countries of the world. How the “balance” in Canadian arms control and security policy will change remains to be seen.

Nuclear connections

Unlike Canadian arms control policy, Canadian connections to and support for nuclear weapons are almost never discussed in public documents. The 1987 defence white paper briefly addressed the subject,¹⁴ but the 1994 defence white paper¹⁵ made no comment on it, acknowledging the threat posed to Canada by the continued existence of nuclear weapons but in no place mentioning Canada’s continuing connections to the nuclear arsenals of its allies.

The following section outlines Canada’s major known connections to the nuclear arsenals of its allies. The purpose of this section is to provide an overview of the ways in which Canada is connected to nuclear weapons that is as comprehensive as possible. Many of these activities are connected to nuclear weapons in comparatively peripheral ways, while also playing other, non-nuclear roles in Canadian foreign and defence policy; thus, inclusion of an activity on this list does not necessarily imply that it would not continue in a nuclear-weapons-free Canada. Since very little information has been officially released on such connections, it must be borne in mind that this list is incomplete and may in some cases be out of date. A list of acronyms used is provided at the end of this paper.

Nuclear command/decision-making

NATO nuclear decision-making

Canada supports NATO’s nuclear strategy and participates in the NATO Nuclear Planning Group, the primary forum for Alliance nuclear decision-making. Canada contributes personnel to, and helps pay the operating costs of, the various NATO headquarters and planning staffs, including the NATO Nuclear Policy Directorate, that are involved in planning for and, if necessary, carrying out nuclear operations.

NORAD nuclear attack warning/assessment and command of strategic air defence

Canada participates in the North American Aerospace Defence Command (NORAD), Canadians are integrated throughout the command structure of NORAD, and Canadian military forces are assigned to support its

operations. The Deputy Commander of NORAD is a Canadian officer. Canadian military personnel participate in NORAD's "Integrated Tactical Warning/Attack Assessment" operations (a vital input to US nuclear weapons decision-making) and participate in command over US and Canadian strategic air defence forces (an important component of the US nuclear war-fighting capability).

In April 2002, the US decided to create a new Unified Command, US Northern Command (NORTHCOM), to coordinate the land, aerospace, and sea defences of the United States. NORTHCOM became operational on 1 October 2002, at which time responsibility for NORAD was transferred from Space Command (SPACECOM) to NORTHCOM, and the Commander of NORTHCOM was double-hatted as Commander in Chief of NORAD.¹⁶ At the same time, SPACECOM was merged with Strategic Command (STRATCOM) to create a new STRATCOM responsible for strategic nuclear and conventional forces, information operations, and strategic defence¹⁷ (including presumably the operation of missile defences once they are deployed). Prior to this reorganization, the US government had decided that NORAD or, in the absence of Canadian agreement, SPACECOM would operate any missile defence of North America eventually deployed. Many Canadians had argued that NORAD was likely to disappear or at least lose all relevance unless Canada agreed to participate in missile defence. The US decision to assign missile defence to STRATCOM instead may reduce the likelihood that the future of NORAD will depend on Canadian support for missile defence. The Canadian government has not decided what position it will take if asked to participate in operating such a system.

A number of Canadian personnel were assigned to SPACECOM prior to its absorption by STRATCOM. It is not yet clear whether Canadians will continue to fill these positions now that they fall under the purview of STRATCOM.

Deployment

Nuclear weapons deployment in Canada

No nuclear weapons have been based in Canada since 1984, when US *Genie* air-to-air missiles

were returned to the United States from their storage sites at Canadian airbases.¹⁸ Secret agreements reportedly existed as recently as the mid-1980s, however, to permit the dispersal of armed US bombers to Canadian airfields during crisis or wartime.¹⁹ The bomber dispersal option remains an element of US nuclear planning, but it is not publicly known whether agreements for dispersal to Canadian sites still exist.

NATO nuclear weapons deployment

Canada contributes to NATO Infrastructure Funds that, among other uses, help pay for NATO-related nuclear weapon deployments in Europe.²⁰ The most recent nuclear-related project was the installation of Weapon Storage and Security System (WS3) nuclear weapons storage vaults at 13 European NATO airbases during the 1990s. Planned modernization of these vaults is expected also to be paid for in this manner.²¹

Transit

Transit of nuclear-armed bombers

Nuclear-armed bombers no longer fly in Canadian airspace during normal peacetime. The airborne alert and positive control launch options²² remain elements of US nuclear planning, however, and arrangements almost certainly continue to exist to authorize operations by armed bombers in Canadian airspace during crisis or wartime. Many of the so-called "fail-safe points" where airborne bombers would remain prior to receiving confirmed attack orders are likely to be in Canadian airspace.²³

Transit of nuclear-armed vessels

US Navy nuclear-capable submarines transit Canadian waters and visit Canadian ports on a regular basis.²⁴ Although almost none of these visitors carry nuclear weapons during normal peacetime, Halifax in recent years has hosted a number of visits by Ohio-class ballistic missile submarines, which carry 24 Trident II missiles armed with a total of up to 192 nuclear warheads. Visitors to the Canadian Forces Maritime and Experimental Test Ranges (CFMETR) at Nanoose, British Columbia also have included at least one operational Ohio-class submarine, carrying in that case 24 Trident I missiles also armed with a total of up to 192 warheads.

Operational Support

Strategic defence operations

In the event of a US/Russian nuclear war, Canadian air defence forces would work with US air defence forces to defend North America against Russian bombers. Such efforts likely would be meaningless in the context of a Russian attack, but they might (at least in theory) be highly significant if the United States were the first to attack. In the event of a US first strike, US and Canadian air defences (and missile defences, if any) would need only to intercept any Russian nuclear forces that survived the initial attack. The technical ability of US nuclear forces to execute a successful first strike against Russian forces probably is greater now than it has been since the 1950s, and it will grow even greater if missile defences are deployed. The May 2002 US-Russia nuclear “reductions” agreement will not change this situation. The existence of such a capability, even if Russia does not fear current US intentions, will encourage Russia to take steps to reduce the vulnerability of its nuclear forces, such as retaining larger nuclear forces than it otherwise would, maintaining those forces on high alert, and preserving the option of launching them on warning of attack (a policy that dramatically increases the danger of accidental nuclear war).

Canada does not deploy missile defences, and US missile defence plans do not currently envisage the siting of tracking radars or other facilities in Canadian territory. This circumstance may change, however – particularly if opposition in Greenland and Denmark prevents the deployment of radars at Thule, Greenland. In that event, Canada would come under strong pressure to permit the use of Canadian territory for deployment of such radars.²⁵

Support for tanker aircraft

Canada has agreed to permit the dispersal of Strategic Command tanker aircraft (to refuel the US bomber fleet) at unspecified Canadian airfields during crisis or wartime.²⁶ It is likely that these arrangements continue to exist. Similar arrangements may also exist for nuclear command-and-control aircraft.

Nuclear-related communications sites

Canadian NORAD-related radio communications sites almost certainly are designated to operate as backup communications systems for airborne nuclear bombers and other Strategic Command aircraft. The air/ground/air radio sites that formerly comprised the *Greenpine* system, primarily co-located with NORAD North Warning System sites, were specifically installed to communicate with US bombers flying at or near their fail-safe points during crisis or wartime.²⁷

Strategic anti-submarine warfare

Canadian naval forces and maritime patrol aircraft help track (and, in wartime, would help to destroy) Russian ballistic missile submarines and other naval forces. Russian missile submarines now rarely, if ever, venture near North America. In recent years, however, Canada also has engaged in research with the US on monitoring submarine movements throughout the Arctic Basin, where the core of the much-diminished Russian missile submarine fleet now patrols.²⁸

Collection/processing of signals intelligence (SIGINT)

The Canadian Forces Information Operations Group (CFIOG) and the Communications Security Establishment (CSE) eavesdrop on radio communications and other electronic emissions to gather information about strategic targets and defence systems in Russia and to help track Russian air and naval forces (among many other intelligence targets).²⁹ CSE and CFIOG operations are tightly integrated with those of their US counterparts, and Canadian detachments and/or exchange personnel serve at a number of similar US SIGINT facilities.

The “New Triad”³⁰ laid out in the US Nuclear Posture Review of 2002 places increased emphasis on the role of intelligence, including the potential offensive war-fighting contribution of Information Operations (“effective IO targeting, weaponeering, and combat assessment essential to the New Triad”).³¹

Testing/training

Bomber training

Unarmed US bombers use Canadian airspace to practice airborne alert operations, low-level flying (along as many as seven low-level bomber training corridors across Canada⁵²), nuclear bombing, and, with the co-operation of Canadian air defence forces, electronic warfare and air defence penetration tactics.

Dual-capable fighter-bomber training

Dutch, German, and Italian fighter-bombers practice offensive tactics, some of which may be relevant to nuclear bomb delivery, as part of their flight training at Goose Bay, Labrador.⁵³ (A small number of Dutch, German, and Italian fighter-bomber squadrons are certified to carry US nuclear bombs during wartime; aircraft from Dutch and German nuclear-certified squadrons are known to have participated in flight training at Goose Bay.) The British Royal Air Force also trains at Goose Bay, but its aircraft are no longer equipped with nuclear weapons.

Anti-submarine warfare testing/training

US Navy surface and submarine forces test torpedoes and practice anti-submarine warfare (ASW) tactics in co-operation with Canadian naval forces at CFMETR in British Columbia.⁵⁴ Among their other purposes, these activities are directly relevant to strategic ASW operations (i.e., operations against Russian missile submarines).

Nuclear weapon delivery vehicle testing

In the past, Canada has permitted flight tests in Canadian airspace of the AGM-86B air-launched cruise missile and AGM-129A Advanced Cruise Missile, both of which are strategic nuclear delivery vehicles in current operational service. These tests were conducted under the Canada-United States Test and Evaluation Program (CANUSTEP) agreement, which was signed in 1983 and extended in modified form in 1993. The cruise missile test program was ended in 1994, but future tests of these or other nuclear delivery systems could be undertaken under the auspices of this agreement in the future.

Research & Development/Production

Missile defence research

The Canadian government chose not to participate formally in US missile defence research when invited to do so in 1985. This position was reversed, however, in the *1994 Defence White Paper*, in which the government announced that Canada would co-operate in “the examination of ballistic missile defence options focused on research and building on Canada’s existing capabilities in communications and surveillance.” A number of Canadian government and joint US-Canadian missile defence-related projects are already underway.⁵⁵ (See the table below for recent Canadian commercial contracts related to missile defence.)

Exports of nuclear technology/materials

Canadian exports of uranium and of nuclear technology contributed to the development and production of nuclear weapons in the United States, Britain, India, and, probably, France. Despite Canada’s comparatively strict safeguards regime, much of which was established after the aforementioned contributions, the risk remains that such exports will continue to contribute to nuclear proliferation in the future.⁵⁶ In 1992, the parliamentary Sub-Committee on Arms Export recommended that “the nature, results and controls over nuclear-related materials, systems, technology and components be the subject of a parliamentary study.”⁵⁷ To date, however, no such study has been undertaken.

Nuclear weapon-related exports

In recent years Canadian industry has produced components for B-2 bombers; B-52 bombers; a number of dual-capable systems, including F-15, F-16, and F-117 fighter-bombers; and a variety of missile defence and other nuclear-related systems (see table below). Many of these contracts were obtained with the assistance of the Canadian Commercial Corporation, a Crown corporation, and subsidised with millions of dollars from the Technology Partnerships Canada program (and its predecessor the Defence Industry Productivity Program) and other government programs.

Notes

- 1 For further discussion of the contradictions (or not) in Canadian policy, see Duane Bratt, "Canada's Nuclear Schizophrenia," *Bulletin of the Atomic Scientists*, March/April 2002 and Erika Simpson, *NATO and the Bomb: Canadian Defenders Confront Critics*, McGill-Queen's University Press, 2001.
- 2 *Nuclear Disarmament and Non-Proliferation: Advancing Canadian Objectives*, Department of Foreign Affairs and International Trade, April 1999, p. 1 (<http://www.dfait-maeci.gc.ca/nucchallenge/POLICY-e.htm>).
- 3 "The Alliance's Strategic Concept," NATO Press Communiqué NAC-S(99)65, 24 April 1999 (<http://www.nato.int/docu/pr/1999/p99-065e.htm>).
- 4 *Canada and the Nuclear Challenge: Reducing the Political Value of Nuclear Weapons for the Twenty-First Century*, Standing Committee on Foreign Affairs and International Trade, December 1998 (<http://www.parl.gc.ca/InfoComDoc/36/1/FAIT/Studies/Reports/faitrp07-e.htm>).
- 5 *Nuclear Disarmament and Non-Proliferation: Advancing Canadian Objectives* (<http://www.dfait-maeci.gc.ca/nucchallenge/POLICY-e.htm>) and *Government Response to the Recommendations of the Standing Committee on Foreign Affairs and International Trade on Canada's Nuclear Disarmament and Non-Proliferation Policy* (<http://www.dfait-maeci.gc.ca/nucchallenge/ANNEXB-e.htm>), Department of Foreign Affairs and International Trade, April 1999.
- 6 "The Alliance's Strategic Concept."
- 7 *Government Response to the Recommendations of the Standing Committee on Foreign Affairs and International Trade on Canada's Nuclear Disarmament and Non-Proliferation Policy*, p. 1.
- 8 *Ibid.*, p. 8.
- 9 For more information, see Ernie Regehr, "UN resolution a breakthrough for nuclear abolition," *The Ploughshares Monitor*, December 1998 (<http://www.ploughshares.ca/content/MONITOR/mond98b.html>).
- 10 For more information, see Senator Douglas Roche, "An unequivocal landmark: The 2000 review of the Non-Proliferation Treaty, April 24 – May 20, 2000," *The Ploughshares Monitor*, June 2000 (<http://www.ploughshares.ca/content/MONITOR/monj00b.html>). The full text of the 13 steps can be found at <http://www.ploughshares.ca/CONTENT/MONITOR/monm01b.html#13%20Practical%20steps>.
- 11 *Report on Options for Confidence and Security Building Measures (CSBMs), Verification, Non-Proliferation, Arms Control and Disarmament*, NATO Press Communiqué M-NAC-2(2000)121, 14 December 2000 (<http://www.nato.int/docu/pr/2000/p00-121e/home.htm>).
- 12 According to the leaked version of the January 2002 report of the US Nuclear Posture Review, "a plan is already underway to conduct a NATO review of U.S. and allied dual-capable aircraft in Europe and to present recommendations to Ministers in summer of 2002. Dual-capable aircraft and deployed weapons are important to the continued viability of NATO's nuclear deterrent strategy and any changes need to be discussed within the alliance." *Nuclear Posture Review [Excerpts]*, January 2002 (<http://www.globalsecurity.org/wmd/library/policy/dod/npr.htm>).
- 13 Elements of the 13 steps endorsing the "irreversibility" of arms control measures and calling for increased transparency, concrete agreed measures to reduce the operational status of nuclear weapons, and unequivocal commitment to the elimination of all nuclear weapons arguably are also breached by current US nuclear policies. For more information on US plans, see *Nuclear Posture Review [Excerpts]*.
- 14 *Challenge and Commitment: A Defence Policy for Canada*, Department of National Defence, June 1987, pp. 17-19.
- 15 *1994 Defence White Paper*, Department of National Defence, December 1994 (http://www.forces.gc.ca/admpol/pol_docs/94wp/white_paper_94.html).
- 16 See "Special Briefing on the Unified Command Plan," US Department of Defense, 17 April 2002 (http://www.defenselink.mil/news/Apr2002/t04172002_t0417sd.html).

- 17 See “United States Strategic Command,” US Department of Defense (<http://www.stratcom.mil/>).
- 18 For more information about US nuclear weapons formerly deployed with the Canadian Forces, see John Clearwater, *Canadian Nuclear Weapons: The Untold Story of Canada’s Cold War Arsenal*, Dundurn Press, 1998.
- 19 William M. Arkin & Richard W. Fieldhouse, *Nuclear Battlefields: Global Links in the Arms Race*, Ballinger, 1985, p. 78.
- 20 The US nuclear weapons assigned for NATO use are estimated by the Stockholm International Peace Research Institute to comprise circa 150 B-61 free-fall bombs “deployed at 10 airbases in 7 European NATO countries. The airbases include: Kleine Brogel, Belgium; Buechel AB, Germany; Ramstein AB, Germany; Spangdahlem AB, Germany; Araxos, Greece (a press report from Jan. 2001 that the bombs at Araxos have been removed has not been confirmed); Aviano, Italy; Gheddi-Torre, Italy; Volkel, Netherlands; Incirlik, Turkey; and RAF Lakenheath, UK.” Hans Kristensen and Joshua Handler, “Appendix 6A. Tables of nuclear forces,” *SIPRI Yearbook 2001*, Oxford University Press, 2001 (<http://projects.sipri.se/nuclear/06A.pdf> [pdf file]). An unspecified number of British “sub-strategic” warheads based on Trident missiles are also held available for NATO use.
- 21 See “WS3 Sustainment Program: Program Management Review,” 3 March 2000, released to Joshua Handler under US Freedom of Information Act (<http://www.nautilus.org/nukestrat/USA/NSNF/WS3.pdf> [pdf file]).
- 22 The “airborne alert” option is the ability to maintain a portion of the US bomber force armed and airborne 24 hours a day, ready to fly directly to their nuclear targets. Routine airborne alert operations were ended in 1968, but the option to reinstate such operations during times of crisis remains. The “positive control launch” option is the ability to send armed bombers airborne on the receipt of indications of a nuclear attack on the United States, but before the attack has been confirmed. To reduce the risk of accidental nuclear war, bombers launched under these circumstances would not fly to their nuclear targets, but would fly instead to “fail-safe points” (formally known as positive control turn around points), where they would await further orders.
- 23 See Bill Robinson, “Radio Activity in the North,” *The Ploughshares Monitor*, March 1988, pp. 22-23.
- 24 The policy of permitting port visits by nuclear-armed or nuclear-capable warships was explicitly reconfirmed as recently as 1991 in Order-in-Council P.C. 1991-2803, 30 October 1991. An environmental assessment of the visits prepared by the Department of National Defence and also made public on 30 October 1991 stated that “a modification of the policy which would risk an interruption of the visits is unacceptable because of the importance to Canada’s national security of the nuclear deterrent and the damage to the deterrent that any interruption would cause. It is also rejected because of its potential effect on relations with Canada’s allies who would rightly perceive such a change as an abrogation of Canada’s Alliance responsibilities.”
- 25 David Pugliese, “U.S. covets Maritime radar post: Eastern Canada sites would help missile shield: DND report,” *Ottawa Citizen*, 28 April 2002.
- 26 *Challenge and Commitment: A Defence Policy for Canada*, Department of National Defence, 1987, p. 18.
- 27 “Radio Activity in the North.”
- 28 See, e.g., Ron Verrall, “Tracking submarines under the arctic ice,” *Maple Leaf*, Vol. 3 No. 14, April 2000 (http://www.dnd.ca/menu/maple/vol_3/Vol3_14/dnews_e.htm).
- 29 Canadian SIGINT collection sites, which are operated by the CFIOG, are located at Canadian Forces Station Alert, Nunavut; Canadian Forces Station Masset, British Columbia; Canadian Forces Base Gander, Newfoundland; and Canadian Forces Station Leitrim, Ontario. SIGINT processing is done by the CSE, located in Ottawa. For more information, see the CSE website (<http://www.cse.dnd.ca/>) and Bill Robinson’s unofficial CSE website (<http://watserv1.uwaterloo.ca/~brobinso/cse.html>).

- ³⁰ The New Triad consists of
- “ - Offensive strike systems (both nuclear and non-nuclear);
 - Defenses (both active and passive); and
 - A revitalized defense infrastructure that will provide new capabilities in a timely fashion to meet emerging threats.
- This New Triad is bound together by enhanced command and control (C2) and intelligence systems.” In Donald Rumsfeld, “Foreword,” *Nuclear Posture Review Report*, January 2002 (<http://www.defenselink.mil/news/Jan2002/d20020109npr.pdf> [pdf file]).
- ³¹ *Nuclear Posture Review [Excerpts]*.
- ³² IR-610 in Ontario; IR-654 in British Columbia; IR-655 in the Northwest Territories, Saskatchewan, and Alberta; IR-656 in Manitoba, Saskatchewan, and Alberta; IR-802 and IR-803 in Québec; and IR-804 in New Brunswick. *Military Training Routes: North and South America*, DoD Flight Information Publication AP/1B, US National Imagery and Mapping Agency, 18 April 2002.
- ³³ For general information about flight training at Goose Bay, see *Goose Bay Foreign Military Training*, Department of National Defence (http://www.capitalnet.com/~pmogb/website/home_e.html) and *Low-Level Flying*, Innu Nation (<http://www.innu.ca/llfindex.html>).
- ³⁴ For general information about CFMETR, see *Canadian Forces Maritime Experimental Test Range*, Department of National Defence (<http://www.marpac.forces.ca/support/units/cfmetr/>) and the website of the Nanoose Conversion Campaign (http://www.user.dccnet.com/welcomewoods/Nuclear_Free_Georgia_Strait/nanoose.html).
- ³⁵ See, e.g., *Outline of Program June 2000*, Defence Research and Development Canada, Department of National Defence, 2000 (http://www.drdc.dnd.ca/program/r&dprogr_e.pdf [pdf file]) and Bill Robinson, “Ballistic Missile Defence for North America: Return of the SDI,” *The Ploughshares Monitor*, December 1997 (<http://www.ploughshares.ca/content/MONITOR/mond97b.html>).
- ³⁶ Bill Robinson, “Does Canada Export the Bomb?” *The Ploughshares Monitor*, December 1992, pp. 18-20.
- ³⁷ *The Future of Canadian Military Goods Production and Export*, Standing Committee on External Affairs and International Trade, Sub-Committee on Arms Export, October 1992, pp. 23-24.

Recent Canadian Suppliers for US Nuclear Weapon Systems

B-52H Stratofortress long-range bomber, which carries:

the AGM-86B air launched cruise missile equipped with a W80-1 nuclear warhead; and the AGM-129A advanced cruise missile equipped with a W80-1 warhead.

Héroux-Devtek Inc	Longueuil, Quebec	Landing gear components
Canadian Commercial Corp*	Ottawa, Ontario	Main landing gear cylinder

B-2A Spirit long-range bomber, which carries:

B61-7 and B61-11 “earth-penetrating” nuclear bombs; or B83-1 nuclear bombs.

Avcorp Metal Products	Laval, Quebec	Metal components
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Recent Canadian Suppliers for US Nuclear-Capable Weapon Systems

F-15E Strike Eagle fighter aircraft, which can carry:

B61 tactical nuclear bomb.

Bomem Inc	Quebec City, Quebec	Infrared imaging spectrometer
CMC Electronics Inc. (formerly Canadian Marconi Company)	Montreal, Quebec	Hybrid microcircuits Infrared target system power supply
Canadian Commercial Corp*	Ottawa, Ontario	Landing gear components
Virtual Prototypes Inc	Montreal, Quebec	Avionics simulation software
West Heights Manufacturing	Kitchener, Ontario	Landing gear components

F-16C/D Fighting Falcon fighter aircraft, which can carry:

B61 tactical nuclear bomb.

CMC Electronics Inc	Montreal, Quebec	Head-up display microcircuits
Canadian Commercial Corp*	Ottawa, Ontario	Communication equipment Electronics
Derlan Aerospace Canada Ltd	Milton, Ontario	Engine accessory gearboxes

F-117A Nighthawk stealth fighter aircraft (is considered nuclear-capable, although at a lower level of nuclear readiness than other aircraft)

Calian Technology Ltd	Kanata, Ontario	Document management system
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Joint Strike Fighter aircraft, which is being designed to permit future nuclear capability.

Haley Industries Limited	Renfrew, Ontario	Fan housing
Honeywell Canada	Mississauga, Ontario	Environmental control systems
Messier-Dowty Inc	Ajax, Ontario	Landing gears
Virtual Prototypes Inc	Montreal, Quebec	Design simulation software

Nuclear-powered attack submarines (SSN), which can carry:

Tomahawk cruise missiles with W80-0 nuclear warheads.

(Although not normally on board, nuclear-armed Tomahawks can be redeployed within 30 days.)

Canadian Commercial Corp*	Ottawa, Ontario	Combat system sound equipment
Northstar Technical Inc	St. John’s, Newfoundland	Control console

Recent Canadian Suppliers for US Nuclear Weapon Support Systems

Ballistic Missile Defence

Panorama Business Views	Toronto, Ontario	Data processing support equipment
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Theater Ballistic Missile Defence (using Patriot missiles)

Bristol Aerospace Limited	Winnipeg, Manitoba	Excalibur Target system
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Advanced Extremely High Frequency Military Satellite Communications (Milsatcom)

Com Dev Space Division	Cambridge, Ontario	Electro-mechanical switches
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E-6B Tacamo Command and Control Aircraft

Atlantis Aerospace Corp	Brampton, Ontario	Avionics trainer upgrade
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Stockpile Stewardship Program

Experimental programs and computer simulation to maintain US nuclear stockpile.

Fakespace Systems	Kitchener, Ontario	Custom visualization systems
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This table was compiled in May 2002 by Project Ploughshares. Sources: The nuclear weapon and support systems of the table are those identified in "U.S. Nuclear Forces, 2002," *Bulletin of the Atomic Scientists*, May/June 2002 (with the exception of the last program listed). The Canadian component data is based on reported transactions since 1996 in Project Ploughshares' *Canadian Military Industry Database*. It is important to note that, because the details of only a minority of contracts between Canadian suppliers and US military agencies or contractors are reported, the table is incomplete.

*The Canadian Commercial Corporation is a federal crown corporation which acts as a broker between Canadian suppliers and foreign governments. The Corporation is listed in the table when the name of the supplier has not been reported.

Acronyms

AGM-86B	Air-Launched Cruise Missile (nuclear-armed variant)
AGM-129A	Advanced Cruise Missile (nuclear-armed)
ASW	Anti-Submarine Warfare
CANUSTEP	Canada-United States Test and Evaluation Program
CFIOG	Canadian Forces Information Operations Group
CFMETR	Canadian Forces Maritime and Experimental Test Ranges
CSE	Communications Security Establishment
IO	Information Operations
NATO	North Atlantic Treaty Organization
NORAD	North American Aerospace Defence Command
NORTHCOM	Northern Command
NPT	Non-Proliferation Treaty
SIGINT	Signals Intelligence
SPACECOM	Space Command
STRATCOM	Strategic Command
WS3	Weapon Storage and Security System

Project

Ploughshares

Project Ploughshares is an ecumenical agency of the Canadian Council of Churches with a mandate to carry out research, analysis, dialogue, and public education on peace and security issues in Canada and the world. It is affiliated with the Institute of Peace and Conflict Studies at Conrad Grebel University College, University of Waterloo.

... and they shall beat their swords into ploughshares, and spears into pruning hooks; nation shall not lift up sword against nation; neither shall they learn war any more. (Isaiah 2:4)

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