

with a clear and present danger to both Canada and the United States.

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## The Missing Essential Part

### Emergency Provision of Nuclear Weapons for RCAF Air Defence Command, 1961–1964

SEAN M. MALONEY

*Abstract: During the Cold War, Canada acquired aircraft and missiles capable of delivering nuclear weapons but no agreement existed for Canadian access to those weapons. The Diefenbaker government, elected in 1957, was suspicious of anything that might compromise Canadian sovereignty and harboured a small cadre of anti-nuclear members in its ranks. During a series of incidents, including the 1962 Cuban Missile Crisis, the Royal Canadian Air Force deployed five squadrons of CF-101B Voodoo interceptors and two squadrons of Bomarc B heavy surface-to-air missiles to protect North America as part of the North American Air Defence Command agreement. This study examines the three available options for the emergency deployment of nuclear weapons to Canada and their viability in light of new information.*

**D**URING THE COLD War, Canada acquired aircraft capable of delivering nuclear weapons. In the midst of these complicated and expensive processes, the Diefenbaker government was elected in 1957 and re-examined the Canadian defence programme. Negotiations began between the Canadian armed services and their American counterparts for access to the nuclear munitions for which these aircraft were designed. The negotiations, however, became entangled in a mire of political controversy. The Diefenbaker government, suspicious of anything that might compromise Canadian sovereignty and harbouring a small cadre of anti-nuclear members in its ranks, delayed dealing with the issue amid increased attacks by the Liberal opposition, who, when in office, had initiated the strategic process

that demanded the procurement of the aircraft that required nuclear munitions.

These deliberations took place against an increasingly apocalyptic backdrop. The Soviet Union precipitated an extremely dangerous crisis over access to West which threatened to escalate into war. As that situation waned, another confrontation emerged in 1962 when the Soviet Union deployed intermediate and medium-range ballistic missiles and tactical nuclear weapons to Cuba.

During these crises, the Royal Canadian Air Force (RCAF) had five squadrons of CF-101B Voodoo interceptors and two squadrons of Bomarc B heavy surface-to-air missiles from the RCAF's Air Defence Command (ADC) dedicated to protect North America as part of the North American Air Defence Command (NORAD) agreement.

Without a formal agreement between the two governments, access to nuclear warheads for these forces was problematic. During the course of events, however, provisions for the emergency deployment of nuclear weapons were examined by both countries. This took three forms: the first was what we would today call “just in time” delivery of complete weapons from US bases as a crisis escalated. The second called for incomplete nuclear weapons to be stored in Canada with the delivery of a “missing essential part” from US bases to be inserted once warning of an attack was given. The third was the deployment of American aircraft equipped with nuclear weapons to defend Canada. Up to now, the ability of the US Air Force (USAF) to implement these options has been obscured by decades of secrecy. This present study will examine these options and their viability in light given availability of newly available information.<sup>1</sup>

<sup>1</sup> The general outline of the emergency provision arrangements initially was based on primary sources requested by the author for declassification and depicted in the author's PhD dissertation “Learning to Love the Bomb: Canadian Nuclear Weapons and Cold War Strategy 1951–1970” which was researched and written in 1993–97, defended in 1998, and published by Potomac Books in 2007. John Clearwater notes the locations of storage facilities in his 1998 work *Canadian Nuclear Weapons* (Vanwell, 1998) which according to his website was written while he was employed at Department of National Defence as a “specialist in access to information matters” but he does not examine emergency provision arrangements in it to the same level of detail or place it in any significant historical context. “The Missing Essential Part” article takes into account new information developed by the author and is an elaboration on the discussion in “Learning to Love the Bomb.” I would also like to thank Bill Burr at the National Security Archive for perusing this article and providing suggestions.

## CONTINENTAL AIR DEFENCE 101

North American air defence planning started after the detonation of the first Soviet nuclear weapon in 1949 and continued after the confirmation that Soviet bomber forces were forward-deploying TU-4 piston-engine bombers to bases capable of reaching North America in 1952–1954. Anticipating that jet bombers and thermonuclear weapons would replace them, a series of high-priority air defence projects emerged in United States and Canada by the early 1950s. These included early warning radar systems, command and control and communications systems, fighter-interception forces, and guided missile systems.

By 1952 joint discussions envisioned an integrated air defence system by the late 1950s, knowing full that many technologies required were not mature. The nature of the threat, demonstrated by the test of an air-droppable Soviet thermonuclear weapon in 1955, forced the planners to undertake these projects simultaneously. Two of these involved the nuclearization of missiles and fighter aircraft weapons systems. Prior to this air defence forces relied on interceptors equipped with machine guns and free-flight rockets. These included the CF-100 in Canada and the F-80, F-84, and F-86 aircraft in American service.<sup>2</sup> With technological breakthroughs in small diameter “sealed pit” nuclear weapon designs, it was possible to equip interceptors with nuclear air-to-air weapons. Similarly, the surface-to-air missiles under development were modified to accept nuclear warheads.<sup>3</sup> It was by the mid-1950s fully understood in the RCAF and the USAF that the next generation of aircraft and missiles would use small nuclear weapons as their primary kill mechanisms.

The integration of the Canadian and US air defence programmes was deemed to be an American priority in 1949. At the same time it was understood in American policy circles that there were issues of national sovereignty that demanded delicate handling.<sup>4</sup> It was

<sup>2</sup> Kenneth Schaffel, *The Emerging Shield: The Air Force and the Evolution of Continental Air Defense 1945–1960* (Washington DC: GPO, 1991), ch.6.

<sup>3</sup> Previously, nuclear weapons were extremely large “open pit” designs that required the in-flight insertion of the plutonium core for them to operate. FOIA, “ADC Historical Study No. 21, Bomarc and Nuclear Armament 1951–1963,” and “ADC Historical Study No. 20, “Nuclear Armament: Its Acquisition, Control and Application to Manned Interceptors 1951–1963.”

<sup>4</sup> This exceptionally complicated historical process has for the purposes of this

recognized on both sides of the table that the air defence systems as a whole existed to protect the USAF's Strategic Air Command's forces, that the deterrent capability of SAC rested on the reduction of its vulnerability, and the larger issue of deterring aggressive Soviet activity generally was based on this deterrent system. However, it was simply not acceptable that the United States should take over the defence of Canada. Nor did the Americans want to, despite the assertions and shrill cries of nationalists in Canada.<sup>5</sup>

It was thus up to Canada to determine its level of involvement. Canada looked at the construction of an indigenous interceptor force, purchasing a complementary surface-to-air missile force compatible with American systems, and manning some form of integrated detection and direction system. By at least 1956 it was evident to Canadian planners that nuclear warheads were going to be the norm for the air defence system. The accidental release of classified Douglas Aircraft reports to Canadian authorities that related to their MB-1 Genie nuclear air-to-air rocket contributed to RCAF interest.<sup>6</sup> By May 1957 active discussion about arming the future interceptor force based on the CF-105 Arrow aircraft with MB-1 was underway.<sup>7</sup> This course of action was confirmed when the entire RCAF leadership witnessed Shot JOHN, the live test of an MB-1 Genie nuclear air-to-air rocket in Nevada during the Plumbob test series in July 1957.<sup>8</sup>

As the MB-1 was about to enter service in the US Air Force, special care had to be taken for its transport and storage. It was not simply a matter of stockpiling the rockets in a hanger on a given base. The highly-destructive nature and technological sophistication of nuclear weapons required exceptionally specialized transport and maintenance procedures. The weapons design had to be safeguarded.

article been dramatically compressed. It is discussed in great detail in the author's *Learning to Love the Bomb: Canada's Cold War Strategy and Nuclear Weapons 1951-1970* (Dulles: Potomac Books, 2007).

<sup>5</sup> US National Archives and Records Administration [NARA] RG 59 file E3077 250/62/30/3 Box 1 (1 Sep 1961) Canadian-American Relations Committee, "Canadian-American Relations."

<sup>6</sup> ATI (27 August 1956) memo CCOS to CJS(W) "Air to Air Atomic Weapons"; (24 September 1956) memo JSWPC to CCOS, "Air-to-Air Atomic Weapons."

<sup>7</sup> DHH file 79/429 vol. 7A, (1 Mar 57) AMTS "Divisional Items of Interest."

<sup>8</sup> Library and Archives Canada [LAC] RG 24 vol 21444 file 1894.2 (Oct 57) "A Report on the Activities Connected with the Formation, Operations and Close-out of the Canadian Administration Group during Operation PLUMBBOB 1 May 57-1 Oct 57 at Camp Desert Rock, Nevada Test Site."

Safety standards and accountability were on an order of magnitude higher than conventional weapons. A single person now had the capability of generating immense destruction and steps had to be taken to eliminate that possibility, thus command, control and alert procedures had to be completely redesigned.

As a result, nuclear weapons could not be transferred to the RCAF like conventional weapons as there were stringent legal aspects regarding the deployment and use of nuclear munitions. To access these systems, and it was not just the warheads but all aspects of the nuclear endeavor, required a series of agreements related to each type of delivery system. Only then could training commence and information on the systems flow between the two air forces. And, if the aircraft were made in Canada, they had to be certified for nuclear weapons delivery by the appropriate authorities at Kirtland Air Force Base in New Mexico. These processes all stalled after the Diefenbaker government was elected in 1957.

#### **AIR DEFENCE DISPOSITIONS: THE TYRANNY OF GEOGRAPHY**

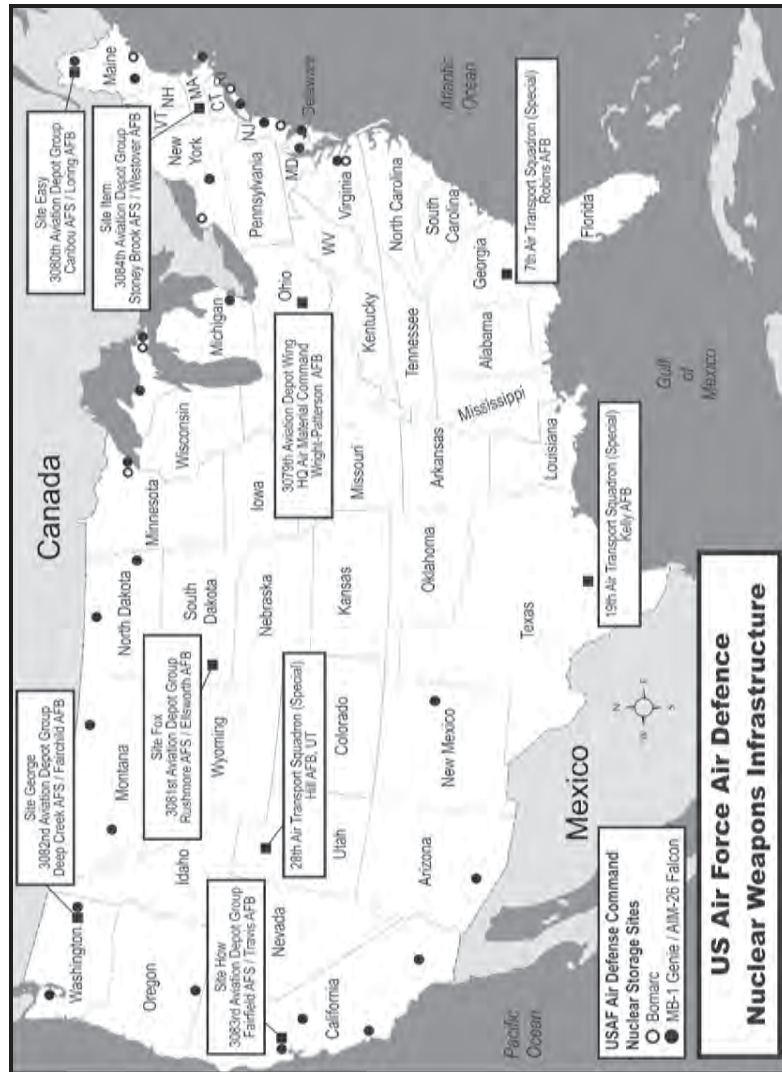
The first USAF interceptors equipped with MB-1 Genie rockets on alert were nine F-89J Scorpions at Hamilton Air Force Base (AFB) near San Francisco and six F-89J's at Wurtsmith AFB in Michigan on 1 January 1957. Twelve bases across the United States were surveyed for MB-1 storage, with construction commencing at nine locations in 1956. Only four were ready by early 1957: Hamilton, Wurtsmith, Dover in Delaware and K.I. Sawyer in Michigan. With the planned deployment of the F-101B Voodoo and F-106A Delta Dart interceptors in 1960-61, up to 30 bases in total were scheduled for MB-1 storage.<sup>9</sup>

At the same time, the Bomarc surface-to-air missile system entered service. Initially designed to ring the perimeter of the United States, the programme was eventually cut back to ten sites, each housing 28 missiles.<sup>10</sup>

One must appreciate the geographical issues facing USAF air defence planning at this time. American heavy industry at the time

<sup>9</sup> FOIA, "ADC Historical Study No. 20, "Nuclear Armament: Its Acquisition, Control and Application to Manned Interceptors 1951-1963."

<sup>10</sup> Schaffel, *The Emerging Shield*, ch.8.



Map drawn by Mike Bechthold ©2014.

was concentrated in the Chicago–Ohio Valley and the Michigan area. There was also a “high tech” corridor from Boston to Buffalo. The SAC base network expanded to include nine major bomber bases from North Dakota to Maine. The US Navy’s nuclear submarine facilities were located in New England. To the south was the command and control hub, Washington DC. The only route that Soviet bombers could take to get at these target complexes was from the Kola Peninsula, over Greenland, Baffin Island, Labrador, Quebec, and then Ontario. On the west coast, bombers based in eastern Siberia were even closer to their targets. To attack the aerospace industry, arrayed from Washington state to California, and the myriad of SAC bases located in both states, Soviet forces had to cross Alaska, then British Columbia.

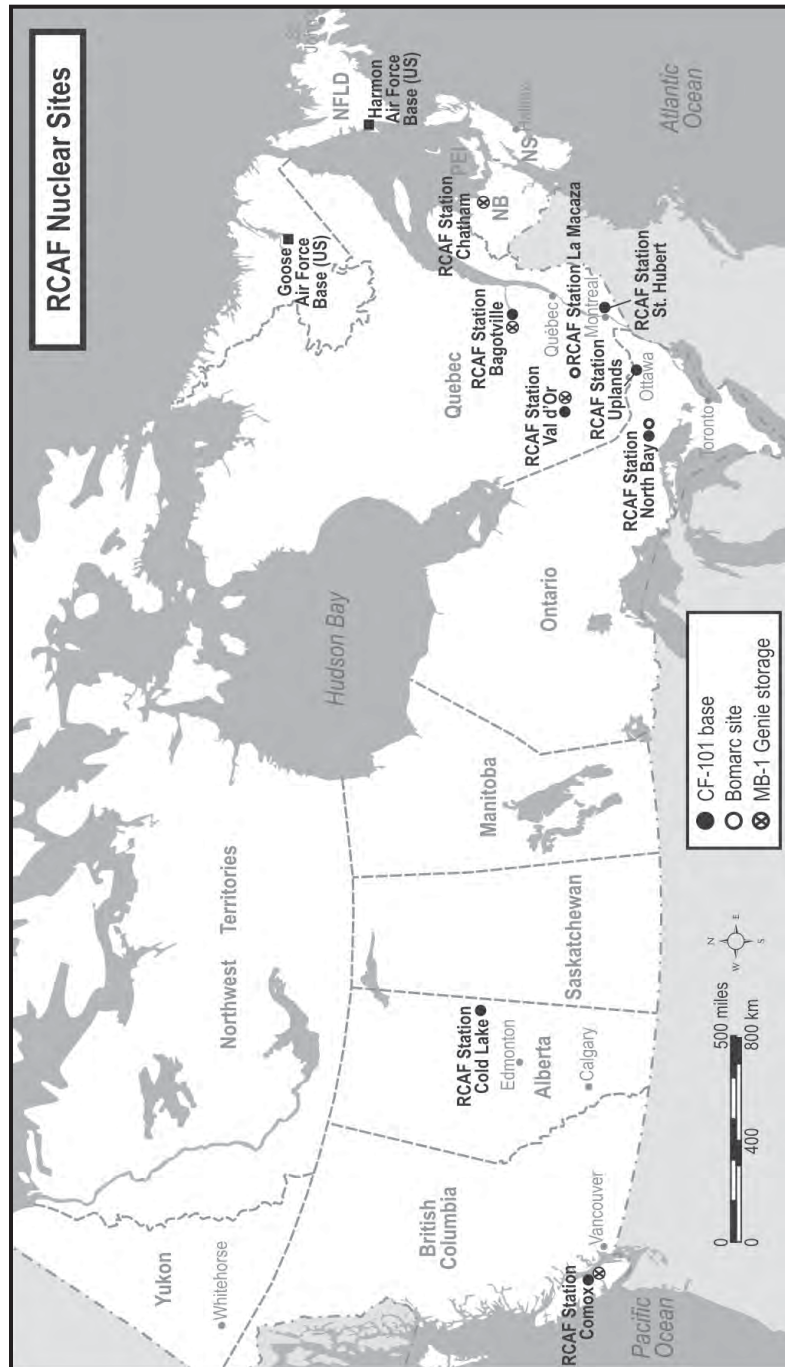
The complicating problem for the air defence forces were the portion of Ontario that jutted southwards into the United States; the proximity of Quebec’s major cities to Vermont; and the location of a major SAC base on the border with New Brunswick at Caribou, Maine. Interception of bomber aircraft had to take place as far away as possible from the targets, not only because USAF interceptors were equipped with nuclear weapons, but because the bombers carried thermonuclear weapons that could generate irradiated craters two miles in diameter. That state of affairs pushed the intercept line north as far as possible and produced a requirement to have interceptor forces cover those spaces.

The USAF sited interceptor forces along the border, with seven fighter and Bomarc facilities in Minnesota and Michigan, and six more from New York through Maine to Massachusetts. Six fighter bases covered the northwest from Washington to North Dakota.<sup>11</sup> The RCAF’s Air Defence Command had CF-100’s based at Comox, BC; Cold Lake, Alberta; North Bay and Ottawa in Ontario, and St. Hubert and Bagotville in Quebec.<sup>12</sup> The RCAF’s dispositions gave depth on the west coast and to some extent for what became known as the “Niagara Triangle.” There were four additional USAF interceptor squadrons that afforded even greater depth: Thule, Greenland; Goose Bay, Labrador; Stephenville, Newfoundland; and Keflavik, Iceland. Similarly air defence forces in Alaska gave the US west coast depth of coverage.

<sup>11</sup> Schaffel, *The Emerging Shield*, 230.

<sup>12</sup> Larry Milberry, *The AVRO CF-100* (Toronto: CANAV Books, 1981), 177.





Map drawn by Mike Bechthold ©2014.

The thorny issue of deploying MB-1 Genies to overseas bases posed questions as to the viability of the four bases on the northeast approaches. First, there was the questionable legality of the presence of Thule Air Force Base in Greenland vis-à-vis the already aggravated Danish–American relations. Second, Iceland, was leaning towards neutrality and there were similar sensitivities. Third, the American use of bases in Newfoundland and Labrador was a sensitive issue dating back to the Second World War. That said, there were US Air Force interceptor squadrons stationed at all four locations. Storage for nuclear air defence weapons was constructed at Goose Bay and Thule.

#### NUCLEAR INFRASTRUCTURE FOR AMERICAN AIR DEFENCE FORCES

Each USAF interceptor base contained a nuclear weapons storage area and a quick reaction alert facility designed by the Black and Veatch Company in Kansas.<sup>13</sup> The MB-1 Genies were kept in thirty-bay Multi-Cubicle Magazine Storage (MCMs) buildings, with one MB-1 mounted on a MF-9 trailer in each bay behind an alarm-protected “garage door of doom.” Each bay was made of concrete with a frangible roof. If there were an accident this would direct any blast upwards and localize any plutonium contamination.<sup>14</sup> Air Defense Command bases with nuclear-capable interceptors generally featured four MCMs buildings (a limited number of bases had three, others had five or six) for an average of 120 MB-1 Genies per base.<sup>15</sup> There was also a warhead checkout building. The MCMSS were built starting in late 1956 with construction delays well into 1958 affecting operational capability for the Air Defense Command.<sup>16</sup>

<sup>13</sup> HQ Air Combat Command Langley Air Force Base, Virginia “Cold War Infrastructure for Air Defense: The Fighter and Command Missions, November 1999,” 76–77.

<sup>14</sup> Author’s site survey of the former Griffiss AFB Weapons Storage Area ADC storage section.

<sup>15</sup> Author’s Google Earth survey of former ADC bases in the continental United States.

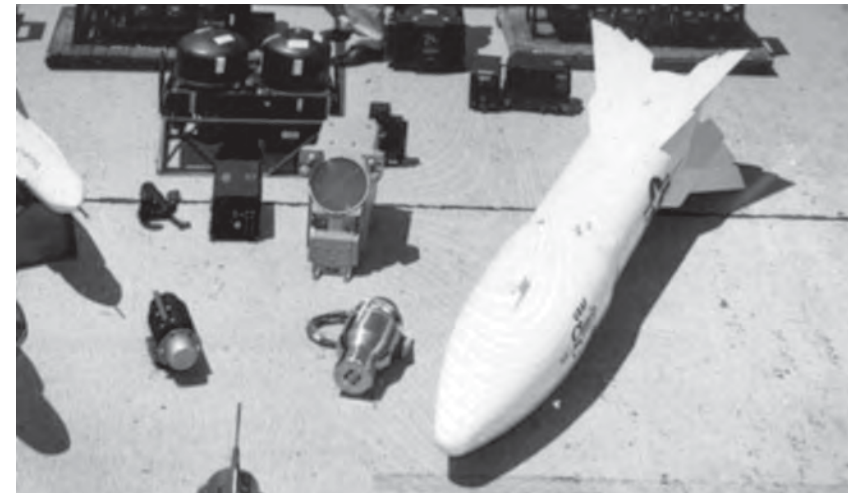
<sup>16</sup> FOIA, “ADC Historical Study No. 20, “Nuclear Armament: Its Acquisition, Control and Application to Manned Interceptors 1951–1963.” See also Bill Green, *The First Line: Air Defense of the Northeast 1952 to 1960* (Fairview: Wonderhorse Publications, 1994), 365.

One problem associated with MB-1 Genie storage in the MCMS structures related to the need to protect the rocket's propellant from freezing. Early MCMS buildings had to be modified with heating and temperature measurement systems. These changes were made at Goose Bay; Griffiss, NY; Glasgow and Grand Forks on the prairies; Duluth, Minnesota; and Loring and Dow in Maine. Later an electrical heating blanket system was incorporated into the MB-1 design which allowed the weapons to be "plugged in" in the bays and kept at optimum temperatures.<sup>17</sup>

Four interceptors at each base were kept on alert in a protected hanger, one pair with conventional weapons for identification flights, and a pair loaded with MB-1s in case of bomber attack. Once F-101B's took over from the F-89J's the Voodoos conducted identification flights while loaded with MB-1s.<sup>18</sup>

As for the Bomarc, the W 40 warhead was mounted in the missile airframe. Each site maintained 28 missiles. A separate warhead maintenance building had MCMS-like bays with space for eight warheads but it is unlikely that there were more than a pair of spare warheads per site. For the Bomarc sites located in the northeast, there appear to be no additional storage areas co-located with the missile coffin launchers.<sup>19</sup> The W 40 warhead was a more sophisticated system that had special maintenance requirements. It was a boosted Mk 28 warhead which required tritium gas to function and thus the gas had to be recharged from time to time as, it turned out, it prematurely aged.<sup>20</sup>

Nuclear weapons like the W 25 in the MB-1 and the W 40 in the Bomarc required second and third-line maintenance. Designed at the Los Alamos Scientific Laboratory and built at Burlington, Iowa and Pantex, Texas,<sup>21</sup> it is not clear where the intermediate storage facilities that the weapons were shipped to prior to deployment to the



This screen shot shows the MB-1 Genie. To the immediate left of the rocket airframe is the seldom-seen W-25 warhead. Note its relatively small size. In less than a decade nuclear weapons shrunk from the huge Fat Man devices to one capable of being launched from a fighter aircraft. [Author]

operational sites. Eventually, the 3079th Aviation Depot Wing of Air Material Command took custody of the warheads. This organization maintained operational storage sites co-located at five SAC bomber bases: Loring AFB in Maine (Site Easy); Ellsworth AFB in South Dakota (Site Fox); Fairchild AFB in Washington (Site George); Travis AFB in California (Site How); and Westover AFB in Massachusetts (Site Item).<sup>22</sup> These facilities usually catered to the SAC bomber force, but, as more bombers came on line and weapons got smaller, SAC dispersed to more bases, each with their own weapons storage area. Each of the original Operational Storage Sites contained in excess of twenty large storage "igloos," each capable of holding, for example, 40 to 50 B-61 gravity bombs. In other words, there was more than enough space to house transient W 25 and W 40 warheads in their 55-gallon-drum-like containers.<sup>23</sup>

Three transport squadrons that belonged to the 3079th Aviation Depot Wing transported the weapons. These were the 28th Air Transport Squadron (Special) at Hill AFB in Utah; the 19th Air

<sup>17</sup> Author's survey of Griffiss WSA. I'd like to thank Larissa Reise for pointing out the remains of the temperature control equipment. See also "ADC Historical Study No. 20, "Nuclear Armament: Its Acquisition, Control and Application to Manned Interceptors 1951-1963."

<sup>18</sup> Green, *The First Line*, 465.

<sup>19</sup> Author's site survey of the North Bay Bomarc site; Author's Google Earth survey of former Bomarc sites.

<sup>20</sup> Chuck Hansen, *US Nuclear Weapons: The Secret History* (New York: Orion Books, 1987), 220.

<sup>21</sup> Rebecca Ullrich, "Tech Area II: A History," Contractor Report SAND98-1617 Sandia National Laboratories, July 1998 pp. 11-12.

<sup>22</sup> See organization chart for 3079th Aviation Depot Wing, at <www.3084adg.us>.

<sup>23</sup> Author's survey of Operational Storage Sites EASY (former Caribou AFS) and ITEM (former Stony Brook AFS).

Transport Squadron (Special) at Kelly AFB, Texas; and the 7th Air Transport Squadron (Special) at Robins AFB in Georgia. Each squadron was equipped with 15 modified C-124 Globemaster II four-engined wide-body transports, manned by specially-trained crews who could protect the weapons and stow them so “as not to create an incipient radiation problem amongst the weapons radioactive materials.”<sup>24</sup> The 3079th Aviation Depot Wing was disbanded in 1962 and the three Air Transport Squadrons (Special) became “Logistics Support Squadrons,” retaining their original numerical designations. The three squadrons were then concealed within the 62nd Air Transport Wing (Heavy) to lower their profile as there were some 400 other C-124 aircraft in the USAF’s airlift inventory.

By 1960, the system for handling nuclear weapons was mature and there was regular traffic between the production facilities, storage sites, and interceptor squadrons. At this time the F-89J was replaced with the F-106A Delta Dart and F-101B Voodoo. The F-106A carried one MB-1 Genie and a new missile, the Falcon GAR-11, also nuclear capable. The F-101B carried two MB-1 Genies.<sup>25</sup> The nuclear Falcon could be loaded five to a cell in the Multi-Cubicle Magazine Storage buildings which meant that one building could house one squadron’s worth of these weapons.<sup>26</sup>

#### FROM ARROW TO VOODOO, 1958–60

The RCAF still had its CF-100 force deployed but with conventional armament, the chances of successfully engaging Soviet bombers were low. NORAD doctrine focused on fighting the air battle as far north and away from population centres and SAC bases as possible. The SAC base complex at this time included a line of bases from Montana to Maine, within 50 miles of the Canadian border. An agreement was struck so that US Air Force interceptors equipped with MB-1 Genies could operate in Canadian airspace under certain conditions.<sup>27</sup> The agreement stipulated that “[USAF] planes so armed will enter

Canadian air space only in the event an air defence warning yellow or red is declared. In such an event the USA planes will confine their activities in the main to Canadian territory bordering the Great Lakes and extending northwards to about 50 degrees north latitude.” MB-1 equipped interceptors “will be authorized by the Canadian government to land or take off from Canadian bases in the territory over which they have to operate.”<sup>28</sup> This was an interim measure until the CF-105 Arrow squadrons, equipped with nuclear weapons, became available.

The need for Canadian access to nuclear weapons was bolstered by a 1958 NORAD threat assessment. The predominant scenario consisted of “two types of attacks against this continent – in 1960 the attack will be a manned attack by infiltration to achieve surprise aimed at the strike force of SAC. This will be followed within 8 to 24 hours by a mass raid over the North Pole of again manned bombers against both SAC bases and centres of population.” It was understood in NORAD after Sputnik that missiles would become the preeminent strategic weapon, but not before 1965. After that, the “threat is envisaged as a surprise attack by ICBM’s attacking primarily SAC bases and missile sites, followed again by a mass raid of manned bombers over the Pole.”<sup>29</sup> NORAD envisioned a layered air defence consisting of manned fighters, area defence missiles, and point defence missiles.

Within weeks of the 1958 NORAD threat assessment, the Canadian Chief of the Air Staff, Air Marshal Hugh Campbell, requested a study of RCAF nuclear weapons requirements. The focus of the study was on MB-1 weapons and the CF-105. The study posited two to four MB-1s per Arrow for a total of 560 to 1000 MB-1s.

Other nuclear weapons for which the RCAF will have a requirement if present air defence proposals are approved are Bomarc and perhaps a nuclear warhead [for] Sparrow II or a GAR 1Y air-to-air guided missile with a nuclear warhead. The total number of Bomarc missiles is 120 though no decision has been taken as to whether all of these will have nuclear warheads.<sup>30</sup>

<sup>24</sup> <www.usaf-nav-history.com/Stories/nucnavs.html> “Air Transport Nuclear Navs.”

<sup>25</sup> Marcel Size Knaack, *Post-World War II Fighters 1945–1973* (Washington DC: Office of US Air Force History, 1986), 150–154, 208–221.

<sup>26</sup> FOIA, “ADC Historical Study No. 20, “Nuclear Armament: Its Acquisition, Control and Application to Manned Interceptors 1951–1963.”

<sup>27</sup> Maloney, *Learning to Love the Bomb*, 64–65.

<sup>28</sup> LAC RG 24 vol.112 096 107.4.v.1, 22 February 1957, “message CANAIRHED to CANAIRDEF.”

<sup>29</sup> DHH, The Max Hendrick Papers, Daily Diary, 30 May 1958.

<sup>30</sup> ATI (25 July 1958) Aide Memoire for Chief of the Air Staff, “Requirements for Nuclear Weapons.”

The CF-105 project was cancelled in February 1959. At that time the American Bomarc were slowly becoming available. The first F-106A squadron deployed to Gieger AFB in Washington in May 1959 with a rapid build up to 275 aircraft by late 1960. The first F-101B squadron stood up at Otis AFB in Massachusetts on 5 January 1959, with 17 squadrons deployed by December 1960.<sup>31</sup> With no CF-105 and thus no nuclear capability, Canada was essentially defended by American. The Diefenbaker government's inability to accept that Canada needed nuclear weapons to maintain sovereignty led to a variety of policy gyrations that substantially delayed the proper force structure and participation in the NORAD air defence plan.<sup>32</sup>

After the CF-105 cancellation, the Eisenhower administration took steps to request that nuclear weapons be stored at Goose Bay and Stephenville for the USAF F-106A squadrons operating there.<sup>33</sup> This played into the rapidly building policy morass and slowed progress down on all fronts as anti-nuclear elements in External Affairs generated linkage between those weapons and an existing Goose Bay storage issue relating to Strategic Air Command dating back to 1950.

Air defence commanders on both sides of the border, who were dealing with real threats generated by an decreasingly stable global environment over Berlin, met to have discuss a 'cross servicing policy' between the USAF ADC and the RCAF ADC. These arrangements permitted "the recovery and turn-around of USAF ADC aircraft at RCAF stations."<sup>34</sup> Nothing was mentioned regarding weapons and armament but the implications of this precautionary measure are obvious in light of the previous 1957 MB-1 overflight arrangement.

Eventually the Diefenbaker government agreed to acquire the F-101B Voodoo in March 1961. In the interim, however, there were discussions regarding the aircraft's nuclear capability and Canadian requirements. The RCAF was prepared to establish five F-101B Voodoo squadrons with 60 aircraft. A total of 312 MB-1s were required to

equip this force "based on a USAF formula of 2.6 sorties per aircraft with 2 MB-1s being carried per aircraft."<sup>35</sup>

The issue now revolved around the Diefenbaker government's policy backtracking on nuclear weapons. Believing that Canada could punch above her weight and play a role in global disarmament talks, elements in the government convinced the Prime Minister to not agree to sign the necessary agreements with the United States to access nuclear weapons for Bomarc and other systems.<sup>36</sup> At the same time, however, Cabinet agreed to initiate those negotiations, stipulating that "preparations should continue to enable the Canadian forces to have the vehicles, missiles, bases, training and other requirements to enable them to be ready to use nuclear weapons to be acquired from the United States under joint control arrangements if and when the adoption of these weapons is considered necessary."<sup>37</sup>

The RCAF was now confronted with mounting a crash programme to accept the CF-101B Voodoo and the Bomarc into its force structure. It was not simply a matter of taking possession of 60 aircraft and 60 missile airframes. They needed bases, maintenance programmes, communications and command and control systems. As nuclear weapons were integral to their operational capability, the specialized aspects of these three elements needed to be understood. Unfortunately, access to the specifics of that American information was not possible without a signed agreement. The RCAF was forced to use all of its resources to develop what amounted to speculation about what was required in these three areas for the interceptors to be nuclearized if the government signed off on the agreement. This took place while trouble was again brewing over Berlin.

#### **RCAF NUCLEAR WEAPONS: THE GROUNDWORK, 1961–62**

The last half of 1961 was a scramble to integrate the CF-101B's and Bomarc into the RCAF. Within days of the decision to acquire the Voodoos, the chief of the air staff was informed that "Agreement on

<sup>31</sup> Knaack, *Post-World War II Fighters 1945–1973*, 150–154, 217–218.

<sup>32</sup> Again, this is discussed in great detail in the author's *Learning to Love the Bomb: Canada's Cold War Strategy and Nuclear Weapons 1951–1970* (Dulles: Potomac Books, 2007).

<sup>33</sup> DHH Raymont Collection, file 996, message External Ottawa to Washington DC, "Storage of Defensive Nuclear Weapons at Goose Bay and Harmon Air Force Base."

<sup>34</sup> DHH file 79/429 vol.10 (19 Feb 1960) AMTS Divisional Items of Interest.

<sup>35</sup> ATI (3 November 1960) COR to VCAS, "Aide Memoire RCAF Requirements for Nuclear Weapons."

<sup>36</sup> ATI (25 November 1960) message External Ottawa to Washington DC, "Acquisition of Nuclear Weapons."

<sup>37</sup> ATI (6 December 1960) Record of Cabinet Decision, "Nuclear Weapons Policy."



a basic plan for positioning warheads on RCAF Bomarc bases was reached between the USAF and RCAF in March 1961 and has been the basis of RCAF and USAF preparatory actions.” That led to advanced movement with the US Air Force Special Weapons Center to implement nuclear command and control systems in North Bay.<sup>38</sup> This “working agreement” passed some but not all information on “minimal control, custody and security requirements” for the Bomarc bases so they could be constructed.<sup>39</sup> It was “recommended that agreement and approval of the technical specifications and programme implications be pursued through channels now existing between the Bomarc System Project Office [section redacted].”<sup>40</sup> Indeed, as the Air Member for Technical Services noted later, “You will recall that this type of information in respect of Bomarc was obtained in the form of a draft annex to the Bomarc Operational Employment Plan. This annex, incidentally, contains much more than construction information and is in effect the technical agreement or technical agreement that would be concluded as a supplementary agreement to any general agreement on the acquisition of nuclear weapons by the RCAF.”<sup>41</sup>

One important item in the back channel was the specifications for the Bomarc warhead security and maintenance building. The detailed aspects of this structure gave away a lot of Restricted Data information on the warhead itself,<sup>42</sup> so what was passed to the Canadians was a sketch labeled “Floor Plan for Canadian Ordnance Facility.”<sup>43</sup> This crucial piece of information allowed a head-start on construction.

Long line communications were established between the two Canadian Bomarc sites and facilities in the United States. The La Macaza site was connected to the NORAD SAGE Direction Center in Bangor, Maine. The North Bay site was connected to a similar site



The Douglas MB-1 Genie served for nearly twenty years as Canada’s main nuclear air defence weapon. [National Museum of Nuclear Science and History]

located in Sault Ste. Marie, Michigan. Most important, the North Bay site established a “logistics circuit” with Griffiss Air Force Base in Rome, New York.<sup>44</sup> The estimate was that in two weeks data could flow between North Bay and the Sault Ste. Marie Direction Centre once everything was hooked up.<sup>45</sup> At the same time there was a meeting at Hill Air Force Base, Utah to finalize the Bomarc logistics support plan.<sup>46</sup>

Air Marshal Hugh Campbell, however, was agitated about the lack of access to warheads “in view of the circumstances ... as well as the dangerous international situation we now face.” He was blunt with Minister of National Defence Douglas Harkness: “On or about 1 May 62 the North Bay Bomarc squadron will be fully operational if warheads have been provided. If no warheads are available this unit will be useless.” As for the CF 101B, “Without its nuclear armament [line redacted] From an over-all North American point of view, the destruction of any number of bombers short of their targets would be worthwhile, but nevertheless the situation is unsatisfactory in that the kill [line redacted]. This is clearly a waste of a most expensive

<sup>38</sup> ATI (11 October 1961) memo to CAS, “Lead Times-Nuclear Weapons Systems.”

<sup>39</sup> ATI (11 April 1961) memo to CCE, “Bomarc-Facilities Related to Installing Nuclear Warheads at North Bay and La Macaza.”

<sup>40</sup> ATI (7 April 1961) CAS to Air Member CJS(W) “Bomarc-Facilities and Support for Nuclear Warheads.”

<sup>41</sup> ATI (24 November 1961) memo AMTS to CAS, “Nuclear Weapons-CF101B.”

<sup>42</sup> This conclusion is based on the author’s survey of the North Bay Bomarc site, specifically the warhead maintenance building. The markings on the walls alone convey what would have been Atomic Energy Commission Secret-Formerly Restricted Data.

<sup>43</sup> Sketch acquired under ATI.

<sup>44</sup> DHH file 79/429 vol.10 (14 April 1961) Divisional Items of Interest.

<sup>45</sup> DHH file 79/429 vol.10 (28 April 1961) AMTS Divisional Items of Interest.

<sup>46</sup> DHH file 79/429 vol.10 (21 April 1961) AMTS Divisional Items of Interest.

interceptor and therefore patently unpalatable to the [line redacted].” Campbell was likely referring to the high probability of destruction of the interceptor and its crew if they tried to shoot down a Soviet bomber loaded with barometrically-fused nuclear weapons, and then detonated by some form of ‘dead hand’ system as the aircraft lost altitude.<sup>47</sup>

But where should the incoming CF-101B’s be based? And what special facilities were needed for handling MB-1 Genies, if Canada got access to them? With the Bomarc sites under construction, the RCAF refocused on the Voodoo problem. The Director of Armament Engineering was told that the Voodoo bases “from which it is intended to scramble the aircraft with nuclear weapons aboard” were Comox, BC; North Bay; Uplands (Ottawa); Bagotville and Val d’Or, Quebec; and Chatham, New Brunswick.<sup>48</sup>

In July 1961, a USAF mobile training team came to RCAF Station Uplands two days before the first CF-101B’s were supposed to arrive. USAF transport aircraft from Hill AFB brought spare parts while another aircraft from Griffiss AFB delivered “loose equipment.”<sup>49</sup> USAF personnel from Hill AFB arrived at Uplands and North Bay to discuss details of various procedures. Word arrived that Bomarc missiles for 446 Surface-to-Air Missile Squadron in North Bay would come off the production line in October. Boeing technicians installed them on 24 November 1961.<sup>50</sup>

Meanwhile, NORAD asked RCAF Air Defence Command to do its utmost to achieve “increased effectiveness during the present period of tension” in the fall of 1961 as the Berlin Crisis got worse and the Soviets airdropped and detonated the largest thermonuclear weapon ever conceived.<sup>51</sup> On 12 October, 11 CF-101B’s arrived in Canada, some months later than originally scheduled. RCAF pilots, some of who were already training with US Air Force F-101B squadrons, started to work up the newcomers at Namao. RCAF C-130 and C-119 transports flew to American sites and airlifted material for the CF-101B programme to RCAF Station Comox.<sup>52</sup> RCAF Station Uplands

finally received its first CF 101B Voodoos in December. RCAF transports also picked up 85 conventional GAR 2A missiles from the Hughes plant in Tucson, Arizona, and the six available aircraft were armed by 18 December.<sup>53</sup>

The lack of Quick Reaction Alert (QRA) areas and special ammunition storage (SAS) sites presented the main problem for the Canadian aircraft. The MB-1 required highly specialized security, communications, and maintenance facilities. The Bomarc project office was willing to bend the rules for the Canadians, but the RCAF did not yet have the same leverage for the CF-101B. Those back channels had to be activated all over again. The Air Member for Technical Services informed the Chief of the Air Staff that “we think we have enough information to undertake preliminary design of the buildings [but] our architectural staff has some unsatisfied queries.”<sup>54</sup>

The need to get the CF-101B force programme moving now outpaced Treasury Board’s ability to respond to the RCAF’s confused request for funds. Somehow, the funding priority for the SAS and QRA sites was allocated Category C instead of Category A. Category A included items like married quarters drainage at RCAF Station Moose Jaw. It took an irate Chief of the Air Staff’s intervention to right this error.<sup>55</sup> Indeed, Campbell ordered his staff to assemble a detailed case for presentation to the minister for the possibility of deploying MB-1 for the CF-101B’s at RCAF Station Uplands (Ottawa) in February 1962. This was labeled a ‘paper exercise’ to see what could be done and how long it would actually take. It was likely not a happy new year for the staff.<sup>56</sup>

### “EMERGENCY CONDITIONS”: SPRING 1962

While the RCAF beavered away, the anti-nuclear elements in the Diefenbaker government continued to delay the signing of the formal nuclear weapons agreement with the United States. While preparing

<sup>47</sup> ATI (8 May 1961) lett CAS to MND, “Lead Times-Nuclear Weapons System.”

<sup>48</sup> ATI (23 June 1961) memo, Acting DarmEng to DAProg.

<sup>49</sup> DHH file 79/429 vol.10 (21 July 1961) AMTS Divisional Items of Interest.

<sup>50</sup> DHH file 79/429 vol.10 (15 September 1961) AMTS Divisional Items of Interest; DHH file 79/429 vol.10 (9 December 1961) AMTS Divisional Items of Interest.

<sup>51</sup> DHH file 79/429 vol.10 (15 September 1961) AMTS Divisional Items of Interest.

<sup>52</sup> DHH file 79/429 vol.10 (20 October 1961) AMTS Divisional Items of Interest;

DHH file 79/429 vol.10 (3 November 1961) AMTS Divisional Items of Interest.

<sup>53</sup> DHH file 79/429 vol.10 (9 Dec 61) AMTS Divisional Items of Interest; DHH file 79/429 vol.10 (15 December 1961) AMTS Divisional Items of Interest.

<sup>54</sup> ATI (24 November 1961) memo AMTS to CAS, “Nuclear Weapons - CF101B.”

<sup>55</sup> ATI (21 November 1961) memo CAS to VCAS, “Nuclear Weapons - 101B.”

<sup>56</sup> ATI (29 December 1961) memo D/VCAS to DPIM, “RCAF and Nuclear Armament.”

material to for the chairman of the chiefs of staff committee, Air Chief Marshal Frank Miller, to make the case to Minister of National Defence Douglas Harkness, Campbell suddenly realized that “somebody might mention to the Minister the possibility of nuclear warheads for both the Bomarc and the MB-1s remaining in storage at selected points [line redacted] to be available for deployment to Canada under emergency conditions only.”<sup>57</sup>

The acting Vice Chief of the Air Staff dismissed the problem, asserting that “We all know that there would be an unacceptable time requirement in doing this, but the CAS wishes it to be spelled out.”<sup>58</sup> And it was. Campbell explained to Miller that there were several factors in providing Bomarc with nuclear warheads. All nuclear warheads were individually numbered and under the control of the Atomic Energy Commission and subject to their rules, regulations and safety procedures. Additionally, there were only two special transport squadrons to move weapons around so it would take ninety days for the Bomarc sites to be ready.<sup>59</sup> Most important:

It is obvious that the technicians who handle and fuse the atomic warheads must be very highly trained and their skills must be kept up to date through constant practice at live sites. During an emergency in which the Air Defence forces of North America might be involved these people would be in great demand by the USAF. We could hardly expect the United States under such conditions of national alert to consent to an arrangement as outlined the provision of the necessary personnel and air transport capability on a standby basis without positive assurance they would be able to perform a useful military function would only tend to degrade, if not weaken the USAF effort.<sup>60</sup>

Campbell concluded that “the separation of the nuclear warheads from their vehicles by any great distance is simply not acceptable as a military operation.”<sup>61</sup>

<sup>57</sup> ATI (22 January 1962) memo AVCS to CplansI, “Nuclear Weapons.” The ridiculously redacted line is “in the USA.”

<sup>58</sup> Ibid.

<sup>59</sup> DHH Raymont Collection file 303, (16 February 1962) memo CAS to CCOS, “Acquisition of Nuclear Weapons-Bomarc.”

<sup>60</sup> Ibid.

<sup>61</sup> Ibid.

Yet, did the RCAF explore the options with their counterparts? From the available sources, the answer is no. And they had their information on the special air transport squadrons wrong: there were three of them, not two. What is clear is that Campbell and Miller did not want to give the Diefenbaker government an easy, but risky, way out of the dilemma the politicians themselves created.

### **NUCLEAR INFRASTRUCTURE FOR THE VOODOOS, 1962**

The 1961 list of potential operating locations for the RCAF Voodoos remained in play until better information on where the squadrons fit into NORAD planning became available. The first issue related to the Quick Reaction Alert (QRA) facilities. A QRA facility consisted of a pair of hangers connected by living quarters for the pilots and ground crew situated on a special concrete extension attached to the runway of an air base or airfield. The size of these facilities depended upon the level of alert deemed necessary and feasible to react to a Soviet air threat.

NORAD determined the capacity for the new Canadian QRA facilities. Each squadron assigned to NORAD had to maintain a pair of interceptors equipped with non-nuclear weapons on five-minute alert for an identification sortie. This was usually a “peacetime” event. There were then three alert levels: Alpha, Bravo and Charlie. Alpha, the normal level of alert, called for a pair of nuclear-armed aircraft on 15 minute alert. Bravo had six nuclear-armed aircraft on 15 minute alert. Charlie, or maximum alert, placed all combat-ready aircraft on five minute alert. At that point the existence of the QRA facility was moot. Canadian requirements, therefore, were determined to be a shelter for a pair of aircraft on 15-minute alert with “hard stands” for four aircraft on fifteen minute alert.<sup>62</sup>

In practice, the distinctive “Y” shaped hardstands were equipped with four enclosed shelters, each of which contained a pair of CF-101B’s, two conventionally-armed for identification sorties and two with MB-1’s, plus additional ramp space for the Bravo-level aircraft.<sup>63</sup>

<sup>62</sup> ATI (24 January 1962) memo A/VCAS to AMTS, “Nuclear Weapons - CF101B Aircraft.”

<sup>63</sup> Author’s site survey of former RCAF QRA facilities at North Bay and Uplands.

QRA facilities were located at Comox, North Bay, Uplands, Bagotville, Val d'Or, St. Hubert and Chatham.<sup>64</sup>

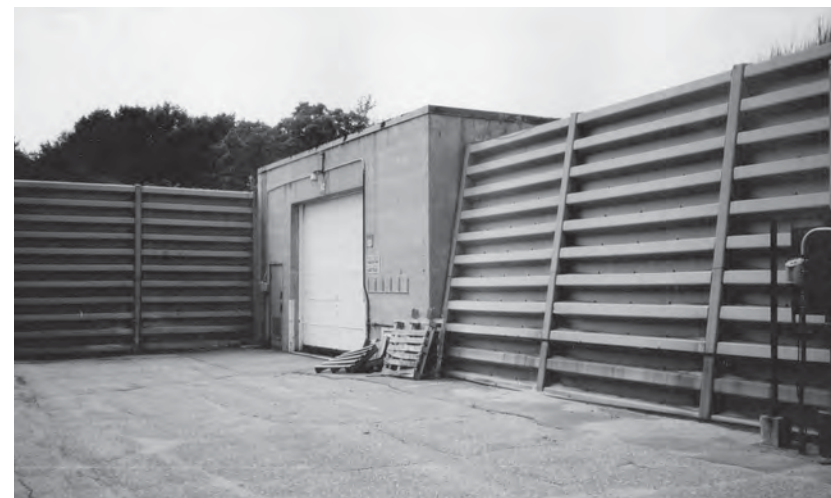
The RCAF at this juncture was still sorting out the operational concept, which was very different from that for the CF-100. In the new scheme, there were going to be five CF-101B squadrons deployed as follows:

- 409 Squadron: Comox
- 410 Squadron: Uplands
- 414 Squadron: North Bay
- 416 Squadron: Chatham
- 425 Squadron: Bagotville

In January 1962, the RCAF concluded that “The location of Uplands, in a major Canadian target area, precludes its use as a base for CF-101B aircraft immediately [if] war is imminent or has commenced.”<sup>65</sup> What to do? There was Val d'Or, an austere remote forward operating location in central Quebec. Establishing facilities for a whole squadron and its personnel and dependents would be an ambitious and costly undertaking. The pressure, however, was on to get proposals through Treasury Board so QRA facilities and special ammunition storage sites were programmed for both Uplands and Val d'Or.

The next hurdle was the nature and layout of the SAS sites. Here the US Atomic Energy Act and the lack of a government-to-government agreement stymied the RCAF. Like the Bomarc sites, warhead maintenance had to be carried out by an American custodial detachment in a secure facility. RCAF attempts to activate back channels similar to those used for the Bomarc warhead maintenance building became problematic in 1962, but not for reasons of secrecy.

The drawings for the existing standard USAF Multi-Cubicle Magazine Storage (MCMS) buildings were duly delivered to RCAF architects and engineers sometime before May 1962. The Canadians learned on the back channel, however, that the MCMS was now considered obsolete and there were safety concerns. A new design was winding its way through the labyrinthine bureaucratic bowels of the



A Special Ammunition Storage facility was constructed at RCAF Station North Bay and was earmarked for use during the Cuban Missile Crisis in 1962. [Author]

Defense Atomic Support Agency and Joint Services Explosives Safety Board in the United States. The new design was not approved yet and its dimensions were still classified as Formerly Restricted Data.<sup>66</sup>

In effect, the Americans were changing the standard at exactly the time that the RCAF was in the process of implementing SAS sites. But Canada could not obtain the latest essential information because the Diefenbaker government continued to stall on the agreement that would give them detailed access. This state of affairs led to a construction anomaly at RCAF bases associated with CF-101B operations. The first two bases expected to get Voodoos were Uplands and North Bay. Using what information they had, RCAF engineers constructed special ammunition storage sites at both bases. These were unique Canadian-designed facilities. The Uplands SAS had two large rectangular bunkered magazines and a smaller bunker with five door-bays, each large enough to contain two Genie MF-9 trailers. The fourth building was a missile maintenance building equipped with drive through doors, a second large bunkered room, and a large

<sup>64</sup> Author's survey of former QRA sites using Google Earth.

<sup>65</sup> ATI (24 January 1962) memo A/VCAS to AMTS, “Nuclear Weapons-CF101B Aircraft.”

<sup>66</sup> ATI (14 June 1962) memo D/AMTS to CCE, “CF101B Program-QRA and SAS Special Armament Facilities”; (17 May 1962) CCOS to CCJS(W), “CF101B Program-Arrangements for Special Weapons.” See also ATI (8 June 1962) message CANAIRWASH to CANAIRHED, “Special Purpose Explosive Storage.”



rail system for moving larger heavy objects from the drive-through area to the large room. The North Bay site possessed only the two rectangular magazines and it appears as though construction was halted before the other two structures could be built.<sup>67</sup>

While the North Bay and Uplands facilities were under construction, however, the planning on where Val d'Or fit into the operational scheme was finalized. Val d'Or, with its forward location, was ideally suited to taking on the brunt of any air attack directed at the target complexes in the "Niagara Triangle." The initial idea was to maintain a pair of CF-101B's on alert with minimal first-line maintenance until proper SAS facilities could be completed.<sup>68</sup>

The follow-on concept looked towards maintaining a Voodoo squadron at Uplands and then deploying it to Val d'Or on an alert to augment the alert aircraft stationed there. By July 1962 this concept solidified whereby squadrons at North Bay and Uplands would share this commitment. The Val d'Or alert aircraft would handle identification flights with no MB-1s aboard. Whatever squadron was not providing the identification aircraft would maintain four aircraft on 15 minutes alert loaded with MB-1. Once the SAS facilities were built at Val d'Or, four would be on alert there, while four Voodoos would remain on nuclear alert at either North Bay or Uplands.<sup>69</sup>

## DEADLOCK, 1962

The Diefenbaker government's indecision on signing the warhead access agreement was starting to wear on the RCAF leadership by the late summer of 1962. This was "an impossible situation," according to Air Commodore E.M. Reyno, in a long letter to the Vice Chief of the Air Staff:

One of the principle reasons why the Government will not agree to accepting special weapons, rightly or wrongly, is that there is a large body of public opinion in Canada which wants Canada to remain out

of the "nuclear club." This group opinion will be respected even more in the future because of the Government's current minority opinion in the House.<sup>70</sup>

Reyno wanted to mount a publicity campaign to counter this thinking with facts. The weapons were defensive in nature, air defence was part of the deterrent system, and "The only means of destroying an enemy bomber with a load of special weapons on board and without subjecting ourselves to fall-out danger is to 'cook' it with a nuclear weapon high in the air."

Reyno's frustration echoed that of the rest of the RCAF:

We have sat with the present situation long enough in my opinion, and in spite of the fact that some of the best military writing I have ever seen has gone forward to the Cabinet on behalf of the cause and we are even worse off now than we were five years ago – because people are laughing at us now because we have carriers but no weapons.<sup>71</sup>

Reyno told his superiors:

[I] know the CAS discussed 'Defensive Weapons' with the Minister but the publicity campaign idea didn't catch on. The former CAS wouldn't buy the idea we should help the gov't out of a dilemma of its own making, I still think we should.<sup>72</sup>

Campbell approached Harkness on the issue on 19 August 1962 and argued that, "the best one might hope for would be an eventual agreement that would involve storage of the warheads in the United States, for transfer to Canada in an emergency."<sup>73</sup> Campbell emphatically noted that Canada "must also be prepared to consider returning the Bomarc and F-101B interceptors to the United States and, in effect, turning over the air defence of Canada to [section redacted]."<sup>74</sup> The redacted section likely referred to American Air Defense Command's interceptors.

<sup>67</sup> Author's survey of former SAS facilities at CFB North Bay and Ottawa International Airport.

<sup>68</sup> ATI (21 August 1962) DAPorg to DCE, "Nuclear Weapon Planning - Val d'Or."

<sup>69</sup> ATI (26 July 1962) CAS to AOC ADC, "Operational Posture Location of 410 Squadron."

<sup>70</sup> ATI (1 August 1962) memo A/VCAS to VCAS "Acquisition of Nuclear Weapons."

<sup>71</sup> Ibid.

<sup>72</sup> Ibid. See minute #7.

<sup>73</sup> ATI (10 August 1962) CAS to MND, "Nuclear Weapons for Air Defence."

<sup>74</sup> Ibid.



There were potentially lethal dangers associated with an emergency "just in time delivery" policy. This is the remains of a US Air Force C-124 Globemaster II transport carrying three Mk 39 bombs that crashed near Barksdale Air Force Base in 1959. [National Museum of Nuclear Science and History]

Air Marshal Miller provided a detailed treatise to Harkness that remains unavailable to the public. In effect Miller explained that "Such a belief must, it would seem, be based on the idea that there is nothing basically different in the handling procedures required for a nuclear warhead as compared say, to an artillery shell.... This, of course is not the case." Miller implies that emergency airlift "could be dangerous to our own forces or population."<sup>75</sup>

The main issue in a "just in time" emergency delivery scenario, Miller explained, was time. "[A]n attack could come at anytime and with little warning, possibly as little as one hour or even less." As a result, "it is the opinion of the Chiefs of Staff that storage of the warheads on other than the bases from which they would be used does not make military sense [paragraph redacted]." In the strongest possible language, Miller asserted "The possession of the carriers without the armament to exploit them properly weakens the entire North American defence system and also exposed Canada and the Canadian armed forces to ridicule."<sup>76</sup>

<sup>75</sup> Ibid.

<sup>76</sup> Ibid.

In the wake of this impasse, the Air Council unilaterally decided to make six CF-101B's of the Operational Training Unit at RCAF Namao (Edmonton) "combat ready." Should they tell the Chiefs of Staff Committee first and wait for the government to sign the access agreement? Or should they get COSC approval, and then make a "formal application to the US Air Force under the canopy of the existing Cabinet directive respecting the preparedness of nuclear weapons systems?" Six CF-101B's were placed on a "Ready" status.<sup>77</sup>

At the same time, ten Bomarc missiles arrived at La Macaza on 15 September and communications and integration tests were underway between La Macaza and the Bangor Air Defence Sector's SAGE computer. 425 Squadron assumed NORAD alert status on 1 October while 414 Squadron was in the process of redeploying to North Bay. This was on the eve of the Cuban Missile Crisis.

#### **THE CUBAN MISSILE CRISIS AND EMERGENCY ACCESS**

The details of Canada's response to the Cuban Missile Crisis are available in two other works.<sup>78</sup> For our purposes however, this section focuses on the issue of the air defence system's readiness. On 24 October, deputy commander-in-chief NORAD, Air Chief Marshal Roy Slemon, contacted RCAF Air Defence Command and informed them that CINC NORAD, wearing his American "hat" placed the American component of NORAD, the Continental Air Command and thus US Air Force Air Defense Command at Defence Condition (DEFCON) 3, weapons status Delta. Wearing his coalition command "hat" he now asked Canada for three things: to please move the RCAF ADC status to the equivalent level of alert; disperse the interceptor force; and that "NORAD should be allowed to bring in nuclear weapons if necessary into Canada and start the arming process."<sup>79</sup> As Slemon later recounted,

It was obviously vital to take preventative action before the Cuban missiles became operational with nuclear warheads, the timing of

<sup>77</sup> DHH file 76/264 (29 August 1962) Air Council Minutes.

<sup>78</sup> Peter Haydon, *The 1962 Cuban Missile Crisis: Canadian Involvement Reconsidered* (Toronto: CISS, 1993) and Maloney, *Learning to Love The Bomb*.

<sup>79</sup> Hendrick Papers, "Conversation between VCAS and AOC ADC, October 25 1962."

which was exceedingly difficult to determine or forecast precisely. If the missiles had become operational, it takes little imagination to visualize the blackmail, pressures and threats to which we all would have been subjected.... Foremost in the minds of all of us, or course, was the real danger that the Russians, when suddenly confronted openly with the knowledge that their big Cuban venture was collapsing, might, in frustration, react in some lunatic manner against the North American continent. This grave possibility demanded that our NORAD defences be readied.<sup>80</sup>

Miller met with Diefenbaker, Green, and Harkness. “They didn’t even touch the question,” according to a report of the meeting, “they just looked at it and bowed away from the question of nuclear tips.” Miller contacted Slemon at NORAD HQ in Colorado and told him “we really didn’t go anywhere on that.” Miller recommended that CINC NORAD put in a request to the Canadian government “to allow the arming of the F-102 squadron at Goose Bay with GAR 11’s and a detachment at Harmon” to “introduce the subject.” An official request arrived in minutes.<sup>81</sup>

The Chiefs of Staff Committee met with Harkness. Campbell suggested that more and better information on how quickly the Bomarc and CF-101B’s could be armed be acquired. During that time the DEFCON in the United States changed to DEFCON 2 for Strategic Air Command and certain naval forces. Harkness went to Diefenbaker who reluctantly agreed to place Canadian air defence forces on the equivalent of DEFCON 3.<sup>82</sup>

After further communication, Slemon “at his own initiative called up about an hour later” and told the RCAF leadership that the fastest way of arming was to have the RCAF CF-101B’s “come down and be armed at American bases. We could do that, and we think it could be done quite quickly.”<sup>83</sup> Slemon relayed American concerns that “to put a capability up in Canada of arming them up on Canadian bases would take a great deal of work because the key problem would be the training of the technicians.” As for the Bomarc, “they reckoned

<sup>80</sup> DHH Raymont Collection file 2503, “Extract from Personal Letter 3 March 1965 from Air Marshal Slemon to General Foulkes.”

<sup>81</sup> Hendrick Papers, “Conversation between VCAS and AOC ADC, October 25 1962.”

<sup>82</sup> NAC MG 32 (B19) Vol.57, Douglas Harkness, “The Nuclear Arms Question and the Political Crisis Which Arose from It In January and February 1963.”

<sup>83</sup> Hendrick Papers, “Conversation between VCAS and AOC ADC, October 25 1962.”



This is a CF-101B in a Quick Reaction Alert facility equipped with Falcon air-to-air missiles sometime in the early 1960s before MB-1 Genies were stored in Canada. [Department of National Defence]

that within six days of any starting time zero they could have half a squadron capability and within nine days the Bomarc squadron could fully operations for nuclear tips.”<sup>84</sup>

At some point after this temporary MB-1 storage areas were delineated at CF-101B bases, though these weapons were not deployed to them from American storage sites. As for the Bomarc, a number of W 40 warheads were flown into North Bay on USAF C-124 transports and were mounted in the missiles but their full capability was not realized when the Cuban Missile Crisis wound down in late October.<sup>85</sup>

Badly shaken by the crisis, the Diefenbaker government ministers met and “unanimously agreed that we should at once reopen negotiations with the United States.” Cabinet decided that “For the weapons in Canada – the Bomarc and the CF-101s – we were to try to get an agreement under which the nuclear warheads, or essential

<sup>84</sup> Hendrick Papers, “Conversation between VCAS and AOC ADC, October 25 1962.”

<sup>85</sup> This information was provided to the author by Lieutenant-General A. Chester Hull.

parts of them, would be held in the United States but could be put on the weapons in Canada in a matter of minutes or hours.”<sup>86</sup>

Consulting with Slemmon in NORAD on 2–3 November while Strategic Air Command remained at DEFCON 2<sup>87</sup> and NORAD forces at DEFCON 3 Weapons State Charlie,<sup>88</sup> Chief of the Air Staff Larry Dunlap looked at the arguments before briefing Harkness and Green. The NORAD staff’s response on the Bomarc’s remains unnecessarily restricted today but for the CF-101B’s the staff concluded that:

by flying CF101 aircraft to selected USAF bases, uploading with MB-1s and flying back to Canadian bases in an operational configuration [is] a highly undesirable course of action to NORAD since it interferes with and reduces the alert posture and the already marginal capability for defence in depth; and could undesirably concentrate our limited forces at a time when survival Dispersal measures might be implemented.<sup>89</sup>

These measures assumed “that the RCAF is trained and provided with adequate equipment [redacted].” (This was likely related to the loading equipment for the weapons). CINC NORAD felt “strongly that the only posture which is justifiable is one that provides all Bomarc’s and all CF101s with an on-site quick reaction operational capability.” And, not incidentally when one was dealing with nuclear weapons, “crash action of the nature herein contemplated to provide nuclear capability to the RCAF forces will generate weapons handling risks greater than would be the case if Canadian policy now enabled weapons to be on site in properly constructed facilities at appropriate bases in Canada.”<sup>90</sup>

It is not clear how much Canadian military leaders or Canadian politicians knew in 1962 about the nature and extent of US Air Force experiences with nuclear accidents in the 1950s. During that decade there were 14 accidents involving bombers loaded with nuclear weapons

<sup>86</sup> NAC MG 32 (B19) Vol.57, Douglas Harkness, “The Nuclear Arms Question and the Political Crisis Which Arose from It In January and February 1963.”

<sup>87</sup> DHH Raymont Collection file 2503, (6 November 1962) memo CGS to dl “States of Readiness of US Forces.”

<sup>88</sup> DHH Raymont Collection file 2503, (5 November 1962) memo CGS to CCOS, “Military Measures Taken During the Cuban Crisis.”

<sup>89</sup> ATI (3 November 1962) message CINC NORAD to CANAIRHED, personal to Dunlap from Slemmon.

<sup>90</sup> Ibid.

or components and two accidents involving C-124’s belonging to the 3079th Aviation Depot Wing special transport squadrons carrying nuclear weapons and components.<sup>91</sup> Consequently, the American side of NORAD could speak with some authority on the dangers of hastily transporting nuclear weapons.

Dunlap briefed high-level Canadian officials during the first week of November. Emergency deployment “is a time consuming process. The timings I shall give you are based on the most ideal circumstances.” There was no existing training agreement: one had to be signed first “to provide the basis for the retraining and [redacted] so that these resources would be available on short notice for movement to North Bay and LaMacaza and to provide for the training of the RCAF element of the warhead loading crews” before “strategic or tactical warning.” Then “at some stage in the period of rising tension, a decision would have to be arrived at by the Canadian Government to request the nuclear warheads – this to be followed by an approach to the United States – this, in turn, by the issuance of instructions by the [lines redacted].”<sup>92</sup>

Dunlap asked the most important question:

How much time is required for a decision to invite the United States to send nuclear weapons to Canada? You are far better judges of that than I. Let me merely say that, under certain circumstances of the day or night [lines redacted] then to that you must add your estimate of the time for a decision. For the purposes of this brief I will assume that this total operation could be accomplished in 1 hour plus decision time.<sup>93</sup>

Then:

Once this action has been cleared, the US manpower and equipment would have to be marshaled, loaded into transport aircraft and [line redacted] which the nuclear weapons are to be drawn. This is a time-consuming process under the best of conditions, even assuming that airlift would be despatched without delay and that weather conditions

<sup>91</sup> Ibid.

<sup>92</sup> ATI (13 November 1962) memo CAS to dl, “Time Factors-Delivery of Nuclear Weapons” and attached paper, “Nuclear Warheads: Time Factors Concerned with Their Delivery.”

<sup>93</sup> Ibid.



are favourable ... and assuming that the air transport bases are within 30 minutes flying of the United States base where the nuclear load is earmarked.<sup>94</sup>

Unfortunately the documents describing the process and timings remain heavily redacted. Fortunately, however, Minister of National Defence Douglas Harkness explained in his papers that

The amount of warning time which could be counted on for a Russian air attack on North American was between two and three hours – thus to be satisfactory a system of delivery and installation of the nuclear warheads on Canadian weapons within two hours was essential. To accomplish this a large number of aircraft and hundreds of men would be required ... one which would seriously complicate the operation of the American bases where the warheads were held ... In addition of the weather conditions were bad, it might not work.<sup>95</sup>

Harkness concluded that

It was quite apparent that any such plan was impractical and far too costly and the only purpose it would serve would be to enable the Canadian Government to say no nuclear weapons were being held on Canadian soil. This, however, appeared to be Howard Green's chief objective and he insisted on going over the times, men involved, and all the other details at great length, evidently with the hope of convincing himself and others that it was a workable scheme.<sup>96</sup>

An American team “went back home to see what essential parts of the warheads, small in size, could be kept in the US and flown up in an emergency [they] returned with a variety of schemes along these lines which materially cut down the cost and improved the time, but it was clear that none of them would provide a really satisfactory solution.”<sup>97</sup>

<sup>94</sup> Ibid.

<sup>95</sup> NAC MG 32 (B19) Vol.57, Douglas Harkness, “The Nuclear Arms Question and the Political Crisis Which Arose from It In January and February 1963.”

<sup>96</sup> Ibid.

<sup>97</sup> Ibid.

Where were the weapons that were earmarked for Canadian bases stored? The American bases that had nuclear weapons storage and were within short flight range of Canadian bases were: Duluth; K.I. Sawyer; Kinchloe; Wurtsmith; Selfridge; Griffiss; Dow, and Loring. The chart depicts the estimated storage space and the aircraft types stationed at each base. The two bases that possessed notable excess storage capacity were K.I. Sawyer (at least 30 spaces for MB-1) and Griffiss (at least 60 spaces for MB-1). As for Loring it is unclear whether there were three, four, or six 30-bay structures. W 40 warheads, in their 55-gallon drum-like container, could easily be stored in any “igloo” bunker and did not require climate control. Griffiss, Wurtsmith, and Dow had this type of storage in location. Both Selfridge and Kinchloe operated F-106 squadrons, which may not have required all available 120 MCMS spaces.<sup>98</sup>

Out west the closest bases with nuclear storage to stations Comox, Cold Lake and Namao were Gieger and McChord in Washington; Glasgow and Great Falls, Montana; and Minot, North Dakota. A healthy candidate to supply Comox is Geiger Field, with five buildings and 150 spaces for a single F-106 squadron.<sup>99</sup>

### **RESOLVING THE PROBLEM, 1963**

In mid-November 1962, a US Air Force team inspected the La Macaza BOMARC site run by 447 SAM Squadron. This inspection “was completed successfully with no major discrepancies.”<sup>100</sup> By January 1963, the RCAF leadership determined that the BOMARC and CF-101B squadrons “can be made operational with nuclear weapons very readily” even though the formal access agreement was not yet signed.<sup>101</sup>

The new timelines for operational capacity were now 19 weeks for the Bomarc sites and “no less that twelve months and possibly as much as eighteen months” for the CF-101B force which was

<sup>98</sup> This is based on the author's survey of MCMS structures at former USAF ADC interceptor bases.

<sup>99</sup> Ibid.

<sup>100</sup> DHH file 79/429 vol.12 (16 November 1962) AMTS Divisional Items of Interest.

<sup>101</sup> ATI (18 January 1963) memo A/CAS to CplansI, “Nuclear Weapons: Time to Become Operational After Agreement Signed.”

“determined by either the construction time for the SAS and QRA facilities or [line redacted]” and the length of construction season.

The frustrations within NORAD were increasingly palpable as they re-assessed the events of October 1962. By April 1963 a request for acceptance of a fighter dispersal plan was mooted through lower level channels. This was not an emergency dispersal plan and the idea was to have nine squadrons deploy to Canadian air bases “on a continuing basis.”<sup>102</sup>

Such a request would have been anathema to the Diefenbaker government if they knew about it. At this point the relationship between Diefenbaker and Kennedy was non-existent. Diefenbaker’s behaviour towards Kennedy was so disproportionately poor that Kennedy frequently used profanity and Diefenbaker’s name in the same sentences to his advisors.<sup>103</sup>

In June 1963 Kennedy toured NORAD HQ where he was briefed by Slemmon. This included a 20-minute mock battle depicting an attack on North America. The threat was based on 90 ICBMs, 20–30 missile-launching submarines and 200 bombers with nuclear weapons:

It commenced with the cutting of the BMEWS [Ballistic Missile Early Warning System] Warning cable followed by a previous indication that the Soviet Long Range Air Force had been launched in large numbers and that there was an abnormal number of submarines concentrated on the Southern Coast of the United States. The first hostile act was the shooting down of an Early Warning aircraft of the Pacific barrier, the next was a BMEWS warning which built up rapidly but before impacts from these shots, which were aimed at all 4 quadrants could be realized there were nuclear explosions on both coasts presumed to come from submarines. As the battle built up the CinC contacted the Joint Chiefs War Room and the Ottawa War Room, reported the situation, indicated that he had increased his Alert to DEFCON 1, was flushing his fighters and asked for reaffirmation on the use of nuclear weapons. At the same time he advised SAC and CINCPAC [Commander-in-Chief Pacific] of the situation. The Joint War Room in the States and Ottawa replied confirming the Presidential decision and the Canadian Prime Ministers decision to carry on and at this point the Deputy CinC [NORAD] brought the regions into the picture authorizing them to flush

and use their weapons. (It was this play which showed the regions were not brought into the picture until some 4 minutes after the original BMEWS warning, the time being taken for this high-level consultation and validation). The next hostile review was penetration of the DEW Line in large numbers with a predicted arrival in the [Zone of Interior] of 2½ hours later. The exercise was then compressed in time by 3 hours and tracks were shown in large numbers along the Canada–US border entering all Sectors. Regions were asked to report their status which they did by telephone indicating that about ½ were operating from their ALCOPs [alternate command post] showing what losses they had of fighters on the ground and Bomarcs and NIKI [*sic* - NIKE] batteries to the nuclear attack and indicated that their success rate against the bombers was reasonable and that they had enough weapons to carry on. At this point the exercise was completed.<sup>104</sup>

CINC NORAD was “empowered to declare DEFCON 1 based on tactical evidence on the board and having done so he could declare objects hostile based on circumstantial evidence or upon having obvious hostile intent. Under the two conditions of DEFCON 1 and a declaration of an object as hostile he was authorized to shoot it down with nuclear weapons once it penetrated US air space that is within the 3 mile limit.”<sup>105</sup>

Given these timelines, the emergency measures discussed so feverishly in November 1962 would not have been feasible. The level of communications disruption brought on by the initial stages of an attack would have made initiation of the process unlikely. In addition, the flight characteristics of the C-124 Globemaster II must be taken into account. “Old Shaky” was a large, slow, four-engine propeller aircraft with a maximum speed of 300 miles per hour.<sup>106</sup>

The only alternative would have been to move warheads by air to sites during the build-up of an international crisis. However, a Privy Council Office assessment concluded that:

I believe that the crisis showed that it would have been very difficult if not impossible to obtain nuclear weapons for Canadian forces in

<sup>104</sup> Ibid.

<sup>105</sup> Ibid.

<sup>106</sup> C-124 data comes from Boeing at: <<http://www.boeing.com/boeing/history/mdc/globemaster.page>>.

<sup>102</sup> DHH file 79/429 vol.12 (26 April 1963) AMTS Divisional Items of Interest.

<sup>103</sup> DHH Hendrick Papers, ‘Presidential Visit to NORAD Headquarters, 8 June 1963.’

a period of anticipated imminent attack. The main difficulty is the reluctance to exacerbate a tense international situation and to alarm opinion in Canada and abroad by taking such a step, which would be widely understood as revealing that the Canadian Government had good reason to believe, perhaps on secret evidence, that war was imminence and unavoidable.<sup>107</sup>

During the course of Kennedy's NORAD visit, the Canadians reported:

there is some uncertainty as to exactly at what point the President authorizes the general use of nuclear defensive weapons against hostile objects. In practice DEFCON 1 would coincide with the general alerts which would arouse both the civil population would bring into play the retaliatory forces and course this would bring into play Presidential approval for the use of strategic defensive forces. It is inconceivable that DEFCON 1 would result in hostile action by Air Defence Command on its own and it is in this respect the system is interlocked.<sup>108</sup>

NORAD had to work around the problem. Until the agreement was signed in 1964, the plan called for deployment of 18 US Air Force F-101B's to Chatham, Bagotville, and North Bay when DEFCON 1 was declared. At the service level, "It was agreed between General Aghan and Air Marshal Harvey that in the event of a real flap aircraft would deploy north loaded and south unloaded and if time permitted there could be a ferry service using fighters to lift the weapons dependent solely on the ground handling equipment available on the Canadian bases. This plan would be a hip pocket plan and not put in writing."<sup>109</sup>

## CONCLUSION

By 1963 Special Ammunition Storage Sites were constructed at Comox, BC, Val d'Or and Bagotville, Quebec, and Chatham, New Brunswick. These new facilities replaced the multi-cubicle munitions

<sup>107</sup> DHH Raymont Collection file 2503, memo for Mr. Bryce, "Lessons of the Cuban Missile Crisis.

<sup>108</sup> Ibid.

<sup>109</sup> DHH Hendrick Papers, Daily Diary 28 February 1964.

storage buildings. There were two earth-covered buildings, each containing two rows of seven special lockers. The three sites each had approximately 28 lockers, storage for enough MB-1s to equip 14 aircraft in each RCAF CF-101B squadron.<sup>110</sup> The two Canadian Bomarc sites each had 28 missiles, with W 40 warheads uploaded onto the airframes and a pair of spare warheads stored in the warhead custodian's building. The W 40s arrived by USAF C-124 on the night of 3 January 1964. By 1965 US Air Force C-124s arrived and handed over the MB-1 rockets with their W-25 warheads to the 425 Munitions Maintenance Squadron detachments at the CF-101B bases. Emergency measures were, finally, no longer required.

In seeking to retain sovereignty, the Diefenbaker government compromised it. The decisions boiled down to undermining the larger deterrent system consisting of NORAD and SAC for domestic political consumption or accepting the technical and temporal realities of nuclear air defence. That this debate took place during the most dangerous nuclear crisis of the period seriously questions the Canadian government's competence. To have a nation's air defence effectively in the hands of a neighbour, even an ally, was too much for the professional military leadership, and ultimately the Canadian voting population, to stomach.

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## ABOUT THE AUTHOR

**Dr. Sean M. Maloney** is Associate Professor in History at Royal Military College of Canada and served as the Historical Advisor to the Commander of the Army for the war in Afghanistan. He previously served as the historian for 4 Canadian Mechanized Brigade, the Canadian Army's primary Cold War NATO commitment after the re-unification of Germany and at the start of Canada's long involvement in the Balkans. Dr. Maloney has extensive field experience in that region, particularly in Croatia, Bosnia, Kosovo and Macedonia from 1995 to 2001, where he inadvertently observed elements of the nascent Al Qaeda organization. His work on the Balkans was interrupted by the 9-11 attacks. From 2001, Dr. Maloney has focused nearly exclusively on the war against the Al Qaeda movement and its allies, particularly on the Afghanistan component of that war. He traveled regularly to Afghanistan from 2003 to 2011 to observe and record coalition operations in that country and was the first Canadian military historian to go into combat since the

<sup>110</sup> Author's survey of SAS facilities at Chatham, New Brunswick.

Korean War. He has authored twelve books, four of which deal with the Afganistan war, as well as the controversial *Canada and UN Peacekeeping: Cold War by Other Means, 1946–1970* and *Learning to Love the Bomb: Canada's Cold War Strategy and Nuclear Weapons 1951–1970*.

## A Forgotten Revolution? Army Co-operation Command and Artillery Co-operation, 1940–1942

MATTHEW POWELL

*Abstract: This article looks at the development of the Air Observation Post during the inter-war period and the Second World War. It places these developments within the context of the procedures that had emerged from the First World War. Further to this it analyses the role played in this process by Army Co-operation Command and its commander, Air Marshal Sir Arthur Barratt, who it has been claimed previously did all he could to prevent the development of the Air Observation Post concept. Evidence will show Barratt's actions in a new light especially against his experiences in the Battle of France.*

THIS ARTICLE ASSESSES the role of the Royal Air Force's (RAF) Army Co-operation Command in the development of artillery observation in Britain between 1940 and 1942. It provides the historical context by exploring the artillery procedures in use during the First World War. These methods changed little by the outbreak of the Second World War in 1939,<sup>1</sup> and failed in the fluid, mobile warfare the British Expeditionary Force (BEF) faced during the German offensive in France in 1940.<sup>2</sup> The article then analyzes the

<sup>1</sup> Hilary Saunders, *Per Ardua: The Rise of British Air Power 1911–1939* (New York and Toronto: Oxford University Press, 1944), 256–7; Shelford Bidwell and Dominick Graham, *Fire-Power: The British Army Weapons and Theories of War 1904–1945* (Barnsley: Pen and Sword Military Classics 2004 [George Allen and Unwin, 1982]), 150.

<sup>2</sup> H.J. Parham and E.M.G. Belfield, *Unarmed Into Battle: The Story of the Air Observation Post*, 2nd ed. (Chippenham: Picton Publishing, 1986), 5–6. John Buckley,