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THE CHALLENGES OF AIR-TO-AIR REFUELLING AND SEARCH AND RESCUE SUPPORT TO ARCTIC FIGHTER OPERATIONS

Maj S.G. Latwaitis

JCSP 44

SERVICE PAPER

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PCEMI 44

ÉTUDE MILITAIRE

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CANADIAN FORCES COLLEGE – COLLÈGE DES FORCES CANADIENNES
JCSP 44 – PCEMI 44
2017 – 2018
SERVICE PAPER - ÉTUDE MILITAIRE

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Word Count: 2361

Compte de mots: 2361

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References:
A. A-GA-007-000/AF-008, *Air Force Vectors*
B. B-GA-400-000/FP-000, *Canadian Forces Aerospace Doctrine*;
C. B-GA-404-000/FP001, *Canadian* Forces Aerospace Move Doctrine;
D. Canada and the Defence of North America: NORAD and Aerial Readiness, *Report of the Standing Committee on National Defence*
E. Strong, Secure, Engaged, *Canada's Defence Policy*;
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H. Boeing, *KC-46 Pegasus,* http://www.boeing.com/defense/kc-46a-pegasus-tanker; and
I. United States Air Force, *KC-135 Stratotanker* http://www.af.mil/About-Us/Fact-Sheets/Display/Article/104524/kc-135-stratotanker.

AIM

1. The aim of this paper is to highlight the challenges of air to air refueling (AAR) and search and rescue (SAR) support to fighter operations in the Canadian arctic.

INTRODUCTION

2. The Canadian arctic is a vast and unforgiving region of the country that endures some of its most extreme weather. Despite this, more and more attention is being focused in the region as reference E describes the "arctic region represents an important international crossroads where issues of climate change, international trade, and global security meet."[1] The North West Passage (NWP) has gained more attention as a viable shipping route, northern adventure tourism is increasing, and Russian long range military flights have increased in the Canadian Air Defence Identification Zone (CADIZ).The resurgence of Russian activity has also seen more North

[1] Department of National Defence, *Strong Secure Engaged* (Ottawa: DND Canada, 2017), 50.

American Air Defence (NORAD) air defence missions as a result. For Canada, the only asset currently equipped for the air defence role is the CF18 Hornet.

3. Two key support components to effective fighter operations in the arctic are AAR and SAR. Due to the large distances and lack of suitable airfields in the arctic, AAR assets provide a critical addition to both range and endurance of CF18's. In the unfortunate event where a SAR response would be required, response time is critical to provide the best odds for the successful recovery of the crew. Due to weather, limited resources and extreme ranges involved this is a very challenging operation. This paper will primarily focus on AAR and SAR support to CF18 NORAD operations in the western arctic. It will not discuss Op *NOBLE EAGLE* (typically conducted further south) and mission specific information is omitted due to classification of NORAD and CF18 activities

DISCUSSION

Increased interest in the arctic

4. The new Canadian defence policy listed as reference E states that of 3 of the 8 core missions for the Canadian Armed Forces (CAF) are to "[1] detect, deter and defend against threats to or on Canada…[2] attacks on North America in partnership with the US, including through NORAD and [3] conduct search and rescue operations."[2] The NORAD missions are therefore described as the highest priority and considered "no fail". As already mentioned, activity in the arctic is increasing but so too is the scope of the mission as Canada is increasing

2 *Ibid*, 82.

the size of the CADIZ to "cover the entire Canadian Arctic archipelago."[3] Considering these factors, the support required to ensure success of these operations should also be considered a high priority as the missions cannot be accomplished without them. Rear Admiral Bishop commented "we would be hard pressed with our fighter aircraft to be able to achieve the NORAD mission without refueling support from tankers." [4]

AAR disposition and capability

5. To meet the challenging demands of supporting CF18 arctic operations, Canada currently has a fleet of only two CC150T Airbus tankers from 437 Squadron in Trenton, and three ageing CC130T Hercules tankers from 435 Squadron in Winnipeg.[5] The CC150T is Canada's strategic refuelling capability and is an excellent asset, however it is not assigned primary support to NORAD operations. The CC130T represents the tactical refuelling capability for the RCAF and does support NORAD operations on a regular basis. To augment the lacking strategic AAR requirements, the United States Air Force (USAF) provides support from KC135 aircraft.

6. The CC130T was not designed to transit fighters quickly over long ranges due to its slow cruise speed and limited fuel available for offload. 4 Wing Cold Lake to Forward Operating Location (FOL) Inuvik is approximately 1050 NM and the CADIZ intercept points can be many hundred more miles further North. Assuming a recovery in Inuvik, this can be a transit of approximately 1500NM or more including hours of waiting in a combat air patrol (CAP). For the

3 *Ibid*, 80.

4 Standing Committee on National Defence. *Canada and the Defence of North America: NORAD and Aerial Readiness* (Ottawa: Library of Parliament, 2016), 49.

5 *Ibid*, 21.

majority of instances, this is not supportable by a single CC130T for a 2 ship of CF18's as the CC130T would have to fly an additional 550 NM from Winnipeg.

7. The CC150T has nearly double the fuel available for offload, a comparable cruising speed to the CF18 but is located more than 1400 NM from 4 Wing, and the timeline is simply not supportable in most cases. Support to 3 Wing is more likely as 3 Wing is 370 NM away from Trenton. This however is not a factor as the CC150T does not conduct direct support to NORAD operations. Factors that likely prevent this are that the CC150T is used as a strategic airlift platform in support (ISO) of other operations, it cannot maintain full fuel tanks for long durations on the ground while awaiting missions and is doing important work ISO of Op *IMPACT*. Although only a single asset is in theater at any one time, the continuous deployment has made the availability of the CC150T for domestic operations scarce.

Support from the USAF and next RCAF tanker

8. The USAF on the other hand has an enormous AAR capability with more than 400 KC135 aircraft spread across active duty, air national guard and air force reserve units.[6] However the USAF also has large commitments around the globe to support with these aircraft and they are aging and due for replacement. A plan is in place to replace the KC135 with the KC46, however the numbers of the new tankers are expected to be only 179.[7] The increasing age of the KC135, the global commitments of the USAF and fewer of the proposed KC46's will make the availability to support Canadian refuelling requirements more challenging. The adaptation of a

[6] United States Air Force, "KC-135 Stratotanker," last accessed 02 Feb 2018, http://www.af.mil/About-Us/Fact-Sheets/Display/Article/104524/kc-135-stratotanker.

[7] Boeing, "KC-46 Pegasus",last accessed 02 Feb 2018, http://www.boeing.com/defense/kc-46a-pegasus-tanker/.

new asset and continual support from an ageing one will additionally strain USAF crews and maintenance support networks. Another factor to consider is that few CF18 pilots have the opportunity to train on the very challenging KC135 before heading into the arctic for the first time, which is often conducted at night. Formalized training plans have been attempted but tanker assets are not available to support.

9. The RCAF has identified that the state of the AAR capability requires updating and has begun investigation into the replacement for the CC150T, however there appears to be no official documentation supporting the replacement of the CC130T. Unfortunately it appears that the decision to select the next AAR asset is dependent on the selection of the future fighter which is considerably delayed and consumed in political jostling. The Commander of the RCAF LGen Hood commented that "once a decision is made on the next fighter aircraft, the next decision will be the tanker replacement…the plan all along was to choose a fighter and then make sure that the tanker capacity was there."[8] The RCAF should not delay this acquisition further as most new tanker aircraft are configured for both the probe and drogue and boom setup allowing for maximum flexibility. Reference A states that a priority is to be "interoperable at all levels with the USAF", and therefore must be compatible with the F35A which is a boom receiver. The new tanker must also be backwards compatible with "classic" CF18's currently in use until 2032 or beyond.[9]

[8] Standing Committee on National Defence. *Canada and the Defence of North America: NORAD and Aerial Readiness* (Ottawa: Library of Parliament, 2016), 49.

[9] Department of National Defence, A-GA-007-000/AF-008, *Air Force Vectors* (Ottawa: DND Canada, 2014), 8.

FOL Inuvik

10. Much has already been discussed on the challenges of distance and asset availability; however operating from FOL Inuvik has considerable challenges of its own. These challenges range from frigid temperatures, rapidly changing localized weather conditions and limited support infrastructure. The runway in Inuvik is only 6000 feet compared to Eielson Air Force Base (AFB) in Alaska which has a 14,000 foot runway. The CC150T and KC135 do not operate out of Inuvik as the runway length combined with often low runway friction indices (CRFI) do not permit safe operations. Also, there is limited ramp space and hangar availability for sustained operations. The CC130T is able to utilize the support facilities and runway successfully in challenging conditions at an elevated level of risk much to the credit of its crew. Many incidents have occurred at FOL Inuvik which involve the rapid recovery of the crew, however an off airfield accident would require a rapid SAR response.

Search and Rescue in the Arctic

11. Due to the harsh operating environment in the arctic, speed of SAR operations is of critical importance. This was highlighted in reference C stating "since the probability of survival of incident victims decreased rapidly with the passing time, particularly if injuries or severe climatic conditions exist, the most essential characteristics of SAR forces is the ability to provide a rapid response."[10] It was also noted unfortunately by the standing committee on National Defence in 2011 that arctic SAR response time is too slow and that demand is on the rise. [11] All

[10] Department of National Defence, B-GA-404-000/FP001, *Canadian* Forces Aerospace Move Doctrine (Ottawa, DND Canada, 2011), 49.

[11] Adam Lajeunesse and P.W. Lackenbauer; CanadianArctic Operations. 1941-2015: *Lessons Learned, Lost, and Relearned*. Fredericton (University of New Brunswick, 2017), 387.

RCAF assets provide a secondary SAR capability and therefore the first on the scene of a theoretical CF18 crash would be the other CF18 or the AAR asset, likely a CC130T.

12. Although the aircraft would already be in the area of the person in distress, there is no pickup capability with either of these aircraft. The CC130T does not fly with a search and rescue technician (SARTECH) on NORAD missions (nor is it being recommended here), but could provide an air droppable shelter if one was carried. There is a survival kit air droppable (SKAD) located at the FOL for use from a CF18 but only represents shelter and supplies, not a rescue. An additional limiting factor in a time critical rescue is the inability for a downed CF18 aircrew to communicate with SAR aircraft. There is no survival radio in the CF18 survival vest but rather a personal locater beacon the SLB-1000 which is capable of communicating with SARSAT on 406 Mhz and provide an accurate location but not the status of the crew. The RCAF has a better capability in the PRC-112G but is reserved for combat operations.

Coordination, Command and Control

13. The current response of dedicated SAR assets does not however provide much better options. The responsibility of SAR operations in Canada falls under Canada Joint Operations Command (CJOC) through the National Search and Rescue Program (NSP).[12] The majority of SAR operations in the arctic falls under the coordination of Joint Response Coordination Centre (JRCC) Trenton which covers a staggering 18 million square kilometers.[13] The JRCC coordinates with all applicable agencies to ensure the most effective and successful rescue whenever possible.

[12] *Ibid,* 388.
[13] Department of National Defence, *Strong Secure Engaged* (Ottawa: DND Canada, 2017), 87.

Response Options

14. The first asset deployed by JRCC Trenton in typically the C130 from Winnipeg and eventually followed by either a Griffon or Cormorant helicopter depending on where the callout occurs. Unfortunately, the transit time to the arctic for either of these rotary wing assets would be likely greater than 24 hours until on station. Also, the Griffon has no anti icing capability and therefore not well suited for arctic operations. The Cormorant is better suited, but not well situated to perform this duty. The CC138 Twin Otter from 440 Squadron in Yellowknife could be used to transport SARTECH's to Inuvik but is located nearly 600 NM away. Support from US assets is a possibility in the extreme West of the operating area, but not well suited the further North East into Canada. The reliance on SARTECH's versus having recovery assets available puts a great deal of risk onto the people jumping into the hostile environment.

15. On October 27th 2011, SARTECH Sgt Janick Gilbert made the ultimate sacrifice attempting to save two fishermen near Igloolik, NU (similar northing to Inuvik). He and two other SARTECH's jumped into the frigid waters from a CC130 with a Cormorant enroute from Gander.[14] The two fishermen were saved by the exceedingly brave actions of the SARTECH's and impressive efforts by the other SAR personnel in the CC130, Cormorant, and JRCC. His death tragically highlighted the dangers of arctic rescues and the additional risk it places on SAR personnel. To alleviate the risk of NORAD arctic operations, a tailored SAR response needs to

[14] Government of Canada, "Death of a Canadian Forces Search and Rescue Technician During Rescue Mission." Last accessed 02 Feb 2017. https://www.canada.ca/en/news/archive/2011/10/death-canadian-forces-search-rescue-technician-during-rescue-mission.html.

be updated to include recovery assets.[15] A stated SAR posture would assist in evaluating the risk in whether or not to launch the mission. The expansion of the CADIZ without an increase in capability further increases the associated risks. It is a credit to the NORAD crews that a significant SAR event has not yet occurred given the operating environment.

16. A successful SAR recovery would likely be the result of a WoG approach due to the lack of readily available assets. Reference F remarks that the "history of Arctic SAR suggests that the way ahead must capitalize on one of the major strengths of the current SAR program: its integrated and multi-agency dimension."[16] 1 Canadian Rangers Patrol Group (CRPG) is located throughout the arctic with local knowledge and arctic survival skills. The Coast Guard and Royal Canadian Navy (RCN) are excellent capabilities but often a long sail from the area. International cooperation through the Arctic Council member nations will also be an important part of SAR in the arctic. Leveraging the available assets with the resources available to the RCAF versus the RCAF only solution is probably the most effective method until a more robust arctic SAR program is put in place.

CONCLUSION

17. The more attention placed on the arctic requires more RCAF operations conducted in that region despite the challenges this poses. Reference A states that Canada requires "an Air Force that has the power and reach to all [of] Canada to maintain its commitment to the shared defence

[15] Many SAR scenarios are exercised in the arctic and such an event is a serious concern to Joint Task Force North (JTF(N)). The focus however tends to be on a large civilian SAR scenario and not a downed pilot in a very remote portion of the arctic. A SAR posture other than the standard national posture is not taken into consideration for the go/no go decision.

[16] Adam Lajeunesse and P.W. Lackenbauer; CanadianArctic Operations. 1941-2015: *Lessons Learned, Lost, and Relearned*. Fredericton (University of New Brunswick, 2017), 387.

of the continent."[17] The longer the RCAF relies on the US for continuous support and a tactical tanker to fill a role it was not designed for increases the risk of not fulfilling the above stated mandate. The lack of infrastructure development in the arctic and specifically the length of the runway at FOL Inuvik will continue to have negative impacts on the RCAF's ability to conduct arctic operations safely both from an AAR and CF18 perspective. The challenging SAR mission in the arctic although well-coordinated, is lacking recovery assets and has a reliance on the use of SARTECH's for the most expeditious means of rescue. Lastly, the effects of the CADIZ expansion are substantial not only for safely operating CF18's that far north, but the AAR and SAR requirements will be stressed to their limit to support.

RECOMMENDATIONS

1. Increase spending on infrastructure at FOL Inuvik in order to extend the main runway and increase support facilities.
2. Further study into the effects of the CADIZ expansion.
3. Replace SLB-1000 with a more capable two way communication radio.

[17] Department of National Defence, A-GA-007-000/AF-008, *Air Force Vectors* (Ottawa: DND Canada, 2014), 4.

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