



SUSTAINED ARCTIC OPERATIONS

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AIM

1. The aim of this paper is to assess the principal factors associated with how the Canadian Army can modernize and adapt to ensure the ability to sustain arctic operations from a Personnel, Equipment, Training, and Sustainment (PETS) perspective. Doing so will ensure a ready posture for prolonged arctic operations when the need arises.

INTRODUCTION

2. The Canadian Arctic, with its vast and pristine landscapes, plays a pivotal role in shaping Canada's national identity, environmental policies, and geopolitical standing. Spanning over four million square kilometers, this region is home to unique ecosystems, indigenous communities, and abundant natural resources. The Arctic's strategic significance has grown in recent years due to climate change, which is rapidly transforming its ice-covered terrain¹, opening new opportunities and challenges for Canada. Yet, Canada's arctic policies remain extant and assert that Canada will continue to ensure security and sovereignty in the area. Canada's current Defence Policy, *Strong, Secure, Engaged* (SSE), provides clear direction to enhance the capabilities of the Canadian Armed Forces (CAF) for arctic operations while maintaining a whole-of-government approach.² The subsequently updated Arctic and Northern Policy Framework (ANPF) in 2019 described one of its six objectives as "enhance Canada's military presence in the Arctic as well as prevent and respond to safety and security incidents in the Arctic and the north."³ Additionally, the Army Arctic Concept 2021 outlined eight elements to focus capability development aimed at personnel, training, and command.⁴

3. Sustaining military operations in the Arctic presents a myriad of challenges due to the region's harsh and unforgiving environment. Extreme cold, limited or endless daylight depending on the season, and vast distances create logistical complexities that require specialized equipment and training. Furthermore, the Arctic's remote location and lack of infrastructure – particularly roads but also airports and seaports – pose significant challenges for deploying and sustaining military forces. These challenges are further exacerbated by the region's dynamic and unpredictable weather patterns, which can impede communication, navigation, and transportation. Moreover, the presence of indigenous communities in the Arctic adds a culture dimension to military operations. All of these factors create a markedly unique environment for soldiers to aptly operate. Arctic operations, viewed through the Personnel, Equipment, Training, and Sustainment (PETS) perspective will be analyzed in terms of addressing the isolation of the Canadian Arctic.

¹ For example, see NASA, Earth Observatory, <http://earthobservatory.nasa.gov/>

² Canada. Department of National Defence. *Strong, Secure, Engaged: Canada's Defence Policy*. Ottawa, Ont., 2017, p. 60.

³ Canada. Crown-Indigenous Relations and Northern Affairs Canada. *Canada's Arctic and Northern Policy Framework*. Ottawa, Ont, 2019, p. 75

Canada. Department of National Defence. *Northern Approaches: The Army Arctic Concept 2021*. Kingston, Ontario, p. 27. https://publications.gc.ca/collections/collection_2014/mdn-dnd/D2-323-2013-eng.pdf

In doing so, the lessons and practices from other isolated operations may provide a nexus for modernizing and adapting arctic operations. This paper will discuss similarities of sustained space operations and mountainous high-altitude operations to interpret PETS as well as examine how the US military is addressing their own operations in the arctic.

DISCUSSION

4. In 2008, Canada renewed its commitment of the CAF's northern mission in the *Canada First Defence Strategy* (CFDS). This strategy described the fundamental requirement for Canadian defence policy as "capacity to exercise control over and defend Canada's sovereignty".⁵ The CAF's role would be to provide a visible presence and assist other government departments (OGDs) in Canada's response to "any threats that may arise."⁶ Since then, the CAF has worked to build component capabilities to meet this requirement. There have been developments and challenges vis-à-vis arctic naval and aviation capabilities, but this paper will focus on those of the Canadian Army (CA). It is also understood that increased activity in the north like illegal fishing, maritime and aerospace accidents, pollution, trespassing and criminal activities will not fall on the CAF to respond. Rather, the CAF would support OGDs in exercising their own responsibilities and mandates, but also be poised to respond to potential safety and security emergencies.⁷ What exactly encompasses safety and security emergencies is evolving as the region becomes more accessible. This increase in accessibility makes the region "an area of international strategic, military and economic importance, with both Arctic and non-Arctic states expressing a variety of interests in the region's potential."⁸ Since 2008, the CAF has been slowly re-developing force capability in arctic operations: Exercise NORTHERN BISON, Operation ARCTIC RAM, Operation NANOOK.⁹ These exercises and operations have been the focus of the Arctic Response Company Groups (ARCGs), small, self-contained, highly mobile units that are force generated from the Primary Reserves. Even though one of the units declared full operational capability as early as 2014, the deployments were very short-term, generally less than a month.

5. Long-term military deployments to the Canadian Arctic simply have not been done. There are many reasons that make this a monumental task, not just for Canadians but for all militaries working in the arctic. The Russo-German Petsamo-Kirkenes Operation, which is the largest in modern military history fought north of the Arctic Circle,¹⁰ included hypothermia, extended and austere lines of communication, and

⁵ Canada. Department of National Defence. *Canada First: Defence Strategy*. Ottawa, Ont: National Defence, 2008, p. 8.

⁶ Canada. Department of National Defence. *Canada First: Defence Strategy*, p. 8.

⁷ Adam Lajeunesse. *The Canadian Armed Forces in the Arctic: Purpose, Capabilities, and Requirements*. Calgary: Canadian Global Affairs Institute, 2015, p. 3.

⁸ Adam Lajeunesse. *The Canadian Armed Forces in the Arctic*, p. 50.

⁹ Government of Canada, Department of National Defence, Operation NANOOK, <https://www.canada.ca/en/department-national-defence/services/operations/military-operations/current-operations/operation-nanook.html>.

¹⁰ James Gebhardt. The Petsamo-Kirkenes Operation: Soviet Breakthrough and Pursuit in the Arctic, October 1944, Leavenworth Papers No. 17, 1989, p. xiii.

marginal trafficability as widespread considerations for commanders.¹¹ The fall timing of the operation overlooked issues of conducting operations on arctic terrain in the summer when soil, topography and light conditions affect military operations differently.¹²

6. Despite the Petsamo-Kirkenes Operation occurring in 1944, the operational-level principles are equally relevant to the employment of non-Soviet military forces on any arctic terrain, then and today.¹³ With regard to equipment, when crossing the Titovka River, it was impossible to deploy tanks, artillery and mortar units off the road due to terrain, which resulted in massive congestion.¹⁴ Considering sustainment, the issue of transportation was highlighted when a piece of high ground along the road to Luostari was captured but had to be surrendered because the Soviets ran out of ammunition. It was available in the supply system but the ammunition could not be delivered until the road was repaired.¹⁵ There was even a point in the battle where many units had used up their supplies of food, fuel, and ammunition and the logistic support could not keep up so “to enable the troops to take a much-needed rest and the logistic system to catch up...[the] commander of the 14th Army, ordered a three-day pause in combat. Both sides used this time to reconstitute, reorganize, and resupply.”¹⁶ These are all relevant considerations in present day. Evidence suggests that corps commanders and staffs of the Petsamo-Kirkenes Operation who lacked experience in arctic combat initially developed unrealistic plans. They did not understand how the arctic terrain could affect operations. Consequently, employment of tanks and artillery was planned just as they would have on ordinary terrain. It is important for commanders of arctic deployments to study arctic war experience or physically visit the arctic terrain.¹⁷

7. When the aspect of isolation in the arctic is compared to other isolated operations, such as space operations, requirement patterns emerge in PETS. The concepts of resiliency and redundancy are equally as important in arctic and space operations. Specifically, equipment and sustainment face the same issues. “Much like the arctic, when it comes to space, our systems have to exist with what they bring.”¹⁸ Whether it’s sufficient fuel, days of supply to carry, or how many spare onboard mission data processors to bring, it’s crucial to “never operate with zero margin for error, or with a single-string path to component capability; you always want backups, because the risk is full mission loss, or for the arctic the death of the people.”¹⁹ With respect to training for isolated operations, another important consideration is fidelity. Without an easy way to conduct on-orbit training, there is heavy leveraging of simulation training; similarly, arctic training may require surrogate environments. Fidelity in training comes only when hard problems are exercised during training rather than bypassed or wished away to keep

¹¹ James Gebhardt. *The Petsamo-Kirkenes Operation*, p. ix.

¹² James Gebhardt. *The Petsamo-Kirkenes Operation*, p. xiv.

¹³ James Gebhardt. *The Petsamo-Kirkenes Operation*, p. xvi.

¹⁴ James Gebhardt. *The Petsamo-Kirkenes Operation*, p. 42.

¹⁵ James Gebhardt. *The Petsamo-Kirkenes Operation*, p. 40.

¹⁶ James Gebhardt. *The Petsamo-Kirkenes Operation*, p. 45.

¹⁷ James Gebhardt. *The Petsamo-Kirkenes Operation*, p. 117.

¹⁸ Aaron Hines. *Sustainment & Training WRT Space as it Compares to the Arctic*, pers comm edited by Lisa Nodwell, 2024.

¹⁹ Aaron Hines. *Sustainment & Training WRT Space*, 2024.

the training on track. Due to the nature of space operations, personnel must have very specific training that also allows them to operate alone or in very small groups.

8. Although for different reasons, the arctic is much like the Siachen Glacier in that climate, topography, and elevation (to a lesser extent) all play a role in shaping operations.²⁰ The Siachen Glacier is located in the eastern Karakoram range in the Himalayas near the Indo-Pak Line of Control and has been a battlefield between India and Pakistan since the 1980's. It is the highest battle front in the world and the largest non-polar glacier.²¹

No conflict can truly be separated from the landscape in which it is fought, especially where the location itself can be a more dangerous foe than the human enemy; on the Siachen Glacier, where every aspect of combat is shaped by the environment, this is especially true.²²

9. The Siachen is extremely remote, has very rugged topography, and frequent avalanches. Establishing supply lines is one of the greatest challenges for the Indian and Pakistani armies in the conflict.²³ In fact, when speaking of sustainment, it is much more accurate to compare the Canadian Arctic to the Siachen Glacier than other arctic regions like Russia, Finland, Sweden, and Norway where infrastructure and road networks are well established. In the Siachen Glacier, for example, only one highway reaches the nose of the glacier; no other roads in the region come near Siachen at all.²⁴ Whilst Canada may not assess avalanches and ice falls, arctic spring melt and winter freeze are significant impediments to arctic supply lines.²⁵ The concept of base camps and outposts support sustained operations. Much like the Siachen, base camps must function as a “protected location from which combat units can be deployed, serving as a staging point for reserve forces, providing training for new troops, and coordinating logistics for the supply of smaller patrols and outposts.”²⁶ The added challenge to the Canadian Arctic is that the ideal location of base camps may be very different between seasons. A winter base camp, for example, would ideally have shelter from the wind but a summer base camp in a sheltered spot would be intolerable due to intense black flies and mosquitos.²⁷

10. As in space operations, high-altitude operations personnel must be highly trained to succeed. The Pakistani army, for example has an Army High Altitude School that is responsible to train units and troops before their deployment. Training includes acclimatization, mountain craft and glacier craft skills with intended deployment in small

²⁰ Kristen Smith. 2021. Mass balance, accumulation dynamics and high- altitude warfare: the Siachen Glacier as a battlefield. *Small Wars & Insurgencies* Vol. 32, No. 8, p. 1204.

²¹ Akram Obaidjanjua. *Considerations for Sustainment Or Training Personnel for High Altitude Operations*, pers comm edited by Lisa Nodwell, 2024.

²² Kristen Smith. 2021. Siachen Glacier as a battlefield, p. 1202.

²³ Kristen Smith. 2021. Siachen Glacier as a battlefield, p. 1206.

²⁴ Kristen Smith. 2021. Siachen Glacier as a battlefield, p. 1206.

²⁵ Dwayne Wohlgemuth. *Sustained Arctic Operations*, pers comm edited by Nodwell, Lisa 2024.

²⁶ Kristen Smith. 2021. Siachen Glacier as a battlefield, p. 1205.

²⁷ Dwayne Wohlgemuth. *Sustained Arctic Operations*, 2024.

sections. A pool of master trainers is maintained at the School.²⁸ Similarly, in India, soldiers undergo rigorous training at the Siachen Battle School, situated at an altitude of 12,200 feet on the banks of Nubra, to prepare for their three-month deployment.²⁹ The same is acknowledged in Canada that specialized training is required but consideration must be made for a dedicated force due to the specialty training required to survive and operate in this harsh environment.

11. Maintenance of morale is a foremost command responsibility for isolated forces. In the Siachen Glacier, there are certain areas where life is extremely hard and therefore rotations occur every 3 weeks.³⁰ Furthermore, soldiers face psychological impacts when they become isolated with their injured or deceased comrades, a situation often caused by complications related to weather, distance, and security during medical evacuations.³¹ Studies have also shown that there are specific social and psychological needs related to the unfamiliarity, confinement, isolation, and threatening environment for soldiers at a Canadian arctic military installation (CFB Alert).³²

12. In the consideration of equipment, multipurpose equipment is the economical option compared to dedicated arctic operational equipment. However, there is a requirement to train and use the equipment as part of regular duties so that all soldiers have a good understanding of the equipment and a good ability to troubleshoot issues. Technology, tools, and equipment must prioritize the ability to function to -50 degrees Celsius. "Below -40 everything breaks, even the stuff we use, and we've chosen because it works better than average stuff in the cold winters."³³

13. Acknowledgement of both self-sustainment requirements and a dedicated arctic force recently came from the US proposal to revise their arctic operations capability in 2021. The proposal was to reactivate the 6th Infantry Division in Alaska to provide a division-level capability with its organic artillery, aviation, and sustainment brigades.³⁴ A dedicated force is paramount to their proposal:

Something as simple as maintaining patrol base security is compounded by weather—static infantrymen laying in snow for hours on end is a recipe for quick cold-weather injury. These elements of fieldcraft must be taught, and the learning curve for a unit suddenly sent from the Army's preferred training areas in the warmer southern United States to the tundra might be insurmountable. Even the summer is difficult, when moving heavy

²⁸ Akram Obaidjanjua. *High Altitude Operations*, 2024.

²⁹ Rahul Singh. "Battleground Siachen." *McClatchy - Tribune Business News*, 2009

³⁰ Akram Obaidjanjua. *High Altitude Operations*, 2024.

³¹ Kristen Smith. 2021. Siachen Glacier as a battlefield, p. 1209.

³² William R. Moore and University of British Columbia. "Planning for Social and Psychological Needs at a Canadian Arctic Military Installation." 1990.

³³ Dwayne Wohlgemuth. *Sustained Arctic Operations*, 2024.

³⁴ RFM Williams. *Bring Back the Sightseeing Sixth: The Case for an Arctic Division*. Modern War Institute. 2021, p. 2.

vehicles across mud fields and muskeg is just as tricky as keeping soldiers and equipment from freezing in the winter months.³⁵

14. In the Canadian Army, there is heavy reliance on the Canadian Ranger Patrol Group (CRPG) for bridging the gap in expertise. “When called upon, the Canadian Rangers are ready to act as the CAF first responders supporting local and territorial governments as well as the federal government.”³⁶ However, they generally do not conduct patrol operations during the spring thaw period or the fall freeze as the terrain is too difficult to manage.³⁷ These time periods were previously mentioned as two of the greatest impediments to movement. Additionally, their expertise is in arctic survival and not military operations, that latter encompassing a host of other considerations.³⁸ While the Canadian Rangers act as a critical and enduring presence, due to the size of the CRPG patrol areas, it is very unlikely they will visit the same area twice in one year, likely even longer.³⁹ A dedicated force would mitigate these issues.

15. A recent publication on preparing the CAF for arctic operations used operational art to determine that the center of gravity for arctic operations was transportation. This supports the idea that isolation plays a central role in determining the “how” of arctic operations. The author also advocates for multi-domain operations employing ground, naval, and air force elements. These elements, in combination with cyber and space resources and other government departments, address the CAF’s newly released Pan-Domain Force Employment Concept.⁴⁰ The author also contends that consideration be given to permanent air and naval assets in the Arctic, specifically a permanent presence in both Nanisivik Naval Facility in Nunavut and Sachs Harbour in Northwest Territories, as the decisive points to security of the Northwest Passage. They would form, together with the CAF Arctic Training Centre in Resolute Bay, Nunavut, mutually supporting facilities. And JTF-N would act as the multi-domain formation headquarters. This proposal of dedicated forces would “dramatically extend [the] operational reach in the Canadian Arctic.”⁴¹

CONCLUSION

16. The premise of a military’s existence to its nation is to deliver a forceful defence force when needed. Defence of the Canadian Arctic poses unique challenges not faced in southern Canada. The aspect of isolation was shown to be shared with space operations and high-altitude operations in Siachen Glacier. This isolation forces special considerations of PETS in arctic operations. The assessment of PETS for the arctic as isolated operations has shown that a self-sustained, dedicated force with dedicated

³⁵ RFM Williams. *Bring Back the Sightseeing Sixth*, p. 3.

³⁶ Canada. Department of National Defence. *Northern Reaches the Canadian Arctic Land Operating Concept (Draft)*. Draft ed. 2024, p. 12.

³⁷ Dwayne Wohlgemuth. *Sustained Arctic Operations*, 2024.

³⁸ Dwayne Wohlgemuth. *Sustained Arctic Operations*, 2024.

³⁹ Dwayne Wohlgemuth. *Sustained Arctic Operations*, 2024.

⁴⁰ Canada. Department of National Defence. *Pan-Domain Force Employment Concept*. Ottawa, Ont, 2023.

⁴¹ Tim Day. "True North Strong and Free: Preparing the Canadian Armed Forces for Arctic Operations ." Master's, School of Advanced Military Studies, 2021., p. 38.

training is necessary to ensure success. While Canada has successfully conducted numerous arctic operations and exercises, they have been short in duration and therefore the true ability of the soldiers, the effectiveness of the equipment and training, and the sustainment system have not been thoroughly tested against the harsh and varying conditions of the arctic. The CRPG provide an important expertise and link to the local environment however limitations on their knowledge and capacities create gaps that need to be filled by a permanent force. A dedicated force with dedicated self-sustainment will have the best result in modernizing and adapting arctic operations to be ready and responsive.

RECOMMENDATION

17. The ability to operate in an Arctic environment is a necessary aspect to Canadian defence and sovereignty. While the CAF has experience in short deployments, the ability to remain in place for extended periods is dependent on numerous factors as discussed in this paper. It is recommended that, to sustain arctic operations beyond 30 days, the CAF creates a specialized, dedicated force element for arctic operations with self-sustainment to include naval and aviation assets. This will allow for a skilled and ready force to effectively ensure the safety and security of the Canadian Arctic.

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