





Evaluating the Capability of the Corps of RCEME to support the Canadian Army in the Arctic

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EVALUATING THE CAPABILITY OF THE CORPS OF RCEME TO SUPPORT THE CANADIAN ARMY IN THE ARCTIC

AIM

1. It is becoming more apparent that there is an expectation for the Canadian Armed Forces (CAF), and specifically the Canadian Army, to further develop its role in the Arctic. The aim of the service paper is to evaluate how the corps of the Royal Canadian Electrical and Mechanical Engineers (RCEME) currently sustains the permanent and deployed forces within the Arctic. Through this analysis, any gaps in doctrine or future capability can be identified in order to ensure that the corps of RCEME is properly aligned to deliver suitable maintenance support for the land forces in its expanded responsibility in the region.

INTRODUCTION

2. The Arctic region is the land and maritime mass that is enclosed within the Arctic Circle, which lies north of the 60 degrees N latitude¹ and encompasses eight Arctic countries and the Arctic Ocean.² The Arctic Council provides the international forum for Arctic States to coordinate and work with each other to develop resources, conduct research, and provide environmental protection this sensitive ecological region.³ Along with Canada, the nations of Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States are signatories to the Ottawa Declaration and form the Arctic States.

3. Countries who are not Arctic States can also have interests in the region for its vast potential for natural resources, geopolitical importance, and maritime economic trade routes. Emerging adversarial nations, such as China, has indicated their desire to gain access to the region in order to exploit the natural resources and declared their aspiration to project more of their influence in the region, culminating in the publishing of their official Arctic policy in 2018.⁴ Such ambitions from a growing adversarial nation required a policy and security response from Canada in order to protect and exert its sovereignty in the Arctic.

4. With the lead from Crown-Indigenous Relations and Northern Affairs, the Government of Canada released its own Arctic policy framework in September 2019.⁵ As a whole-of-government approach towards the Arctic, it outlined six objectives within the *Safety, security, and defence* chapter.⁶ For the CAF and the Canadian Army, the relevant objectives were to "strengthen Canada's cooperation and collaboration with domestic and international partners"⁷ in

¹ Department of National Defence, *Operations in Cold Weather*, B-GL-323-003/FP-001 (Ottawa: Director of Army Doctrine Shield CBRN, 2012), 27.

² National Geographic, "Arctic," last accessed 1 March 2023.

³ Arctic Council, "The Arctic Council: A Quick Guide," last accessed 28 February 2023.

⁴ China, State Council Information, *China's Arctic Policy (English Version)* (Beijing: China ntercontinental Press, 2018)

Intercontinental Press, 2018).

⁵ Canada, *Canada's Arctic and Northern Policy Framework*, (Her Majesty the Queen in Right of Canada, 2019).

⁶ Ibid, 72-84.

⁷ Ibid, 51.

the Arctic while expanding the military's presence in the region in order to respond to matters of security.

5. These objectives were built upon the extant defence policy for Canada, titled *Strong, Secured, Engaged* (SSE). Published in 2017, it outlined the government's commitment to procure equipment and vehicles to allow the Canadian Army to be able to operate in land operations in the Arctic. This would be accomplished by obtaining "all-terrain vehicles, snowmobiles and larger tracked semi-amphibious utility vehicles optimized"⁸ for the region. This would permit the CAF to not only have an increased presence in the Arctic, but also the ability to conduct joint exercises with Canada's allies.⁹

6. In order to have the capability to sustain the land equipment and weapon systems required for this expanded role, the corps of RCEME will need to ensure it can meet the new exigencies of the Canadian Army. An important aspect of sustaining the force is the execution of the Land Equipment Management System (LEMS), which is an "equipment support system for land technical equipment that spans the strategic, operational and tactical levels of sustainment"¹⁰ for the CAF. RCEME technicians, as the tactical practitioners of LEMS, must be appropriately equipped and properly trained in order to continue to provide a responsive level of maintenance service in Arctic.

DISCUSSION

7. Operations in the Arctic tend to be austere and difficult due to the extreme cold and treacherous terrain. Although projecting and sustaining a large force is possible, it is extremely challenging due to the issues with logistics, movement, and weather.¹¹ This arduous nature of operating in the Arctic necessitates careful planning and a heavy reliance on intelligence and surveillance of the environment. Often times, guidance from Canadian Rangers and assistance from air assets are required in order to move and survive in the region. For larger land forces on Arctic exercises or deployments in the future, the corps of RCEME must play a key role in ensuring that the equipment is properly maintained, repaired, and recovered.

Doctrine

8. When looking to support the Canadian Army in the Arctic, it is important to refer to the doctrine. For maintenance related doctrine, the key publication is *Maintenance in Battle*, which aims to describe how the members of the corps of RCEME can support the CAF in conducting land operations.¹² Although the doctrine has not been updated for more than thirty years, many of the details still hold true. It describes in broad strokes of key requirements and factors relating

109.

⁸ Canada, Strong, Secure, Engaged: Canada's Defence Policy, (Ottawa, Canada: National Defence, 2017),

⁹ Ibid, 113.

¹⁰ Department of National Defence, *Land Equipment Management System*, B-GL-342-001/FP-001 (Ottawa: Director of Army Doctrine, 2001), 6.

¹¹ Department of National Defence, *Operations in Cold Weather*, 37.

¹² Department of National Defence, *Maintenance in Battle*, B-GL-314-002/FP-001 (Ottawa: Force Mobility Command, 1989), "Preface".

to conducting maintenance in Northern operations. When combined with the *Combat Service Support (CSS) Units in Operations*, there is sufficient doctrinal information on how to organize, plan, and execute maintenance in a tactical setting but considerations for operating in the Arctic can be amended to give more clarity. In particular, a greater focus on the equipment and techniques that a RCEME technician will require should be better codified to ensure it is taken into consideration when planning an Arctic exercise or deployment.

9. Firstly, the doctrine can be improved by including more substantiation on the requirement of heated maintenance shelter for the technicians. For minor repairs requiring a brief time to return a broken equipment to serviceability, the technician can work on site in the elements.¹³ Although it will be uncomfortable and not ideal, it is supportable in most circumstances; however, a majority of tasks would require the RCEME technician to work on the equipment for a longer period of time. In addition, many optronics, electronics, and vehicle components are sensitive. Inspections, repairs, or calibrations on these items will require a warm and clean space.

10. A maintenance shelter will also need to be heated. In lower temperature, metals are more brittle and prone to cracks and breaks, affecting the serviceability of the equipment. In addition, components of a vehicle which generate heat will quickly rust in the Arctic due to the condensation when exposed to the extreme cold. A heated maintenance tent allows the vehicle to thaw before being worked on, preventing rust in critical areas and ensuring that parts do not break after turning brittle. A lack of substantiation in the doctrine for a heated maintenance tent can lead to an incorrect assessment that the shelter is less of a requirement but merely a creature comfort.

11. Secondly, the doctrine lacks acknowledgement of a work-rest cycle or precautions that a technician should take in the extreme cold. Although resources are readily available for the ideal work-rest cycle for hot and humid climates, only a limited amount of information is available for Arctic environments. By leveraging existing military policies, such as the NATO Science and Technology Organization's *Management of Heat and Cold Stress Guidance*,¹⁴ a more comprehensive considerations for technicians working in Arctic conditions can be included.

Vehicle Platform and Variants

12. A key function that RCEME provides in land operations is the rearward recovery of equipment and kit for either repairs, backloading, or disposal. Although the equipment being used in the Arctic tend to be small for ease of movement, the environment and terrain itself provides difficulties in extrication and recovery. In the instances where relatively small vehicles require recovery, the usual method has been to use helicopters for both extrication and movement rearward.¹⁵¹⁶ This is a workable solution in the current environment where recoveries

¹³ Kathryn Mazos-Vega, "Mechanics Maintain the Mission," US Army News, March 20, 2022.

¹⁴ Science and Technology Organization, "Management of Heat and Cold Stress Guidance to NATO Medical Personnel," December 2013.

¹⁵ Chris Thatcher, "Operation recovery: Airlifting a CC-138 off the Arctic ice," *Skies Magazine*, September 24, 2020.

¹⁶ Liny Lamberink, "Expedition pulls off elaborate plan to recover sunken truck near Taloyoak, Nunavut," *CBC News*, August 31, 2022.

tend to be rare due to the small-scale nature of the operations in the Arctic. If the strategic ambitions as stated in the *Arctic and Northern Policy Framework* and *SSE* are realized, the larger presence of land forces in the Arctic will inevitably lead to more instances of recoveries being required. Helicopters, although very capable, are limited in numbers and not readily available in inclement weather which can strike the region. When operating in a fragile environment such as the Arctic, it may also be crucial to be able to extricate and recover equipment before it becomes an environmental hazard due to oil leaks or chemical fires.

13. A potential solution could be found in the domestic Arctic mobility enhancement project, which aims to replace the current fleet of BV206.¹⁷ The fleet of BV206 are currently employed by the Canadian Army for operation in the Arctic as it provides mobility both on and off roads. Due to its rubber tracks, it is an ideal vehicle for snow covered terrains. It has three main variants: command post, ambulance, and cargo.¹⁸ Although these three variants provide platforms to conduct most land operations in the Arctic, it is lacking a mobile repair team (MRT) and recovery variants, which are part of other Canadian Army fleets. An argument for not having a recovery variant of the BV206 is that the vehicle is capable of direct tow. In essence, a BV206 can pull a disabled BV206 through the use of an A frame or a tow rope;¹⁹ however, recovery variants would have an overhead crane as part of its platform which permits a greater range of repair tasks, such as swapping engine blocks or extricating a snowmobile from a ditch. A MRT variant would also be important to provide the specific tooling and provide small cabin space for the technicians to be able to work on components or weapon systems.

14. If the domestic Arctic mobility enhancement project is to become the backbone of the Canadian Army's mobility in the Arctic, then the replacement vehicle fleet should have both of these variants in order to provide the proper platforms for the RCEME technicians to be able to follow and support the land force.

Training

15. Although Arctic by itself is not defined as a new domain, the appetite to project a larger and more permanent military presence is relatively novel. Much like Canada, the US Army released their own strategic paper in 2021, titled *Regaining Arctic Dominance*, a view to "develop doctrine, training, and equipment to meet the unique requirements" of operating in the Arctic.²⁰ In line with *SSE*'s aim to increase cooperation with our Allies in the Arctic, the US Army's strategy also sees the need to work with their allies in order to project and sustain a capable military force.²¹

16. While the modifications to doctrine and equipment needed to support can be discussed in theoretical terms, there is little substitute to understanding the capability gap through tactical

¹⁷ Department of National Defence, "Domestic Arctic Mobility Enhancement," *Defence Capabilities Blueprint*, January 9, 2020.

¹⁸ Canadian Army, "BV 206 Tracked Carrier," *Equipment*, February 10, 2021.

¹⁹ Hagglunds Vehicle, "Operators Manual" (Sweden: Hagglunds Vehicle AB, November 1996), 146.

²⁰ Department of the Army, *Regaining Arctic Dominance: The US Army in the Arctic* (US Army, January

^{19, 2021), &}quot;Foreword".

²¹ Ibid, 22.

feedback obtained through exercises in the environment. This learning process of trial and error can also benefit by ensuring that the Canadian Army conducts joint training with the American counterparts. This is important for technical trades such as mechanics which rely on creativity and ingenuity when dealing with new environments.²² By conducting training with Canada's international Arctic partners and providing a forum for the technicians to share ideas, it can open up innovative ideas, raise issues with current processes, and gain insight to shape future procurement projects.

CONCLUSION

17. The Arctic is an important region for geopolitics, natural resources, and global trade. Due to its emerging prominence, Canada and its allies have outlined policies and strategies on projecting and sustaining a military presence in the Arctic. This is not only to leverage the benefits that can be gained, but in order to protect the sovereignty against adversarial nations, such as China, who are not Arctic States but have ambitions to exploit it to further their own national interests.

18. Published policies such as the *SSE* and the *Northern policy framework* outline roles for the CAF and the Canadian Army in the Arctic. The corps of RCEME, responsible for executing the LEMS function for land equipment, needs to ensure it is positioned to be able to support the Canadian Army's anticipated expanded role and presence.

19. Currently, RCEME related doctrine is serviceable, but should be updated to reflect the evolution in the nature of land operations and its related sustainment, especially as it relates to the unique environments contained in the Arctic region. Although the information contained within it is valid, it needs a refresh as it has been over thirty years since last publication.

20. In addition, the corps of RCEME must ensure that maintenance and recovery considerations are included in the requirements for a future Arctic fleet which will replace the inservice BV206. Although a direct recovery capability inherent to the platform can suffice, a specific recovery variant with the equipment, such as a crane, would expand the role of RCEME technicians in being able to extricate, recover, and repair equipment in situ. Furthermore, a MRT variant will be important in ensuring that technicians can follow the elements that they are tasked to support.

21. Finally, the concepts and equipment must be tested in real world conditions within a joint training environment with our allies. This is a crucial step in ensuring that concepts are tested against realistic demands and tactics while supplying a venue for exchange of ideas among likeminded trades and allies.

RECOMMENDATION

22. It is recommended that the Canadian doctrines surrounding the employment of RCEME technicians in Arctic conditions be updated. The update should emphasize the requirement of

²² Kathryn Mazos-Vega, "Mechanics Maintain the Mission."

heated maintenance shelters as an essential item for maintenance organizations. In addition, future procurement of Canadian Army vehicles designed for employment in the Arctic should include a recovery and MRT variants in order to provide RCEME technicians the proper platforms from which to support. Finally, realistic training in the Arctic environment is needed to confirm current capabilities and help show gaps. Working with CAF's international allies will also help the technicians by sharing each other's techniques and perspectives.

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