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PRECISION: THE FUTURE OF CANADIAN ARTILLERY

Maj F.H. Gould

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Maj F.H. Gould

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AIM

1. The aim of this service paper is to identify the requirement for the Royal Regiment of Canadian Artillery to fully embrace the role of precision fires in order to ensure its relevance and ability to provide desired effects in the current and future defence and security environment.

INTRODUCTION

2. In his foreword for the publication 'Designing Canada's Army of Tomorrow', then Commander Canadian Army, Lieutenant-General (Ret.) P.J. Devlin stated that "the world is fraught with risks that directly challenge Canadian values, national interests and security…to remain an effective instrument of national power the Canadian Army must continue to innovate and adapt."[1] This same document also indicates that precision will become increasingly important to achieving desired effects.[2] The Canadian Army is a relatively small force which somehow continues to 'punch above its weight' on the domestic and international stages. The Canadian soldier is well equipped, highly trained and professional. However, in order to remain relevant as a source of national power, the Canadian Army must embrace technological innovation and adapt to the current and future security threat.

3. Within the Canadian Army, the artillery corps serves as a microcosm of the requirement to embrace technological innovation in order to remain a relevant weapon of choice on today's battlefield. This paper will first of all highlight why it is important for

[1] Canada, Dept. of National Defence, Designing Canada's Army of Tomorrow: A land Operations 2021 publication. 2011, 3.
[2] *Ibid*., 70.

the Canadian artillery corps to focus its efforts on precision for the foreseeable future. Secondly, the many advantages of adopting the role of a precision fires system will be discussed. Finally, the paper will make recommendations on the way ahead for the artillery corps in order to make it a more relevant and desirable weapon of choice for the Canadian Army and joint fires community.

DISCUSSION

4. Conflicts in Afghanistan, Iraq and Libya as well as terrorist attacks around the world on a seemingly daily basis, exemplify the current global security threat. It is one defined by an enemy composed of state and non-state actors conducting nonconventional and irregular warfare. Today's enemy, whether it is the Taliban, Al Qaeda, or ISIS, is adaptive, resourceful and determined. It does not adhere to the same laws of armed conflict as western nations. It quickly blends into the population and uses it as concealment and even cover.[3] This enemy is extremely difficult for conventional forces to defeat. Adding to the difficulty and complexity of defeating this enemy is the reluctance of western countries to accept unnecessary levels of collateral damage in order to achieve mission success. Any tactical gains achieved which result in excessive collateral damage quickly become strategic losses in today's conflicts. The requirement to minimize collateral damage, especially in the form of innocent non-combatants, is a key driving force in the mass proliferation of precision weapons across western militaries. It is highly unlikely that this trend will stop any time soon as "irregular warfare conducted by highly adaptive and technologically enabled adversaries, rogue states bent on challenging the status quo, and trans-national criminal organizations will remain the

[3] *Ibid*., 43.

most likely defence and security threats."[4] The requirement for precision will remain, and any force, or weapon, incapable of precision runs the risk of becoming obsolete, or in the best case scenario, the weapon of last resort.

5. In the early years of the Canadian Army's combat mission in Kandahar, Afghanistan the Canadian artillery corps was instrumental in nearly every successful battle against Taliban forces. Providing the Canadian Battle Group and coalition forces with 24/7 all-weather indirect fire support, the artillery proved its value in combat. During operations such as Operation MEDUSA in 2006, Canadian guns fired thousands of rounds in support of ground manoeuvre. The vast majority of those rounds however were conventional and although the GPS guided Excalibur round was introduced into the Canadian arsenal during this timeframe[5], it was rarely used for a myriad of reasons. The cost of the round, $150,000 each[6], was arguably the most significant factor. As such, the round was unofficially reserved for high value targets and the Canadian guns never really played a significant role in precision targeting. As the insurgents adapted their tactics and relied more heavily upon IED's and irregular warfare than conventional force-on-force, targets became more sensitive and susceptible to collateral damage. The enemy blended into the population and the requirement for precision grew exponentially. The use of artillery diminished as commanders opted for the precision of Close Air Support (CAS) Precision Guided Munitions (PGMs) in order to minimize collateral damage while still ensuring mission success. The guns often became the second option to CAS.

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[4] *Ibid*., 18.

[5] Murray Brewster, "Canadian Army Begins Using $150,000 Artillery Shells in Afghanistan." *Daily Bulletin*, 2008.

[6] *Ibid*.

6. Understanding the fact that CAS munitions will always be better suited for certain targets, if the Canadian artillery corps fails to expand its arsenal of PGMs and take full advantage of its precision potential it risks becoming a less desirable weapon of choice. Commanders will remain reluctant to use it due to concerns of collateral damage and will seek other options in the targeting cycle.

7. In order to expand its PGM arsenal, the corps must introduce a relatively low cost PGM to supplement the expensive Excalibur round, therefore making artillery delivered PGMs a more desirable option for a much wider array of targets. The Excalibur round has an official Circular Error Probable (CEP) of approximately five meters[7] which is extremely precise, but as mentioned is very expensive. Much like the Paveway guidance kit used by Canadian Air Force CF-18's, a Precision Guidance Kit (PGK) such as the Orbital ATK Armament Systems M1156 PGK would provide the corps with a balance of precision capabilities. It has a CEP of less than 10 meters and is more than five times cheaper than the Excalibur.[8] This will provide more options for the use of artillery during the targeting cycle[9] and will see the guns become a much more viable option for the engagement of targets with collateral damage concerns. In addition to ensuring the guns remain a viable option for the engagement of targets which require precision, there are numerous other advantages of embracing the precision fires role.

8. Precision also has its benefits in the conventional fight. Although the asymmetric, irregular warfare we see today is expected to prevail into the foreseeable future, it does not discount the potential for state-on-state or more conventional style warfare to occur.

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[7] Christopher F. Foss, "Smart Ammo: Precision-Guided Munitions for Field Artillery." Janes Defence Weekly, 2015, 6.

[8] *Ibid*., 8

[9] David A. Sparrow, Cynthia Dion-Schwarz, Association of the United States Army, and Institute of Land Warfare. *Gun-Fired Precision Munitions for a Transformed Army*, Vol. 3-4, 2003, 2.

Russia's offensive actions in Crimea in recent years highlight the potential to once again see large scale force-on-force warfare. In the conventional fight, the adversaries of western forces are far better equipped than the nonconventional enemy. They possess a significant ability to detect through an array of advanced sensors similar to those of western forces. Artillery fire is susceptible to this detection and first round accuracy and the ability to open a fire mission in 'Fire for Effect' is essential. In the conventional fight, once an artillery unit has fired, the clock starts ticking as to when they will be detected and inevitably engaged by enemy assets. As much as we strive to solve 'the gunnery problem' with accurate positioning, gun orientation, atmospheric data, etc., first round accuracy and the ability to accurately open a mission in 'effect' cannot be guaranteed. Forward observers are likely to require adjustment of the target, sacrificing time and the element of surprise. A corps with an extensive arsenal of precision munitions will be able to provide that guarantee, getting rid of the requirement of adjusting rounds, achieving greater surprise and enabling the rapid engagement of enemy forces. The use of precision rounds will therefore shorten the duration of any given fire mission when compared to the use of conventional munitions, facilitating the movement of friendly artillery units before they are detected and engaged.

9. Following artillery transformation, an artillery regiment now consists of two gun batteries of 4 guns each. Historically, that would constitute one battery. The engagement footprint of a gun regiment has been greatly reduced. Opening a fire mission in 'effect' when the regiment had a large footprint would result in a much higher probability of 'target rounds'. Through precision and accuracy, a regiment of eight guns can achieve an even higher probability. Precision will have a synergetic effect for the current regiment.

10. Another significant advantage of precision artillery munitions is the easing of burden on the logistics system.[10] Historically, artillery ammunition resupply has been extremely taxing on the logistics system. The current state of the corps' echelon system exasperates this issue. During regimental exercises it is common to see two or even only one ammunition resupply vehicle doing resupply for the entire regiment. Although it remains in doctrine, the battery echelon system is all but non-existent today. B-fleet reduction has certainly played a role in the diminished echelon capability but even if the corps regains the capability, the use of guided munitions will ease the inevitable problem of artillery resupply. Using guided rounds as a convention rather than exception, artillery units will significantly become more efficient in the expenditure of rounds. Ensured precision will result in fewer rounds wasted in adjustment, registration missions, etc., thus significantly reducing resupply requirements and even the size of basic combat loads if so desired.[11]

11. In precision targeting, a precise and accurate weapon is only part of the equation. The precise and accurate acquisition of target location is equally important and essential to the effective use of PGMs. It is beyond the scope of this paper to discuss the various categories of location precision and accuracy. Suffice to say, when using precision weapons, a PGM can only be as accurate as the target location it is given.[12] Target mensuration software such as Precision Strike System – Special Operations Forces (PSS-SOF) enable forces to get extremely precise and accurate target locations which

[10] J.R. Wilson, "The Future of Precision-Guided Munitions." Military & Aerospace Electronics, Vol 20, no. 12, 2009.

[11] *Ibid*.

[12] Rupert Pengelley. "Excalibur Precision Munitions to be trailed in Spain." *Janes International Defence Review*, 2014, sec 47.

facilitates the use of PGMs.[13] Although PSS-SOF is employed by the Canadian Army on operations, its use is limited in the field force. In order to effectively employ artillery delivered PGMs, this software, or another which provides the same capability, needs to be employed by forward observers. Observers and Joint Terminal Attack Controllers (JTACs) in the Royal Artillery have been equipped with a small, compact tablet-like computer which provides access to PSS-SOF and the ability to determine accurate and precise target grids. Canadian observers have no such capability but must if the corps wishes to take full advantage of PGM capabilities.

12. If there is one aspect of PGMs that may dissuade today's army and artillery corps from fully embracing their use it is likely the cost. When comparing conventional rounds to PGMs, round for round the PGM is obviously more expensive. In order to conduct a fair comparison however, it is important to consider the advantages of PGMs as described above as well as the fact that the cost of PGM technology continues to decrease.[14] When the cost savings of logistics, decreasing cost of PGM technology and efficiency of round expenditure is added to the tactical benefits of rapid, accurate and precise fires, it becomes clear that the benefits of PGMs greatly offset the disadvantage of a higher cost per round.

CONCLUSION

13. Today's defence and security environment will likely go unchanged for the foreseeable future. Terrorism, hybrid warfare consisting of state and non-state actors, an enemy relying on insurgent and guerilla tactics, and a society which does not accept

[13] Rupert Pengelley, "Lockheed Offers Exportable Target Mensuration Capability." *Jane's International Defence Review*, 2012, sec. 45.

[14] Murray Brewster, "Canadian Army Begins Using $150,000 Artillery Shells in Afghanistan."

unnecessary collateral damage will define the defence and security environment for years to come. From the Taliban, to Al Qaeda, to ISIS, there is no shortage of adversaries willing to use population centers and built up areas to provide cover and provide western forces with collateral damage concerns which can slow and even halt the targeting process. In order to stay relevant and capable of defeating such an enemy, the Canadian Army must possess the ability of precision strike. As a major part of Canadian Army fire power, the Royal Regiment of Canadian Artillery must fully embrace the role of precision fires and the benefits it provides. For the foreseeable future, accuracy and precision is how the artillery corps can remain a relevant weapon of choice in irregular, asymmetric warfare. Precision will also facilitate the rapid and accurate engagement of the enemy in the conventional fight and must not be considered as any less important in potential state on state conflict.

RECOMMENDATIONS

14. The Royal Regiment of Canadian Artillery needs to fully embrace its potential as a precision fires system. The guns have always been an excellent area weapon, ideal for supressing and/or neutralizing enemy targets. In order to remain a relevant and effective source of fire power for the Army, the Regiment must, as Lieutenant-General (Ret.) Devlin stated, "continue to innovate and adapt."[15] With precision guided artillery munitions, field artillery units are now capable of providing commanders with a 24/7 precision strike capability. The Army must begin large scale procurement of artillery delivered PGMs to ensure it has an integral precision fires system to meet the needs of current and future conflicts. In order to facilitate the effect use of PGMs, technology such

[15] Canada, Dept. of National Defence, Designing Canada's Army of Tomorrow: A land Operations 2021 publication, 3.

as PSS-SOF must be made available at the tactical level. Forward observers and JTACs require this capability in order to ensure PGMs are as accurate as they are precise.

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