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CLOSE COMBAT VEHICLE AND LEOPARD 2 MAIN BATTLE TANK: BACK IN THE HEAVYWEIGHT FIGHT

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Master of Defence Studies

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By Major Howard Mark Anthony, CD

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LIST OF ABBREVIATIONS

AFV- Armoured Fighting Vehicle

AHSVS- Armoured Heavy Support Vehicle System

AO- Area of Operations

AP- Armour Piercing

APV- Armoured Patrol Vehicle

BG- Battle Group

CA- Canadian Army

CAS- Close Air Support

CCV- Close Combat Vehicle

CDS- Chief of Defence Staff

CF- Canadian Forces

COE- Contemporary Operating Environment

CMBG- Canadian Mechanised Brigade Group

COIN- Counterinsurgency

CTIS- Central Tire Inflation System

CW- Conventional Warfare

DND- Department of National Defence

DOD- Department of Defense (US)

EFP- Explosively Formed Projectile

FEC- Force Employment Concept

FSE- Future Security Environment

HETS- Heavy Equipment Transport System

HWF- Heavy-weight force(s)

IDF- Israeli Defence Force

IED- Improvised Explosive Device

IFV- Infantry Fighting Vehicle

ISAF- International Security Assistance Force

JTF- Joint Task Force

KE- Kinetic Energy

KIA- Killed In Action

LdSH(RC)- Lord Strathcona's Horse (Royal Canadian)

LAV- Light Armoured Vehicle

LGen- Lieutenant-General

LORIT- LAV Operational Requirements Integration Task

LUVW- Light Utility Vehicle Wheeled

LWF- Light-weight force

MBT- Main Battle Tank

MGS- Mobile Gun System

MND- Minister of National Defence

MRP- Managed Readiness Plan

MSVS- Medium Support Vehicle System

MWF - Medium-weight force

PPCLI- Princess Patricia's Canadian Light Infantry

PWGSC- Public Works Government Services Canada

QRF- Quick Reaction Force

R22eR- Royal 22nd Regiment

RCAF- Royal Canadian Air Force

RCD- Royal Canadian Dragoons

Ret'd- Retired

RCR- Royal Canadian Regiment

RPG- Rocket Propelled Grenade

SME- Subject Matter Expert

SOR- Statement of Operational Requirement

SPG- Self-propelled Gun

TAPV- Tactical Armoured Patrol Vehicles

USTACOM- U.S. Army Tank-automotive and Armaments Command

TFK- Task Force Kandahar

TTP- Tactics Techniques and Procedures

US- United States

USMC- United States Marine Corps

ABSTRACT

This is a persuasive paper, which examines the impact of the Leopard 2 Main Battle Tank (MBT) and the Close Combat Vehicle (CCV) on the Canadian Army (CA). In particular, it will examine the effect of these vehicles on the way in which the CA will fight within the *Army of Tomorrow*. It will contend that with the introduction of these Armoured Fighting Vehicles (AFV), the CA will gain a heavyweight tactical ability, which will enable it to fight across the complete spectrum of conflict in order to achieve operational level objectives. It will also demonstrate that the introduction of these AFVs is required in order to ensure the CA remains a multi-purpose and strategically relevant combat capable force.

In order to support this argument, this paper will examine how the lessons learned from recent conflicts have changed the CA's view on the Force Employment Concept (FEC) and has rekindled the requirement for heavy-weight forces (HWF) remaining a vital part of the CA. It will conclude with an analysis of HWF in a counterinsurgency (COIN) campaign and the lessons learned from the CA's recent experiences in Afghanistan.

This paper concludes that although the CA intends to endure as a medium-weight force (MWF) with elements of a HWF task tailored as required for a mission, the fact remains that the CA will soon have the ability to employ a complete HWF based Joint Task Force (JTF), if it so desires. This would allow the CA to contribute to a wider array of multi-national missions across the spectrum of conflict, while simultaneously enabling Canada to make a greater impact on the world stage.

CLOSE COMBAT VEHICLE AND LEOPARD 2 MAIN BATTLE TANK: BACK IN THE HEAVYWEIGHT FIGHT

INTRODUCTION

The intensity and complexity of recent military operations in countries like Lebanon, Iraq and Afghanistan have shown that main battle tanks provide military forces with protection, mobility and firepower that cannot be matched by more lightly armoured wheeled vehicles.¹

The Close Combat Vehicle (CCV) will provide the Canadian Forces with a medium- weight infantry fighting vehicle that is both highly protected and tactically mobile.

The CCV will allow infantry to operate in intimate support of the Leopard 2 tanks, providing the Army with a more balanced and integrated fleet. This vehicle's reliable protection and enhanced mobility and firepower will improve our troops' combat effectiveness on the battlefield of today and tomorrow.²

The CA recently has made many major capital equipment purchases during the last five years, including the AHSVS (Armoured Heavy Support Vehicle System), M777 155mm Artillery, MSVS (Medium Support Vehicle System) and RG-31 TAPV (Tactical Armoured Patrol Vehicles) to name but a few. However, there are two platforms or vehicles, which have been subjects of much discussion within the CA and within defence circles. These are the recent introduction of the Leopard 2 MBT and the soon to be acquired CCV.

¹ Canadian Army Strategic Review, "Tank Replacement Project- Upgrade and Conversion of up to 100 Used Leopard 2 Tanks in Canada- MERX LOI Notice," <http://www.casr.ca/doc-loi-leopard-tank.htm> ; Internet; accessed 21 January 2012.

² Canada. Department of National Defence Backgrounder. "Close Combat Vehicle," BG 09.016, 8 July 2009, <http://www.forces.gc.ca/site/news-nouvelles/news-nouvelles-eng.asp?id=3036> ; Internet; accessed 21 January 2012.

The Leopard 2 MBT is a modern successor to the current CA Leopard C2 MBT. The Canadian version began to enter service in 2010. The CCV is essentially a heavily armoured Infantry Fighting Vehicle (IFV). It is currently not in service and at the time of drafting this paper, the potential contenders were undergoing final tests and evaluation.

The Leopard 2 MBT and the CCV are both considered heavy AFVs, which according to CF doctrine, are vehicles “over 40 tonnes in combat weight.”³ The primary armament of the Leopard 2 MBT is a 120mm cannon and the CCV will be armed with a weapons system “able to destroy protected dismounted troops, soft skin vehicles, LAVs [Light Armoured Vehicle].”⁴ HWF are, according to CA doctrine, “characterized by large physical mass, particularly in its major weapon systems.”⁵ Therefore, the Leopard 2 MBT and the CCV would fall into the category of HWF.

The CA is no stranger to HWF and it has never lost the capability to operate and employ these forces, as evidenced by recent operations in Afghanistan. However, in the late 1990’s the Canadian Army started to move away or transform itself from a heavy-weight mechanized force structure designed for conventional warfare (CW) to a MWF based primarily on a wheeled fleet. The idea was to move beyond its Cold War constructs as a conventional force trained to fight the Soviets on a Western European

³ Canada. Department of National Defence. B-GL-310-001/AF-001, *Toward Land Operations 2021: Studies In Support of the Army of Tomorrow Force Employment Concept*, ed. Major Andrew B. Godefroy and Peter Gizewski. Directorate of Land Concepts and Design. (Kingston, ON: DND Canada, 2009), 6-13.

⁴ Canada. Department of National Defence. *Preliminary Statement of Operational Requirement: Close Combat Vehicle*, Version 1.1, Director of Land Requirements. (Ottawa, ON: DND Canada, June 2010), 51.

⁵ Canada. Department of National Defence. *Advancing With Purpose: The Army Strategy*. Director of Land Strategic Planning. (Ottawa, ON: DND Canada, May 2002), 31.

battlefield to one that would be able to operate effectively in the future security environment (FSE).⁶

Land Force Strategic Direction and Guidance in 1998 was the first document to outline the Army's plan for transformation, while aligning itself with the CF three-horizon future security and force planning concept. This concept divided the future into distinct periods. The short term would be the *Army of Today* (0-5 years), the mid-term the *Army of Tomorrow* (5-10 years), and the long term the *Army of the Future* (10-30 years).⁷

Army transformation was further developed and articulated in the Army doctrine strategy of 2002, *Advancing with Purpose: The Army Strategy*.⁸ This document set the conditions for Army transformation and was the first keystone publication for the Canadian Army in the post 9/11 world. It also set the stage for the *Army of Tomorrow* while conceptualizing the *Army of the Future*. This strategy eventually led to the creation of the *Interim Army*, which was a blueprint for an interim land force structure defining what the Army would look like before transitioning to the *Army of Tomorrow*. It provided a gap measure to link the existing Army force structures to the *Army of Tomorrow*.⁹

⁶ Canada. Department of National Defence. *Land Operations 2021 (Adaptive Dispersed Operations): The Force Employment Concept for Canada's Army of Tomorrow*, ed. Major Andrew B. Godefroy. Directorate of Land Concepts and Design. (Kingston, ON: DND Canada, 2007), 8.

⁷ *Ibid*, 3-3 to 3-4.

⁸ Andrew B. Godefroy. "Chasing The Silver Bullet: The Evolution of Capability Development in The Canadian Army," *Canadian Military Journal*, Spring 2007, 63.

⁹ Canada, *Toward Land Operations 2021*, 3-6.

Advancing with Purpose stated that the Army Commander's vision, which formed the basis of the Army strategy was that the "Army will generate, employ and sustain relevant and tactically decisive medium-weight forces."¹⁰ This document defines a MWF as one which:

exploits technology to achieve the high levels of lethality and protection formerly provided by weight, to enhance strategic responsiveness and operational and tactical agility and combat power. The reduction in physical mass enhances deployability facilitating the exploitation of future strategic airlift and surface vessels.¹¹

After in depth analysis and feedback from various levels of command within the Army, on 31 March 2004, the Army published its *Interim Army* force employment concept. According to this concept, the Army then began to:

transform some of its organizations towards a command-centric, knowledge-based, medium-weight infrastructure that was capable of applying the five operational functions of Command, Sense, Act, Shield, and Sustain across the entire spectrum of conflict.¹²

The *Army Futures Project* was published in 2002 shortly after *Advancing with Purpose*. Its aim was to "complete the conceptual design of the *Army of Tomorrow* that would evolve out of the *Interim Army* model."¹³ The first task of the project was to determine the environment in which the *Army of Tomorrow* would operate as well as the capabilities it would require. *Future Force: Concepts for Future Army Capabilities* would be the end-product document of this study that established the road map and

¹⁰ Canada, *Advancing With Purpose*, 13.

¹¹ *Ibid*, 31.

¹² Canada, *Toward Land Operations 2021*, 3-8.

¹³ *Ibid*.

security environment for a new force employment concept to connect the *Interim Army* to the *Army of Tomorrow*.¹⁴

After a series of workshops, working groups, war games, experiments and operational feedback the Army published its new FEC, *Army 2021: The Force Employment Concept for the Army of Tomorrow*. This new FEC came into effect on 31 March 2007, clearly demonstrating that the Army had “successfully transitioned from a Cold War conceptual and doctrinal design to one prepared to face the challenges of the current environment as well as those emerging on the horizon.”¹⁵

The question then is how can the Canadian Army justify purchasing the Leopard 2 MBT and the CCV, both of which are classified as vehicles within the HWF class, if all of their doctrine indicates that they are moving towards a MWF? A follow on to this question is that if they are justified in acquiring these AFVs will their introduction change the way in which the Canadian Army will be employed and fight in both the *Army of Tomorrow* and the *Army of the Future*?

THESIS

This paper will argue that the introduction of the Leopard 2 MBT and the CCV will provide the Canadian Army with a heavyweight tactical capability, which will enable it to fight across the complete spectrum of conflict in order to achieve operational level objectives.

¹⁴ Canada, *Toward Land Operations 2021*, 3-9.

¹⁵ *Ibid*, 3-10.

The methodology for this analysis will utilize current CF and CA doctrine as well as recent lessons learned from CA operational experiences in Afghanistan. It will also examine doctrine and operational experiences from allied nations and technical expertise and analysis from CF and allied subject matter experts (SME). It will also draw on modern historical examples.

This paper will not be a technical assessment of the type of AFVs the Army has acquired or should have acquired. This will be left to the trained technical staff officers. Instead, this will be a paper discussing combat capability and the shift from HWF to MWF and the recent diversion back to elements of HWF and their effect on our doctrine and Tactics, Techniques, and Procedures (TTPs) as well as the effect on the Army's overall combat capability. It will also focus solely on the impact of the Leopard 2 MBT and CCV.

This paper will also explore the notion that with the acquisition of elements of a HWF the CA is now in a better position to participate in other types of multi-national operations, which require HWF. This list would include major combat operations against other conventional military forces. This ability would in turn allow the CA to have an impact at the operational level by enabling it to achieve operational objectives through tactical success. It would also help strengthen strategic relevancy for the CA while simultaneously generating new strategic options for the Government of Canada. The CA would now have a brand new set of tools in the toolbox that it could use to achieve its international strategic objectives and protect the national interests of Canada.

This paper will be divided into three areas of examination. Chapter 1 – “Defining the Requirement,” will discuss the origin and driving force behind the requirement for the Leopard 2 and the CCV. The main argument of this chapter will be that the selection of the Leopard 2 and the CCV was primarily based on the CA operational experience in Afghanistan. In particular, the operational and political impact of improvised explosive devices (IED) and their inherent damage resulted in the desire to acquire vehicles that offered better protection and reduced casualties.

Chapter 1 will begin with a discussion of the origin of the driving force behind the shift towards reinvigorating HWF within the CA. It will include a brief description of the differences between the current CA fleet of medium-weight AFVs and the new fleet of heavyweight AFVs in terms of tactical capabilities in the contemporary operating environment. Next, it will discuss the need to mitigate risks on operations without sacrificing strategic objectives, especially in the risk averse climate in which the CA must operate today. Specifically, it will discuss how HWF can in many instances; reduce the likelihood of casualties permitting commanders to take risks that they would be unwilling to take with light or medium-weight forces. Finally, it will conclude with a discussion on the influence of the Government of Canada and the part they played in selecting these AFVs. In particular, it will examine the role they played in accepting the need for these heavyweight vehicles as a means of reducing casualties in Afghanistan and in future operations, while simultaneously gaining public support for the mission and the government.

Chapter 2 – “A shift from Light and Medium Forces,” will discuss in detail the relevancy and importance of shifting from an Army able to participate only in low to

medium intensity operations to one that would be able to participate in full spectrum operations. The main argument of this chapter will be that with the introduction of the Leopard 2 MBT and the CCV the CA will be able to participate in full spectrum operations, specifically up to high intensity conventional operations against an enemy armed with heavy mechanized forces. It will begin with an examination of the current operational capabilities and limitations of the light and medium-weight forces within the CA. It will then contrast these with the capabilities and limitations of HWF. Next, it will discuss the ability of the CA to support all three types of forces, light, medium, and heavy. In particular, it will examine the training, maintenance and logistical difficulties of sustaining three different types of forces within a small army. Finally, it will conclude with a discussion on the institution's reluctance within the CA to fully embrace the concept of HWF. This reluctance will be examined from the perspective that despite the introduction of the heavyweight vehicles and capabilities, the CA is reluctant to move beyond its MWF construct.

Chapter 3 – “Heavy Forces in a COIN Campaign,” will discuss the impact and effects of HWF employed during a COIN campaign. The main argument of this chapter will be that HWF can successfully be employed in support of a COIN campaign, but need to be carefully managed and controlled in order that their impact only is felt by the insurgents and not the people whom you are supporting. This chapter will begin with an examination of the impact of the Leopard 2 MBT had during CA COIN operations in Afghanistan. It will examine only the MBT and not the CCV, as it is not yet in service. The examination will focus on why it was employed and its tactical success as well as the operational and strategic impacts that resulted from that employment. Next, it will

discuss the successes and failures of other armies that have employed HWF in support of a COIN campaign. The discussion will focus mainly on the lessons learned by other armies in regards to the employment of HWF and if their employment made a difference and what impact they had on both the insurgents and the people they were supporting. Finally, it will conclude with a discussion on the likelihood of the CA employing HWF during future COIN campaigns.

The conclusion of this paper will provide a summary of deductions that were determined throughout the course of this paper. It will then give an assessment on the fiscal and political likelihood of maintaining HWF within the *Army of Tomorrow*. This section will close with a recommendation on the way ahead for HWF being employed as a Joint Task Force in the *Army of the Future*.

CHAPTER 1

DEFINING THE REQUIREMENT

“While the Army will be largely a medium-weight force, some robust armoured capabilities, such as tanks, infantry fighting vehicles and specialized armoured engineer and logistic vehicles, will also be available in small numbers to reinforce a deployed medium-weight force when required.”

*Army Strategy, circa 2008*¹⁶

INTRODUCTION

A HWF structure according to the CA doctrine of 2002, *Advancing with Purpose*, would not be part of the FEC. Instead, it contended that the “Army will generate, employ and sustain relevant and tactically decisive medium-weight forces.”¹⁷ There is no mention in the strategy of employing HWF to “reinforce” MWF. Why was there a shift in Army transformation strategy that has almost taken the CA in a complete circle? Specifically, what was the driving force behind the decision to acquire MBT and CCV? This chapter argues that the primary reason for this shift was predominately based on the operational experience of the CA in Afghanistan and the need for enhanced protection.

This chapter will begin with a discussion of the origin of the driving force behind the strategy shift towards reinvigorating HWF, in particular the MBT and CCV within the CA. It will include a brief description of the differences between the current CA fleet of medium-weight vehicles and the new fleet of heavyweight vehicles in terms of tactical capabilities in the contemporary operating environment. Next, it will discuss the need to

¹⁶ Canada. Department of National Defence. *Advancing With Purpose: The Army Strategy*. 2nd Edition (2009). 4th Draft 2008. Director of Land Strategic Planning. Ottawa, ON: DND Canada, December 2008, 13.

¹⁷ *Ibid.*

mitigate risks on operations without sacrificing strategic objectives, especially in the risk averse climate in which the CA must operate today. Specifically, it will discuss how HWF in many instances can reduce the likelihood of casualties permitting commanders to take risks that they would be unwilling to take with light or medium-weight forces. Finally, it will conclude with a discussion on the influence of the Government of Canada and the part they played in selecting these AFVs. In particular, it will examine the role they played in accepting the need for these heavyweight vehicles as a means of reducing casualties in Afghanistan and in future operations, while simultaneously gaining public support for the mission and the government. It will close with a very brief discussion on how the increased tactical capabilities of HWF will improve the ability of the CA to fight across the spectrum of conflict.

A PARADIGM SHIFT

In 2004, the Canadian Minister of National Defence (MND), David Pratt announced that the Canadian government would be purchasing the General Dynamics Mobile Gun System (MGS). This system is an AFV based on the wheeled LAV III platform, incorporating a 105mm cannon intended to replace the direct fire role of the Leopard C2 MBT.¹⁸ Minister Pratt made the following public statement regarding the rationale behind acquiring the MGS:

The Mobile Gun System is part of the government's commitment to modernize the Canadian Forces. This \$521 million project will

¹⁸ Christopher F. Foss, *Jane's Armour and Artillery: 2011-2012*. 32nd ed. (Alexandria, Virginia: Jane's Information Group Inc, 2011), 219-221.

provide our soldiers with a valuable tool for use in future operations in a changing international security environment.¹⁹

This statement confirmed that the Canadian government was committed to the CA's plan for transforming into a modern MWF able to meet the challenges in the future security environment.

The MGS according to John Ulrich, senior vice president of GDLS-Canada at the time, would "provide Canadian forces with a fast, highly mobile, highly lethal gun system, just as it will for the U.S. forces."²⁰ It was definitely a vehicle, which matched the CA's strategy for MWF as reflected in *Advancing with Purpose*. However, in April 2007 Canada decided to abandon its plans to acquire the MGS instead opting for a new fleet of refurbished Leopard 2 MBT.²¹ What was the catalyst or driving force behind this paradigm shift?

In order to answer the aforementioned question it is important to note what the focus was for the CF in 2006-2007. During this time, Canada was fighting a COIN campaign against Taliban insurgents in Afghanistan with a MWF. In terms of AFVs, the CA was employing its medium-weight LAV III. The LAV is an eight-wheeled AFV, which has a combat weight of 20 tonnes. It is armed with a 25mm Bushmaster cannon, two 7.62mm machine guns (coaxial mounted and pintle mounted on top of the turret), and eight 76mm smoke grenade dischargers with an integrated fire control system

¹⁹ Ann Roosevelt, "Canada To Negotiate With General Dynamics To Buy Mobile Gun Systems," *Defence Daily*, 16 April 2004, [journal on-line]; available from http://findarticles.com/p/articles/mi_6712/is_12_222/ai_n29091338/; Internet; accessed 28 January 2012.

²⁰ *Ibid.*

²¹ Ann Roosevelt, "Canada Cancels Plans For Mobile Gun System, Turns To Tanks," *Defence Daily*, 17 April 2007, [journal on-line]; available from http://findarticles.com/p/articles/mi_6712/is_11_234/ai_n29345528/; Internet; accessed 28 January 2012.

including a thermal imager. It is manned by a crew of three (driver, gunner, and commander) and normally has an Infantry Section of seven soldiers in the crew compartment. The LAV entered service with the CA in 1999.²²



Fig 1.1: LAV III IFV: Infantry Section Carrier Version.

Source: <http://www.casr.ca/bg-army-armour-lav-upgrade.htm>.

The LAV was more than a match for the Taliban insurgents who often operated in small numbers of five to ten fighters, who would amalgamate into a platoon size formation of 20-40 fighters for larger attacks.²³ They primarily attacked and moved on foot or via soft-skinned vehicles such as civilian cars or motorcycles as they had no AFVs.²⁴ However, in the summer of 2006 the Taliban in Kandahar province changed their tactics from traditional guerrilla tactics of ambushes and small raids to tactics in which they would stand and fight. Military historian and CF officer, Colonel Bernd Horn noted that in 2006 the “Taliban had chosen to build-up and posture themselves in a conventional manner, namely by digging-in, building fortifications, and holding

²² Foss, 505.

²³ Lieutenant-Colonel Ian Hope. *Dancing with the Dushman: Command Imperatives for the Counter-Insurgency Fight in Afghanistan*. Department of National Defence. (Kingston, ON: Canadian Defence Academy, 2008), 34.

²⁴ *Ibid*, 33-36.

ground.”²⁵ This was a change in insurgent tactics that the CF and the International Security Assistance Force (ISAF) did not expect. The coalition forces saw this move to CW as an unwise tactical decision on the part of the Taliban due to the superior firepower of the ISAF coalition forces.²⁶ However, defeating the Taliban would not be simple.

By September the CA, as part of Task Force Kandahar (TFK) found itself directly up against this new threat when they became an integral part of Operation MEDUSA: The Battle for Panjawai in Kandahar province. This was an operation, according to Colonel Horn, with the mission of “[destroying] insurgent forces poised to launch a major attack to capture Kandahar city, thereby threatening the tenuous hold the central Government of Afghanistan held over the country.”²⁷

MEDUSA, according to Colonel Horn, “was a force-on-force battle against an enemy that employed a classic Soviet tactical defence.”²⁸ The enemy consisted of an estimated 500 fighters armed with various small arms, Rocket Propelled Grenades (RPG), mortars and 76mm/82mm Self-propelled Guns (SPG) anti-tank guns.²⁹ These weapons were all employed in defensive positions that used natural and man-made obstacles that were very resilient against 25mm LAV cannon fire and hampered the mobility of the LAV.³⁰ Furthermore; these positions were reinforced with many IEDs

²⁵ Colonel Bernd Horn. *No Lack of Courage: Operation Medusa, Afghanistan*. (Toronto: Dundurn Press, 2010), 41.

²⁶ *Ibid.*

²⁷ *Ibid*, 13.

²⁸ Adam Day. “Operation Medusa: The Battle for Panjwai - Part 3: The Fall of Objective Rugby.” *Legion Magazine*, January/February 2008, 22.

²⁹ Horn. *No Lack of Courage*, 39.

³⁰ *Ibid*, 41.

that hindered both mounted and dismounted mobility.³¹ Lieutenant-Colonel Shane Schreiber, the Operations Officer for the NATO Multi-National Brigade HQ (TFK Higher HQ in Afghanistan) during MEDUSA described the enemy preparations:

[The Taliban] had a battalion defensive position fully dug-in with complex robust command and control capability with mutually supporting positions and advanced surveillance and early warning.³²

MEDUSA was conducted using the LAV as the main AFV, which had performed admirably thus far due to its robustness to withstand enemy small arms fire and the harsh Afghan terrain, while giving TFK the ability to conduct its operations with speed and flexibility.³³ Although it lacked the firepower and protection of a MBT, it was highly feared by the Taliban, who often referred to it as “the Dragon that shits white men.”³⁴ Its capabilities should have been more than a match for foot-borne insurgents. Despite these capabilities, the employment of the LAV during MEDUSA was contrary to CA doctrine, which upholds the principle: “attacking with tanks is the rule.”³⁵ Unfortunately, TFK had no choice as they lacked MBTs and the MGS was yet to be in CA service. TFK instead planned to rely on the added firepower of close air support (CAS) and indirect artillery fire to neutralize the Taliban positions before assaulting with the LAV III equipped infantry.³⁶

³¹ Horn, *No Lack of Courage*, 41- 43.

³² *Ibid*, 41.

³³ *Ibid*, 28.

³⁴ *Ibid*.

³⁵ Canada. Department of National Defence. B-GL-321-007/FP-001, *LAV Company Tactics (Interim)*. Directorate of Army Doctrine (Kingston, ON, 14 October, 2003), 73.

³⁶ Colonel Bernd Horn. *From Cold War to New Millennium: The History of the Royal Canadian Regiment, 1953-2008*. (Toronto: Dundurn Press, 2011), 295.

The initial attack during MEDUSA began with a river crossing (dry riverbed) on the approach to the main Taliban position without the benefit of any heavy direct fire support or heavy armoured engineer vehicles.³⁷ This phase of the operation would be considered an obstacle breaching drill in CA doctrine, which states: “obstacles are normally breached by a combination of engineers, plough and roller tanks [with] assault tanks providing fire support for the breaching.”³⁸ The initial stage of this procedure is illustrated in Figure 1.2, which demonstrates that tanks are normally the forward elements that provide the main fire support to a breach due to their excellent firepower and protection. They can also be fitted with tactical mobility implements to execute breaching operations, including mine rollers, mine ploughs, and dozer blades. Although an Engineer LAV, Zettlemeyer (wheeled front-end loader), and a bulldozer were used to support the obstacle breaching, they were only lightly armoured as compared to an AEV.³⁹ AEVs, like the CA Badger (Leopard 1 based) are designed to “operate under heavy fire.”⁴⁰ Although the Engineering vehicles were able to provide some breaching capability during MEDUSA their limited mobility and lack of armour resulted in at least one immobilized vehicle (Engineer LAV) and one vehicle casualty, the Zettlemeyer, disabled from an 82mm recoilless rifle.⁴¹

³⁷ Horn. *From Cold War to New Millennium*, 297-298.

³⁸ Canada, *LAV Company Tactics*, 75.

³⁹ Horn, *No Lack of Courage*, 62-78.

⁴⁰ Canada. Department of National Defence Backgrounder. “Force Mobility Enhancement,” BG 09.018, 8 July 2009, <http://www.forces.gc.ca/site/mobil/news-nouvelles-eng.asp?id=3038> ; Internet; accessed 20 February 2012.

⁴¹ Horn, *No Lack of Courage*, 67-70.

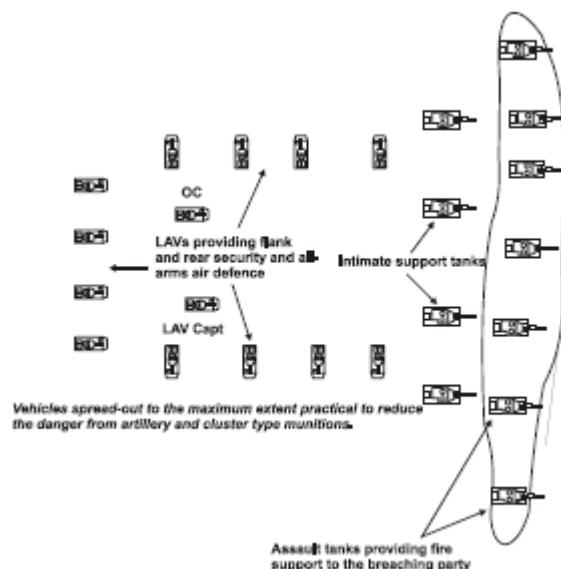


Fig 1.2: Action in the Attack Position during Breaching

Source: Canada. Department of National Defence. B-GL-321-007/FP-001, *LAV Company Tactics (Interim)*. Directorate of Army Doctrine (Kingston, ON, 14 October, 2003), 76.

In order to put MEDUSA into perspective, the CA conducted, according to *Legion Magazine* author, Adam Day, “its first company-sized mechanized combined arms attack on a fixed position since the Korean War.”⁴² This attack was also conducted using only a lightly protected IFV against a heavily fortified and dug-in enemy armed with anti-tank weapons without the added firepower, protection, and mobility of MBTs. This operation not only went against CA doctrine and training, but the CA was not prepared for this type of operation when they deployed to Afghanistan in 2006.⁴³ Although, the battle eventually ended in success for NATO it was not without cost, as the

⁴² Adam Day. “Operation Medusa: The Battle for Panjwai - Part 1: The Charge of Charles Company.” *Legion Magazine*, January/February 2008, 28.

⁴³ *Ibid.*

Canadians suffered five killed in action (KIA) and approximately 40 wounded.⁴⁴ They also had three vehicles put out of action, including one LAV during the initial assault.⁴⁵

There are those in the CA that have argued that tanks would have made a significant difference in MEDUSA during the initial assault on the Taliban main defensive positions. The Deputy Commanding Officer of the 1st Battalion, The Royal Canadian Regiment (1 RCR) BG during MEDUSA, Lieutenant-Colonel Martin Lipcsey recently summarized the effect tanks would have had during MEDUSA:

Tanks would have made a significant impact during the initial assault onto the Taliban strong points in terms of their firepower and protection, if we had them in theatre and were able to employ them.⁴⁶

A counter-argument that disputes that the use of tanks would have made a difference during MEDUSA is that the use of CAS could have saved the day. CAS was actually used to engage targets during MEDUSA, but according to Colonel Horn, “inexplicably, Brigade HQ cancelled a planned air strike on a number of known or suspected Taliban command-and-control nodes.”⁴⁷ The author of this paper has spoken to several officers and soldiers, who participated in MEDUSA and will remain nameless; who have claimed that had CAS been better employed it would have made a difference in the battle. In regards to the use of tanks versus CAS, there is a significant difference in their abilities to support an attack in that tanks during an assault, according to CA

⁴⁴ Horn, *From Cold War to New Millennium*, 321.

⁴⁵ *Ibid*, 310-313.

⁴⁶ Lieutenant-Colonel Martin Lipcsey, Former DCO of 1st Battalion, The Royal Canadian Regiment Battle Group 2006-2007, telephone conversation with author, 4 February 2012.

⁴⁷ Horn, *No Lack of Courage*, 55.

doctrine, “provide intimate support for the infantry.”⁴⁸ CAS, on the other hand is defined as “air action against targets that directly affect the course of the land battle and are in close proximity to friendly land forces.”⁴⁹ The key difference is that tanks, like LAVs can provide intimate fire support whereas CAS cannot. According to CA doctrine in regards to intimate fire support,

Intimate support does not refer to the proximity of the LAVs to the supported infantry. It is a measure of the responsiveness of the supporting unit and the effectiveness of the fire. For the LAVs to provide intimate support, they must be able to communicate directly with the supported organization and must be able to respond quickly with effective fire.⁵⁰

CAS as per CA doctrine should be considered complementary fire support assets to an attack, much like attack helicopters and artillery.⁵¹ In the end, MEDUSA exposed the limitations of MWF in conventional operations while reinforcing the rationality of maintaining HWF within the CA.

The experience and lessons from MEDUSA did not fall on deaf ears and the CA along with the CF responded swiftly. The CF recognized the changing security situation and the need for HWF. As a result, on 15 September 2006, before MEDUSA was even completed, then Chief of Defence Staff (CDS) General Rick Hillier announced that up to

⁴⁸ Canada. Department of National Defence. B-GL-305-001/FT-001, *The Armoured Regiment In Battle (Volume 1)*. Mobile Command Headquarters (St-Hubert, Quebec, 31 December 1990), 19.

⁴⁹ Canada. Department of National Defence. B-GL-300-001/FP-001, *Firepower*. Directorate of Army Doctrine (Kingston, ON, 9 February 1999), 34.

⁵⁰ Canada, *LAV Company Tactics*, 69.

⁵¹ Canada, *The Armoured Regiment In Battle*, 182.

15 Leopard C2 tanks would be sent to Afghanistan.⁵² The CA Commander at the time, Lieutenant-General Andrew Leslie commented on the reason for the change:

Leopard tanks will prove to be a valuable asset for troops in Afghanistan. A tank is a big machine that's good in a fight, and it's got more protection than any other vehicle we have in the Canadian Army. The Leopard will be able to provide direct-fire support as well as help extract damaged LAV-3s.⁵³

The Leopard C2 MBTs proved to be an invaluable asset to TFK according to lessons learned reports that stated: “[tanks] enhanced the protection of CF troops, deterred insurgent attacks and cleared routes of mines and explosives with ploughs and dozer blades.”⁵⁴ The superior mobility of these tracked vehicles also provided TFK with the “capability to access the insurgent defensive positions in terrain that would otherwise be impassable to wheeled armoured vehicles.”⁵⁵ However, not all was well with the Leopard C2s and problems started to emerge. As these 30-year-old tanks began to be employed, several deficiencies came to light. The most obvious deficiency of the Leopard C2 was its age. Its technology was obsolete combined with the fact that it hadn’t been in production for several years and as a result spare parts availability became an issue.⁵⁶ As well, the Leopard C2 lacked any air conditioning further exasperated by

⁵² David Pugilese. “Canada Sending Leopard Tanks To Afghanistan,” *The Ottawa Citizen*, 29 December 2009, NP.

⁵³ *Ibid.*

⁵⁴ Canada. Department of National Defence. *Statement of Operational Requirement: Tank Replacement Project*, Director of Land Requirements. (Ottawa, ON: DND Canada, 21 August 2008), 10.

⁵⁵ *Ibid.*

⁵⁶ Defense Industry Daily, “Tanks for the Lesson: Leopards, too, for Canada,” <http://www.defenseindustrydaily.com/tanks-for-the-lesson-leopards-too-for-canada-03208/>; Internet; accessed 21 January 2012.

the heat produced from its antiquated hydraulic systems, which made it very uncomfortable and dangerous for its crew in the extreme heat of Afghanistan.⁵⁷

The Leopard C2 MBT also had deficiencies in the areas of firepower and protection. In terms of protection, the Leopard C2 MBT was noted as being: “highly vulnerable to mine blasts and IEDs detonated underneath the belly of the vehicle”⁵⁸ as well as possessing limited protection from the rear of the vehicle.⁵⁹ Although attempts were made to improve the level of protection against IEDs and anti-tank weapons by adding modern armour protection, there remained shortcomings as it placed the vehicle at its weight limit for safe operation.⁶⁰ Furthermore, the hydraulic turret drive placed the crew at risk if the hydraulic system was ruptured in an attack; highly pressurized and super-heated hydraulic fluid could fatally burn the crew.⁶¹ In terms of firepower, the Leopard C2 MBT is armed with the 105mm L7A3 rifled gun,⁶² which although is more than a match for the Taliban it lacks the firepower to “engage in combat against a modern MBT in a warfighting situation.”⁶³

As a result of the deficiencies of the Leopard C2, the CF decided that it needed to acquire a new MBT. The Department of National Defence (DND) released the following public statement on 12 April 2007 highlighting the requirement for a new MBT:

⁵⁷ Canada, *Tank Replacement Project*, 10.

⁵⁸ *Ibid.*

⁵⁹ *Ibid.*

⁶⁰ *Ibid.*

⁶¹ *Ibid.*

⁶² Foss, 49.

⁶³ Canada, *Tank Replacement Project*, 10.

The heavily protected direct fire capability of a main battle tank is an invaluable tool in the arsenal of any military. The intensity of recent conflicts in Central Asia and the Middle East has shown western militaries that tanks provide protection that cannot be matched by more lightly armoured wheeled vehicles. Simply put, tanks save lives, providing soldiers with a high level of protection. In Afghanistan, the Taliban's use of lethal and readily available anti-armour weapons, such as improvised explosive devices (IEDs), is a clear threat. Canada's Leopard 1 tanks have provided close direct fire support and mitigated the threat of IEDs, as well as landmines. The tanks have also provided the Canadian Forces (CF) with the capability to travel to locations that would otherwise be inaccessible to wheeled light armoured vehicles, including Taliban defensive positions. Renewing Canada's tank capability will enable the CF to meet current operational needs in the short and long term. Canada's 30-year old Leopard 1 tanks are due for replacement, and Leopard 2 tanks offer more protection against IEDs and landmines; and are technologically more advanced than their predecessor. Furthermore, by 2012 there will no longer be logistics support and spare parts for the turrets of Leopard 1s, resulting in complete obsolescence by 2015.⁶⁴

This statement supports the argument that the primary reason for the shift towards HWF was predominately based on the operational experience of the CA in Afghanistan and the need for enhanced protection. It is this need to increase force protection that is highlighted above all other factors within this statement. Even its firepower and mobility are seen as complimentary capabilities to enhancing force protection.

As a result of a requirement for new MBTs Canada approached six allied nations regarding availability of surplus modern MBTs as the refurbishment of the existing fleet of Leopard C2 MBTs had already been maximized and new tanks would cost three times as much as surplus tanks with delivery years away.⁶⁵ DND and Public Works and Government Services Canada (PWGSC) then conducted a thorough evaluation process

⁶⁴ National Defence and the Canadian Forces, "Backgrounder: Renewing the Canadian Forces' Tank Capability," 12 April 2007," <http://www.forces.gc.ca/site/news-nouvelles/news-nouvelles-eng.asp?id=2252> ; Internet; accessed 5 February.

⁶⁵ *Ibid.*

based on price, availability, delivery time, operational performance, survivability and operating and maintenance costs. Following the evaluation, a decision was made to acquire up to 100 surplus Leopard 2A4 tanks from The Netherlands and negotiate a loan with Germany for 20 Leopard 2A6 main battle tanks to meet the immediate operational requirements in Afghanistan.⁶⁶

A possible counter-argument could be that the Leopard 2 MBT was simply acquired to replace the ageing Leopard C2 MBT and that any additional new capabilities that came with this acquisition were nothing more than selling features used to gain public support for new tanks. It is true that the Leopard C2 was well past its expiry date, but its level of protection, even with add-on armour was insufficient to meet the security challenges of Afghanistan and across the spectrum of conflict. It is contended that protection played the most significant role in this acquisition. It was already explained that the Leopard C2 was an antiquated design that reached its pinnacle in terms of protection upgrades and improvements. In other words, the Leopard C2 had gone as far as it could go without seriously hampering its performance. Furthermore, in April 2007, then Defence Minister Gordon O'Connor highlighted that protection was the primary reason for the acquisition in a statement:

Equipping Canada's soldiers with the best protection is my top priority. By immediately acquiring stronger and more heavily protected tanks, our soldiers in Afghanistan have the best equipment possible to offer them protection during this mission.⁶⁷

⁶⁶ National Defence, "Backgrounder: Renewing the Canadian Forces' Tank Capability," NP.

⁶⁷ Sharon Hobson. "Canada seeks Leopard solution for Afghanistan." *Jane's Defence Weekly*, 18 April 2007, NP.

Protection was without a doubt the predominate factor in acquiring the Leopard 2 MBT, although the Leopard C2 is old and need of replacement, it is doubtful that a new MBT would have been acquired if the Leopard C2 provided the required level of protection needed in Afghanistan. The Leopard 2 MBT would not be the only heavy weight vehicle that the CA would acquire based on the requirement to improve the protection of its soldiers.



Fig 1.3: Canadian Forces Leopard C2 MBT Up-armoured for Afghanistan

Source: Canadian American Strategic Review, <http://www.casr.ca/101-leopard-1-tank.htm> .



Fig 1.4: Canadian Forces Leopard 2 A4M CAN MBT In Afghanistan

Source: Canadian American Strategic Review, <http://www.casr.ca/doc-dnd-leopard-2a4m.htm> .

The LAV III is still considered the backbone of the CA; this view was confirmed by Lieutenant-General (LGen) Peter Devlin, Commander of the CA in a 2011 Defense

Review interview in which he stated: "We are a LAV-based army."⁶⁸ If this is the case, where did the requirement for the CCV originate? It is argued that this requirement originated from Canada's own operational experience in Afghanistan and those of its allies in Iraq and Lebanon.⁶⁹ It was the operational experience of the CF and its allies that, according to operational feedback, demonstrated that a "requirement for a new highly survivable medium-weight armoured infantry fighting vehicle."⁷⁰ In particular, this was determined based on the threat from IEDs, Explosively Formed Projectiles (EFPs), mines and anti-armour weapons, which were also noted to "have proliferated and are likely to be faced in most medium to high threat missions."⁷¹ It was also determined in Afghanistan that the LAV had limitations in mobility especially in terms of its off-road mobility and its inability to operate in intimate support with Leopard tanks across natural and man-made obstacles. This limitation often forced the LAV to travel on roads and tracks allowing the enemy to canalize and predict routes thus making them more vulnerable.⁷²

The CA came to the realization that they had a capability deficiency in its medium weight AFVs. This evidence points almost entirely to a deficiency in protection in that the LAV lacked suitable armour to meet the threat in Afghanistan combined with the lack of mobility endangered the protection of both the vehicle and its occupants as the

⁶⁸ David Pugilese. *LAV-3 Upgrade Still a Priority for Canada*. Defense News. Monday, July 18, 2011, [journal on-line]; available from <http://www.defensenews.com/article/20110717/DEFFEAT06/107170309/LAV-3-Upgrade-Still-a-Priority-for-Canada> ; Internet; accessed 3 February 2012.

⁶⁹ Canada, *Close Combat Vehicle*, 12.

⁷⁰ *Ibid.*

⁷¹ *Ibid.*

⁷² *Ibid.*

complex terrain forced the LAV to operate on predictable routes. The CA also determined through its own experiences and analysis that the LAV III, despite a series of protection upgrades, could not provide the level of protection required to meet the aforementioned threats. As a result of these shortcomings in protection and mobility, the CA determined that a more robust vehicle with a sufficient level of protection would be required to meet the threats facing its forces.⁷³

It is also worth noting that in 2009 the CF also reclassified the weight classes that constituted light, medium and heavy vehicles. Since 2009, the CF defines the weight of its three classes of vehicles as follows: light vehicles as five to twenty tonnes, medium vehicles as 25-45 tonnes, and heavy vehicles as those weighing more than 45 tonnes.⁷⁴ This was done despite the fact that CF doctrine of the time stated that heavy vehicles are “over 40 tonnes in combat weight.”⁷⁵ An exact explanation of why the classes have been changed by the CF has not been divulged to the public. However, *Jane’s Defence Annual Review 2011-2012*, provides some substantiation for this change. Jane’s asserts that based on recent operational experience, western armed forces are “now demanding much higher levels of protection which means that the vehicles are usually much heavier, and larger and more expensive than in the past.”⁷⁶ This latest trend of increasing the standard level of AFV protection would lead to a requirement for a change in AFV weight classes to coincide with the new standard. Hence this is the probable reason behind the

⁷³ Canada, *Close Combat Vehicle*, 12.

⁷⁴ Canada, “Close Combat Vehicle Backgrounder,” NP.

⁷⁵ Canada, *Toward Land Operations 2021*, 6-13.

⁷⁶ Foss, 7.

BAE Systems Hägglunds CV9035 MkIII
CCV Project candidate



Fig 1.5: BAE Systems CV90: Potential CCV Candidate

Source: Canadian American Strategic Review, <http://www.casr.ca/bg-army-ccv-cv9035.htm> .

GDLS-C Piranha 5 CCV



Fig 1.6: General Dynamics Piranha 5: Potential CCV Candidate

Source: Canadian American Strategic Review, <http://www.casr.ca/bg-army-ccv-piranha5.htm> .

Nexter (Giat) VBCI with
30mm Hitfist turret



Fig 1.7:Nexter (Giat) VCBI 30: Potential CCV Candidate

Source: Canadian American Strategic Review, <http://www.casr.ca/bg-army-ccv-nexter-vbci-30.htm> .

change, and it seems to provide some substance to the CA doctrine of maintaining its status as a MWF.

RISK MITIGATION

HWF have other advantages in that they can also assist commanders in risk mitigation on operations. Specifically, HWF have distinct advantages over LWF and MWF. The triad of firepower, mobility, and protection is significantly greater with HWF in terms of their capabilities in the contemporary operating environment (COE). The COE is defined as “the overall operational environment that exists today and in the near future (out to the year 2020).”⁷⁷ The COE is characterized by threats that extend from smaller, lower-technology opponents using more adaptive, asymmetric methods to larger, modernized forces able to engage our forces using more conventional, symmetrical means.⁷⁸ According to CA doctrine, the triad of firepower, mobility and protection provides the “best combination of attributes/capabilities that address the current challenges of the COE.”⁷⁹ HWF provide the best performance in these areas as compared to LWF and MWF and as a result, this paper argues that the increased capabilities of HWF will assist commanders in mitigating risk on operations.

Risk Mitigation in the CF is part of risk management. The aim of risk management according to CF doctrine is “to enhance operational capabilities and mission

⁷⁷ United States, Training and Doctrine Command, “Operation Enduring Freedom: Tactics, Techniques and Procedures Handbook No 02-8,” <http://www.strategypage.com/articles/operationenduringfreedom/chap1.asp> ; Internet; accessed 20 February 2012.

⁷⁸ *Ibid.*

⁷⁹ Canada, *Toward Land Operations 2021*, 6-14 to 6-15.

accomplishment, with minimal loss.”⁸⁰ Risk management is a process that involves two key activities: risk assessment and risk mitigation.⁸¹ Risk assessment is the step within the process that includes threat identification and a threat assessment. Risk mitigation is the process by which the risks are weighed against the benefits and appropriate actions are taken to eliminate unnecessary risk. It also involves assessing risks to the overall success of the mission.⁸² In terms of force protection on operations a commander must weigh mission requirements with force protection.⁸³ A primary tool for balancing these competing obligations is by assessing and balancing risk and thus forming a direct relationship between force protection and risk management.⁸⁴ This paper argues that the enhanced capabilities of HWF enable commanders to mitigate risks on operations. Specifically, it will in many instances, reduce the likelihood of casualties. This in turn would permit commanders to take risks that they would be unwilling to take with LWF or MWF.

The HWF superior triad of firepower, mobility and protection offers commanders significant tactical advantage over a lesser equipped adversary. The main advantage offered by HWF is protection in that it often takes greater firepower to destroy or neutralize HWF due to their higher level of protection. This is especially true when

⁸⁰ Canada. Department of National Defence. B-GJ-005-502/FP-000, *Risk Management for CF Operations (Change 1)*. CFEC Joint Doctrine Branch. (Ottawa, ON, November 2007), 1-1.

⁸¹ *Ibid*, 2-2

⁸² *Ibid*.

⁸³ *Ibid*.

⁸⁴ *Ibid*, 2-3.

operating in an environment such as Afghanistan in which the insurgents are unable to go head to head in a fight against a tank-equipped force without suffering heavy casualties.

One could argue that HWF would not allow a commander to mitigate risk on certain operations, as HWF are not impervious to attack and destruction any more than LWF or HWF. Specifically, HWF such as MBTs can be disabled or destroyed by large unsophisticated IEDs. However, the protection offered by HWF is not limited to armour. Protection, as referred to within this paper also includes enhanced mobility. This enhanced mobility allows a heavily armoured vehicle to operate in areas, which cannot be accessed easily by lightly armoured vehicles such as across rugged terrain. Unlike, the LAV and the once proposed MGS, the tracked Leopard MBT has superior cross-country mobility due its tracks and does not have to rely on the predictability of using roads and tracks. The same fact can be said of the proposed CCV, which according to the Statement of Operational Requirement (SOR), will possess “high mobility both on and off-road.”⁸⁵ Therefore, the best chance for a successful attack against a HWF could only be achieved through the placement of IEDs on known routes, choke points or canalizing ground.⁸⁶

The firepower of both generations of Leopards is excellent and can only be matched by similar platforms. This paper contends that this firepower is able to increase the overall protection of a TF. This in turn, will help a commander to reduce risk as the mere appearance of HWF can often deter aggressors. This was evident when the United

⁸⁵ Canada, *Close Combat Vehicle*, 10.

⁸⁶ Canada. Department of National Defence. B-GJ-005-315/FP-001, *Countering Improvised Explosive Devices*. Joint Doctrine Branch. Canadian Forces Counter-IED Task Force. (Ottawa, ON, September 2011), 1A-3.

States Marine Corps (USMC) deployed tanks to Afghanistan in November 2010.⁸⁷

USMC Commandant General James Amos commented that the “tanks are psychologically and kinetically impacting the insurgents in a significant way.”⁸⁸ He also said that in terms of its firepower, “when the M1 tank fires downrange it has a way of quieting things rather quickly.”⁸⁹

It is the firepower, armour, and mobility of HWF that help mitigate risk for commanders and fulfills the ever-present requirement to reduce casualties. This risk mitigation also enables commanders to achieve strategic and operational objectives without being hindered by a risk averse political climate. In the words of the first Canadian Tank Squadron Commander in Afghanistan, Major Trevor Cadieu on the subject of deploying armour to Afghanistan: “[it has] sent to the Taliban a clear message that we have the tools and determination to pursue them at a time and place of our choosing.”⁹⁰ This comment adds weight to the argument that HWF can enhance the CA tactical abilities, while simultaneously reducing risk. This need to reduce casualties not only had an influence on commanders during the conduct of operations in Afghanistan, but it was an extremely dominant need back home for the Canadian political masters.

⁸⁷ Daniel Wasserbly, “M1A1 Abrams makes positive impact in Afghanistan.” *Jane’s Defence Weekly*, February 21, 2011, NP.

⁸⁸ *Ibid.*

⁸⁹ *Ibid.*

⁹⁰ Major Trevor Cadieu, “Canadian Armour in Afghanistan.” *Canadian Army Journal*, Volume 10.4, Winter 2008, 10-11.

POLITICAL INFLUENCE

In 2006, the death toll of Canadians increased to 35 KIA compared to no KIA due to enemy action the previous year.⁹¹ This sharp increase began to draw media and public attention, which caused the Canadian public to turn to their politicians for answers.⁹² The government at the time consisted of a Conservative minority under Prime Minister Stephen Harper. The issue of Afghanistan quickly became a major political issue in which the opposition parties, consisting of the Liberals, New Democrats and Bloc opposed the combat mission in Kandahar province. This opposition to the mission was compounded by the recent spike in Canadian casualties, which was reflecting negatively on the Conservatives. They, like any government, especially a minority had to do something to change the casualty situation.⁹³ This paper argues that the Conservative government in 2006 deployed HWF to Afghanistan primarily in order to improve the force protection of its soldiers with a view to reducing the likelihood of casualties within the TF and simultaneously increase public support for the mission in Afghanistan and the Conservative government.

The first HWF to deploy to Afghanistan were the CA Leopard C2 MBTs. These vehicles with their upgraded armour, superior mobility and firepower were a welcome addition to the TF. However, the MBTs were not the insurgents' target vehicle of choice

⁹¹ The Ottawa Citizen, "Canada's Fallen: Canadians Killed in the Mission to Afghanistan since 2002," <http://www.ottawacitizennews.com/soldiers/>; Internet; accessed 12 February 2012.

⁹² Duane Bratt, Mr. Harper Goes to War: Canada, Afghanistan, and the Return of "High Politics" in Canadian Foreign Policy. Department of Policy Studies Mount Royal College Calgary, Alberta. <http://www.cpsa-acsp.ca/papers-2007/Bratt.pdf>; Internet; accessed 11 February 2012.

⁹³ Joseph F. Fletcher and Jennifer Hove, "Emotional Determinants of Support for the Canadian Mission in Afghanistan: A View from the Bridge." (Discussion Paper on Afghanistan, University of Toronto, 2010), 4.

and casualties continued to mount.⁹⁴ Instead, according to CF Lieutenant-Colonel Stephane Lafaut, former Commanding Officer of the Operational Mentoring and Liaison Team in Afghanistan, “IEDs tend to be used more by the Taliban to target other vehicles - such as Canada's LAV3, Nyala and Bison armoured vehicles - instead of tanks.”⁹⁵ This problem was apparent to the government and they acquired more armoured vehicles to enhance force protection, such as the RG-31 APV (Armoured Patrol Vehicle) and the upgraded LAV, known as the LORIT (LAV Operational Requirements Integration Task).⁹⁶ This paper contends that these vehicles were needed in order to reduce casualties and hence gain public support for the mission and the Conservative government.

A possible counter argument to the need to reduce casualties to gain public support for the mission is that it was simply something dreamed up by anti-Conservative activists and that the real reason was that the CF under General Hillier actually used casualty estimates to gain support for the resurrection of tanks in the CA. This argument has some credence in that it was well known that Hillier’s background is armoured and that it is only logical that an armoured officer in command of the CF would not want to see the armoured MBTs relegated to monuments and museums. It is also logical to assume that Hillier would want to replace the ageing Leopard C2 with a modern MBT that would be the envy of many nations. Furthermore, with the cancellation of the MGS and the decision to deploy MBTs, Hillier needed a substantial reason to change his

⁹⁴ Standard: Freeholder, “German tanks for Canadian use won't cut casualties much in Afghanistan,” <http://www.standard-freeholder.com/ArticleDisplay.aspx?archive=true&e=653448> ; Internet; accessed 11 February 2012.

⁹⁵ *Ibid.*

⁹⁶ *The Ottawa Citizen*, “DND seeks more than \$2B for vehicles for Afghanistan,” 17 November 2008, NP.

former view of tanks, which he referred to in 2006 as “millstones around the neck of Canada’s military.”⁹⁷ A logical argument would be that deploying tanks to Afghanistan would not only reduce casualties, but it would prove to the CF and more importantly the politicians that these HWF are an invaluable asset that the CF needs to invest in to ensure its operational effectiveness.

Although these arguments have some credibility since the CA realized the need for increased levels of protection afforded by HWF was required to deal with the threats in Afghanistan, there is very little evidence to support the argument that casualties or some hidden agenda of Hillier was the reason. It is asserted that Hillier was left with no choice but to deploy tanks to Afghanistan in 2006 as the CF was engaged in combat against the Taliban who changed their tactics and casualties were mounting. An immediate solution was needed and tanks would provide an enhanced level of protection for the troops in order to complete the mission in accordance with the government’s mandate. It was his responsibility as the CDS to determine the right solution to the problem based on what his operational commanders recommended. After MEDUSA, the solution requested from theatre was to send tanks and he did.⁹⁸ This need for protection would lead to other CA initiatives such as the soon to be acquired CCV and the TAPV. It was the need to reduce casualties in order to gain public support for the Afghan mission and the Conservative party that influenced the political decision to acquire HWF. It is doubtful if the CF did not sustain the casualties they did in 2006 that there would be any

⁹⁷ Bob Bergen, “Military is Banking On Tanks,” *Embassy Magazine*, 10 February 2012 [journal on-line]; available from <http://embassymag.ca/dailyupdate/view/194> ; Internet; accessed 12 February 2012.

⁹⁸ LCol Martin Lipcsey, Former DCO of 1st Battalion, The Royal Canadian Regiment Battle Group 2006-2007, telephone conversation with author, 12 February 2012.

political support behind the acquisition of HWF, in particular new MBTs. There were no other valid reasons to entice the government to support this change in tactical doctrine to achieve its strategic aims. The CA had already assessed the FSE and determined that it could achieve its operational level objectives as a MWF.⁹⁹ More importantly, there was no valid reason up to that point to spend the money to support the acquisition of HWF.

CONCLUSION

In conclusion, this chapter has presented evidence to support the argument that the primary reason for the shift towards employing and acquiring elements of HWF was primarily based on the operational experience of the CA in Afghanistan and the need for enhanced protection. The aim of this chapter was to describe the background and reasoning behind this shift in Army strategy. This chapter has also presented evidence that HWF provide the CA with improved tactical capability due to their enhanced firepower, mobility, and protection. This improved tactical capability better enables the CA to fight across the spectrum of conflict up to and including high intensity operations against a peer or near-peer adversary. This leads to the next chapter- A shift from Light and Medium Forces. It will discuss in detail the relevancy and importance of shifting from an army able to participate only in low to medium intensity operations to one that would be able to participate in full spectrum operations.

⁹⁹ Canada, *Advancing With Purpose*, 13.

CHAPTER 2

A SHIFT FROM LIGHT AND MEDIUM FORCES

“We have been able to establish a series of priorities that culminates with our vision of sustaining a medium-weight army capable of full-spectrum operations.”

*Major-General Howard, Assistant Chief of the Land Staff,
Interview with Jane’s Defence Weekly 2011¹⁰⁰*

INTRODUCTION

The previous chapter substantiated the argument that protection was the primary driving force behind the shift in strategy from the CA existing predominantly as a MWF to one that can now be reinforced with elements of a HWF. It also provided evidence to support the argument that this need for protection stemmed from the CA’s operational experience in Afghanistan. This chapter will continue the discussion on HWF by examining the next evolution for the CA. In particular, it will discuss the importance and relevancy of shifting from an army capable of participating only in low to medium intensity operations to one that would be able to participate in full spectrum operations. The main argument of this chapter will be that with the introduction of the Leopard 2 MBT and the CCV the CA will be able to participate in full spectrum operations, specifically up to and including high intensity conventional operations against an enemy armed with heavy mechanized forces.

This chapter will begin with an examination of the current operational capabilities and limitations of lightweight forces (LWF) and MWF within the CA. It will then contrast these with the capabilities and limitations of HWF. Next, it will discuss the

¹⁰⁰ Sergei DeSilva-Ranasinghe, “Interview: Major General Alan Howard, Assistant Chief of the Land Staff, Canadian Army.” *Jane’s Defence Weekly*, January 7, 2011, NP.

ability of the CA to support all three types of forces, light, medium, and heavy. In particular, it will examine the training, maintenance and logistical difficulties of sustaining three different types of forces within a small army. Finally, it will conclude with a discussion on the institution's reluctance within the CA to fully embrace the concept of HWF. This reluctance will be examined from the perspective that despite the re-introduction of HWF and their capabilities, the CA is reluctant to move beyond its MWF construct.

OPERATIONAL CAPABILITIES AND LIMITATIONS

In order to begin a discussion on the operational capabilities and limitations of HWF it is essential that we contrast these with the capabilities and limitations of LWF and MWF. This section will concentrate its analysis on the main fighting platforms (fighting echelon vehicles) themselves as opposed to the other elements of these forces such as armoured engineer and reconnaissance vehicles, which is beyond the scope of this paper. However, in order to add LWF to the comparison, it is important to define them in relation to CA doctrine. LWF are those forces that “maximize strategic deployability and responsiveness in order to compensate for a relative lack of combat power.”¹⁰¹ The lack of combat power within this definition refers to their specific lack of firepower as compared to the LAV III or MBTs. In the case of the CA, a light infantry battalion or light BG would be considered a LWF and will be used as the baseline for discussion purposes within this paper. Both the CA Mercedes Light Utility Vehicle Wheeled (LUVW) and the RG-31 APV will be used in this

¹⁰¹ Canada, *Advancing With Purpose*, 31.

comparison as these two vehicles have been used extensively by LWF during recent combat operations in Afghanistan. It is worth noting that the CA's LWF are currently undergoing modernization, including the acquisition of a new TAPV in order to, according to the CA, "provide light infantry battalions with armoured utility vehicles,"¹⁰² but a detailed analysis of this vehicle is beyond the scope of this paper.

Table 2.1 provides a brief snapshot of the primary fighting vehicles employed by LWF, MWF, and HWF within the CA. The table illustrates the differences in speed, firepower, and protection between the various vehicles; in particular, it is obvious that the level of protection and firepower increases from lightweight to heavy weight vehicles. In regards to firepower, the LUVW and RG-31 do not possess the capability to engage enemy MWF or HWF as their firepower is only suitable for engaging enemy personnel, primarily in a self-defence role. They also lack any weapons with the ability to neutralize or destroy armoured vehicles such as APCs. The LAV III has the firepower to engage and destroy LWF and similarly equipped MWF with its 25mm cannon. However, it does not have the ability to engage heavily armoured APCs and MBTs nor does it have the ability to use the latest generation of programmable airburst ammunition, which is capable of engaging targets behind cover at selectable ranges. HWF, on the other hand are able to neutralize and destroy LWF and MWF and can fight against a similarly equipped peer due to its advanced fire control system technology matched with its anti-armour firepower.¹⁰³

¹⁰² Army News, "Army to upgrade combat vehicle fleets," <http://www.army.forces.gc.ca/land-terre/news-nouvelles/story-reportage-eng.asp?id=3655> ; Internet; accessed 19 February 2012.

¹⁰³ Simon Dunstan, *Modern Tanks and Armoured Fighting Vehicles*. (Shrewsbury, England: Airlife Publishing Ltd, 2002), 61.

Table 2.1- Capability Comparison of Light, Medium, and Heavy Fighting Vehicles

Vehicle	Weight (Tonne)	Class	Speed	Firepower	Protection
LUVW ¹⁰⁴	3	Light	120km/h	5.56mm/7.62mm Machine Gun(MG)	Ballistic: 7.62 NATO Ball Mine: 1kg (under wheel) & Arty Fragments
RG-31 ¹⁰⁵	8	Light	100km/h	Remote Weapon Station: .50cal/7.62mm MG	Ballistic: 7.62 Armour Piercing (AP) Mine: 6kg (under veh) & 12kg (under wheel)
LAV III LORIT ¹⁰⁶	20	Medium	100km/h	25mm Cannon & 2x 7.62mm MG	Ballistic: 14.5mm Mine/Kinetic Energy (KE): Classified, but offers protection from RPG and Mine/IED
CCV	30-45	Heavy	Must be able to keep pace with Leopard 2 MBT cross-country. Maximum road speed of 50km/h-60km/h. ¹⁰⁷	Capable of destroying soft-skinned vehs and LAVs 2000m, and neutralizing or suppressing troops behind cover at ranges up to 2000m. ¹⁰⁸	Essential Capabilities: Ballistic: -14.5mm (Desirable 30 mm AP) - 155 mm Arty Fragments Mine/KE: -10 kg under wheel/track & belly -Canadian IED standard -RPG-7 ¹⁰⁹
Leopard C2	42.5	Heavy	65km/h: Road ¹¹⁰	105mm main gun & 2x 7.62mm MG ¹¹¹	Details of up-armour are classified, but it offers enhanced protection against RPG and mines/IEDs. ¹¹²
Leopard 2	62	Heavy	72km/h: Road 55km/h: Cross-Country ¹¹³	120mm main gun & 2x 7.62mm MG ¹¹⁴	Ballistic: 30mm AP KE: RPG-7 Mine: 8-10Kg under track or belly. ¹¹⁵

¹⁰⁴ Shaun C. Connors and Christopher F. Foss. *Jane's Military Vehicles and Logistics: 2010-2011*. 31st ed. (Alexandria, Virginia: Jane's Information Group Inc, 2010), 254-255.

¹⁰⁵ *Ibid*, 666-667.

¹⁰⁶ *Ibid*.

¹⁰⁷ Canada, *Close Combat Vehicle*, 12 and 71.

¹⁰⁸ *Ibid*, 76.

¹⁰⁹ Lieutenant-Colonel Dean Tremblay and Major R.C., "Close Combat Vehicle (CCV)," Army presentation, Director of Land Requirements 10, Fall 2011.

¹¹⁰ Dunstan, 61.

¹¹¹ *Ibid*.

¹¹² *Ibid*, 48-50.

¹¹³ Canadian American Strategic Review, "Canadian Forces Armour - Leopard 2A6M CAN Main Battle Tank," <http://www.casr.ca/101-army-armour-leopard-2a6m.htm> ; Internet; accessed 26 February 2012.

¹¹⁴ Foss, 40.

¹¹⁵ Canada, *Tank Replacement Project*, 42-44.

HWF are the only forces with the tactical ability of not only engaging and destroying LWF and MWF, but they are the only force capable of fighting high intensity conventional operations against an enemy armed with heavy mechanized forces. Only tanks are capable of fighting tanks and although the CA possesses modern anti-armour weapons, they are not suitable for offensive operations against armour and are instead primarily designed for defensive operations.

It is imperative that the CA recognize the improved tactical capability that they have inherited with the re-introduction of HWF. It will give the CA the ability to achieve operational level objectives, which it has not been able to undertake since the end of the Cold War. A prime example of this would be another Iraq War (2003 invasion) type event involving the CA. In 2003, it was doubtful if the CA being primarily equipped with the LAV III would have had the ability to go head to head against the Iraqi Republican Guard without suffering significant casualties. However, with the Leopard 2 MBT and the CCV it is asserted that the CA would have been more than a match for the Iraqis.

The enhanced tactical capability of HWF also has strategic follow-on effects, as their re-introduction will enable the CA to participate in future multi-national operations on par with its NATO peers. This new capability will not only greatly strengthen the ties between Canada and the US, but it will help advance Canada's position as a middle power by empowering the CA to exercise the political will of the government across the spectrum of conflict.

Within Table 2.1, it is also worth noting that the speed of light and medium vehicles is significantly faster than heavy weight vehicles. This is mainly because they

are not only lighter, but they are wheeled whereas the heavy vehicles are mostly tracked. Track vehicles are characteristically slower than wheeled vehicles on roads.¹¹⁶ However, what is not reflected in the table is the mobility performance of the various vehicles. Mobility within the context of this paper means more than the ability to move about the battlefield under the vehicle's own power. Mobility is a diverse capability, which is defined in the CA as:

A quality or capability of military forces that permits the forces to move from place to place while retaining the ability to fulfill their primary mission. It entails the movement of assets into a theatre of operations within or from Canada (strategic mobility); the movement of resources over great distances within the theatre of operations (operational mobility) and movement in contact (tactical mobility).¹¹⁷

All three types of mobility will be discussed within this chapter. Note that the CCV project has not stipulated within its SOR that the CCV must be a tracked or wheeled vehicle. The SOR only stipulates that it must possess “tactical high mobility,”¹¹⁸ which specifically states that the CCV is “expected to be able to take advantage of a significant proportion of off-road terrain during manoeuvre warfare”¹¹⁹ and that it must “travel in intimate support with Leopard tanks across the same natural and man-made obstacles.”¹²⁰ The SOR also specifies that it must have a sustained cruising speed of 50km/h and a maximum speed of 60km/h-70km/h.¹²¹ Therefore, for discussion purposes this paper will

¹¹⁶ Paul Hornback, “The Wheeled Versus Track Dilemma,” *Armor Magazine*, U.S. Army, March-April 1998. 33.

¹¹⁷ Canada, *Close Combat Vehicle*, 62.

¹¹⁸ *Ibid*, 63.

¹¹⁹ *Ibid*.

¹²⁰ *Ibid*, 12.

¹²¹ Canada, *Close Combat Vehicle*, 71.

consider the CCV as a heavy weight vehicle with tactical mobility and speed equal to that of the CA Leopard 2 MBT.

Tactical mobility is that type of mobility that involves moving about the battlefield. In other words, it refers to the ability of the vehicle to traverse various types of terrain on both roads and cross-country. Within this context, the two generations of Leopard MBTs and the CCV have superior tactical mobility as compared to the LAV III, LUVW and RG-31. Tracks have a larger surface area in contact with the ground as compared to wheels; the result is low ground pressure and excellent cross-country mobility.¹²² However, both the RG-31 and LUVW are wheeled vehicles with less tactical mobility than the LAV III. The LAV III has the advantage over the RG-31 and the LUVW with a more powerful 350hp engine and a central tire inflation system (CTIS), which allows the driver to adjust the tire pressure from within his driver station in order to gain traction.¹²³ The driver lowers the pressure for more traction and increases it for speed on hard surfaces such as roads. The CTIS is designed to mimic the characteristics of a tracked vehicle by increasing the surface area in contact with the ground similar to a tracked vehicle. The Leopard MBTs and CCV are designed specifically for all terrain mobility and is the primary reason they have tracks as opposed to tires. This lack of tires gives them a distinct tactical advantage on the battlefield as tires unlike tracks can be shot, burned or easily disabled and although many have run flats (hard rubber inserts) to enable a vehicle to continue moving, they have limited range. This is further complicated

¹²² Combat Reform, "Tracks versus Wheels: The Laws of Physics and what's best for Combat-an extreme activity-an illustrated study of the facts," <http://www.combatreform.org/WHEELSVSTRACKS/> ; Internet; accessed 26 February 2012.

¹²³ Foss, 505.

by the fact that CA wheeled vehicles only carry one spare tire, which is the Achilles heel of a wheeled fleet. This weakness could easily be exploited by a few snipers, who have the ability to disable a company of LAVs with a few well-aimed shots.

Operational mobility can be achieved in various ways. These methods include: air, road via own power, tank/low bed carrier, cargo ship, or rail. When deploying operationally via their own power, LWF and MWF have a distinct advantage over HWF due to their lighter weight and their wheels. This lighter weight combined with the use of wheels lowers the rolling resistance. CA LWF and MWF can move faster when travelling via their own power and burn less fuel as the rolling resistance of wheeled vehicles equals only two percent of their weight, on average, whereas tracked vehicles equals four percent of their weight.¹²⁴ The increased rolling resistance of tracked vehicles can also increase the wear on the vehicles in comparison to wheeled vehicles due to the increased power needed to overcome the increased resistance combined with the increased vibration inherent with steel tracks. As a result, most heavyweight vehicles are forced to rely on tank carriers or trains to equal the speed, fuel economy and wear of wheeled AFVs over long distances. This problem was encountered by the United States (US) Army in 2004 during operations in Iraq when they discovered that “wheeled vehicles could also travel long distances on their own, while tracked vehicles suffered considerable wear unless carried by Heavy Equipment Transport System (HETS) vehicles.”¹²⁵ However, when heavy weight vehicles use tank carriers or trains for

¹²⁴ Lutz Unterseher, “Wheels or Tracks? On the 'Lightness' of Military Expeditions,” *Project on Defense Alternatives*, Briefing Memo #16 July 2000 (revised December 2001) available from <http://www.comw.org/pda/0007wheels.html#2.1.1> ; Internet accessed 19 February 2012.

¹²⁵ Mark J. Reardon and Jeffery A. Charlston, *From Transformation To Combat: The First Stryker Brigade at War*. United States Army. (Washington: Center of Military History, 2007), 12.

transport they also make them vulnerable to enemy attack as they are normally fully secured to the trailer and unmanned rendering their firepower useless.

For operational mobility by air, the CF relies on airlift provided by the Royal Canadian Air Force (RCAF) C-130 aircraft. This is the primary aircraft used for tactical airlift, but can also be used within the context of operational and strategic mobility. The C-130 has the ability to transport up to 21.7 tonnes of cargo or up to one LAV III or RG-31 or two LUVWs.¹²⁶ Unfortunately, the C-130 does not have the capacity to carry the Leopard MBT or the CCV, demonstrating a distinct advantage of LWF and MWF over heavy weight vehicles in terms of operational mobility by air.

With strategic mobility, there are fewer options for deployment as most CF operations involving the deployment of forces into a theatre of operations are concerned with expeditionary operations. This is due in part to the fact that most of the expeditionary operations that involved the CA have included deployment across the Atlantic or Pacific Oceans. The most common mode of transportation for strategic trans-oceanic deployment is via a cargo vessel. All forces can be said to be on equal footing in this area, as the CF does not have their own ship large enough to deploy any of these forces. Instead, the CF is forced to rely on commercial carriers in order to carry out any movement of its land forces by sea. The disadvantage of sea transportation is that it is often the slowest method of transport for any force to go from point A to B, but it can carry a large number of vehicles simultaneously. The fastest means of strategic deployment is by air in which the primary CF aircraft is the RCAF C-17 Globemaster. This aircraft is the only CF strategic airlift asset and has a payload capacity of 72.7

¹²⁶ Royal Canadian Airforce, "CC-130 Hercules," <http://www.rcaf-arc.forces.gc.ca/v2/equip/cc130/index-eng.asp> ; Internet; accessed 19 February 2012.

tonnes or up to one Leopard 2 MBT or two LAV IIIs.¹²⁷ This again reveals another distinct advantage of LWF and MWF, as they are able to deploy more vehicles strategically in a shorter amount of time due to their lower payload aboard aircraft requiring less aircraft and flights to support their deployment.

This paper argues that it was the enhanced operational and strategic mobility that was the primary reason behind adopting the MWF concept for the CA. In particular, the CA realized that in order to be strategically relevant, it had to be able to deploy their forces into a theatre of operation quickly. As stated in *Advancing with Purpose*, “reduction in physical mass enhances deployability facilitating the exploitation of future strategic airlift and surface vessels.”¹²⁸ General Rick Hillier, when serving as the Chief of the Land Staff (2003-2005) confirmed this notion in an interview stating that:

The strong qualities of a Leopard parked in Valcartier and Edmonton are useless to the soldiers in Kabul, Eritrea, Bosnia or anywhere else we need direct fire. In some cases, we can't get it there since it is too heavy for the C-130 to lift.¹²⁹

It could be counter-argued that HWF can still deploy strategically and operationally just as rapidly as LWF and MWF, if they use more aircraft. This is true, but the reality is that the RCAF only has four C-17 aircraft, which are the only CF aircraft large enough to carry the Leopard 2 MBT and the CCV.¹³⁰ This would force the CF to rely on the logistical support of its allies, such as the US or rely on private contractors with similar airlift. The CF has used private contractors in the past to deliver its tanks to

¹²⁷ Royal Canadian Airforce, “CC-177 Globemaster III,” <http://www.rcaf-arc.forces.gc.ca/v2/equip/cc177/index-eng.asp> ; Internet; accessed 19 February 2012.

¹²⁸ Canada, *Advancing With Purpose*, 31.

¹²⁹ Bergen, NP.

¹³⁰ Royal Canadian Airforce, *CC-177 Globemaster III*, NP.

Afghanistan using AN-124 Antonov aircraft.¹³¹ The difficulty with relying on contractors is that you cannot guarantee their support or one must wait in queue to solicit their services. Therefore, it is essential that a nation's military have its own organic strategic airlift capability, even if it has limited capacity. As a result of this reduced airlift capacity, it will be difficult for the CA to be strategically relevant with HWF if they are required to be in a theatre rapidly.

In summarizing mobility, HWF have the tactical advantage, whereas LWF and MWF have the operational and strategic advantage in terms of their ability to rapidly deploy, especially for expeditionary operations. HWF in most cases cannot rapidly deploy to a theatre in support of expeditionary operations due to a lack of integral CF airlift resources. In most cases, the best method to deploy HWF in support of these operations is via sealift, rail, road or a combination of these methods. In summarizing the operational capabilities and limitations of LWF, MWF, and HWF it should be noted that the emphasis of firepower and protection increase exponentially as the vehicles increase in weight due to the weight of their armour and weapon system. However, the speed and methods of their deployability also simultaneously decrease.

As discussed in Chapter 1, protection was the main driving force behind the latest shift towards HWF in the CA. Protection within this paper is described in terms of physical protection provided by armour and tactical protection provided by enhanced mobility and increased firepower to enhance crew and force protection. The legendary tank commander, General Israel Tal, summarized this argument of protection best, "Without proper protection even the most agile and cross-country capable vehicle could

¹³¹ Wings Magazine, "The Standard for Strategic Airlift," *Wings Magazine* [Journal on-line]; available from <http://www.wingsmagazine.com/content/view/3604/38/>; Internet; accessed 19 February 2012.

not move forward in harm's way.”¹³² In summary, LWF and MWF can get to a fight quickly. However, are they bringing enough to the fight?

SUPPORTING A DIVERSE FORCE

The CA is without a doubt a small army when compared to its NATO allies such as the US and the UK, but it is comparable in size to the Australian Army. Despite its size, the CA strives to continue to be a “truly strategically relevant force,” according to former CLS Lieutenant General Mike Jeffery.¹³³ Within this concept, the CA has maintained its stance as a “MWF capable of full-spectrum operations.”¹³⁴ However, the CA continues to operate smaller LWF, predominately the three light infantry battalions. These are the third battalions of the Royal Canadian Regiment (RCR), Princess Patricia’s Canadian Light Infantry (PPCLI), and the Royal 22nd Regiment (R22eR). One of these light battalions is maintained within each of the three regular army brigades. Their roles are different from that of mechanized infantry in that they are “trained through a variety of insertion methods (parachute, helicopter, vehicle, boat, and most importantly by foot) and in a variety of complex terrains (e.g. urban, mountains) that would prove difficult for mechanized forces.”¹³⁵

The CA maintains three mechanized brigade groups, known as Canadian Mechanized Brigade Groups (CMBG). They are dispersed throughout the country as

¹³² Unterseher, NP.

¹³³ Canada, *Advancing With Purpose*, 1.

¹³⁴ DeSilva-Ranasinghe, NP.

¹³⁵ Canadian Army, “Third Battalion of Princess Patricia's Canadian Light Infantry,” <http://www.army.gc.ca/iaol/143000440000292/index-Eng.html> ; Internet; accessed 19 February 2012.

follows: 1 CMBG in the West, 2 CMBG in Ontario with one mechanized infantry Battalion (2 RCR) and a Royal Canadian Dragoon (RCD) tank squadron in Gagetown, New Brunswick, and 5 CMBG in Quebec. Each of these brigades has three infantry battalions, two mechanized and one light. Two of the brigades (1 and 2 CMBG) are now being equipped with Leopard 2 MBTs. One squadron of MBTs will be in Gagetown with the RCD under command of 2 CMBG and two squadrons in Edmonton with the Lord Strathcona's Horse (LdSH (RC)).¹³⁶ The CA plans on fielding the CCV to 1 CMBG with 1 PPCLI having two companies combined with a LAV company and 2 PPCLI having one company of CCV with two companies of LAV.¹³⁷ There will also be CCV Artillery Forward Observation Vehicle variants, which will be co-located with 2 PPCLI in Shilo, Manitoba. The reason for the Shilo allocation is to combine the individual and collective training of the two units without having to relocate either unit. The key conclusion is that the CA has a complete range of light, medium and heavy capabilities within two of its CMBGs located in the east, central, and western regions of the country.

At first glance, the distribution of forces within three regions of the country seems logical, but there are some difficulties with the plan. First, 5 CMBG does not have any HWF and there is no known plan at this time to allocate them such resources. 5 CMBG would therefore not have the capability to undertake a mission with HWF without the “plug-n-play” concept of integrating HWF from another brigade prior to a mission. A common contention to this concept is that it has proven itself in the past during recent operations in Afghanistan with the employment of Leopard tank squadrons being

¹³⁶ Canada. Department of National Defence. *Land Forces Central Area: Commander's Update Briefing from Army Council November 2010*, 4-5 December 2010.

attached to different infantry battle groups (BG) from different brigades. However, the key to this success was the long pre-deployment training period in which units conducted training and integration up to a year in advance of a deployment. It is doubtful if a unit could conduct training to the same degree of competency for a short notice deployment with a new unit, while simultaneously integrating their combat capabilities within their brigade, including the logistical and maintenance demands that this entails. HWF, especially tanks require demanding logistical and maintenance resources that must be in place to conduct training and operations.

With three different types of forces to maintain, different skill sets are required to maintain these fleets. For example, a maintainer who is trained to repair a LUVW will require another series of courses to repair a LAV III and a different series of courses for a Leopard 2 MBT or CCV. This training poses additional burden on an already stressed training system. If these soldiers are promoted, released or remuster then the time to retrain replacements becomes a burden on the CA's ability to maintain its fleets of vehicles and affects its deployability. The other prevailing problem of maintaining multiple fleets is parts availability. All of the vehicle fleets being discussed within this paper require unique parts, which are not interchangeable. The problem is that number of parts needed on hand must be increased in order to maintain different vehicle fleets, which is also a logistics problem. The problem is further exasperated by the fact that certain units will have light, medium, and heavy fleets within one unit, such as 1 PPCLI, which will be equipped with LUVW, TAPV, LAV III, and CCV. It is therefore obvious that maintaining three different types of fleets within a small army is a challenge.

¹³⁷ Canada. Department of National Defence. *Tank Replacement Project Information Brief to Combat Training Centre*, CA Director of Land Requirements, 14 February 2012.

Clearly, it is difficult to maintain three different types of fleets in the CA, but which fleet is easiest to maintain? This paper argues that recent advances in technology have made the maintenance of HWF comparable to that of LWF and MWF. Traditionally, LWF and MWF in the CA have been easier to maintain than HWF as they benefit from the use of wheels, which are normally less maintenance intensive than tracked vehicles. Tracked vehicles normally require constant adjustments such as the torquing of individual track connectors and the replacement of track pads and bolts. This fact was highlighted in an edition of *Armor* magazine by Paul Hornback in 1998, as the Canadian and US militaries were adopting MWF. The article emphasized the simplified maintenance concept of MWF, which stated, “studies have concluded that wheeled vehicles are intrinsically more reliable than tracked vehicles and, therefore, require less maintenance and supply support (spare parts).”¹³⁸ This was discovered by the US Army in Iraq, who was replacing the metal tracks on its Bradley heavyweight fighting vehicle every two weeks.¹³⁹

The maintenance advantages of wheels are undisputed; however, there have been recent advances in track technology, particularly with the introduction of rubber one-piece band tracks. A band track has significant advantages over a traditional steel track, according to the US Army's Tank-automotive and Armaments Command's (TACOM's) Tank Automotive Research Development and Engineering Center. They assert, “[that a band track] combines the aggressive cross-country, wet, or soft ground performance of

¹³⁸ Hornback, 33-34.

¹³⁹ Greg Grant, “US Army Chooses Molded Rubber Tracks for FCS,” Defence News.com; available from <http://www.combatreform.org/bandtracks.htm> ; Internet; accessed 26 February 2012.

tracks with the road-friendly ride of wheels.”¹⁴⁰ Furthermore, band tracks provide a much smoother ride than the severe vibration of metal tracks, are much quieter, and are more resistant to small arms fire than metal tracks.¹⁴¹ Band tracks have even been tested in 2011 on the CV90 deployed to Afghanistan, which is a possible contender for the CA’s CCV.¹⁴²

Arguably, rubber band tracks are not a solution as they are only suitable for lighter APCs and have yet to be developed and fielded for heavier weight vehicles such as MBTs. Therefore, the advantage in maintenance remains with LWF and MWF. However, other factors affecting the maintenance of LWF and MWF such as add-on armour and drive trains are more complex. As the threat has increased from IEDs, the CA has sought counter-measures to these devices. Often the first thing done is to add additional armour. This add-on armour often adds significant weight, which can sometimes exceed the vehicle’s maximum payload. This modification will substantially increase the wear and tear on the vehicle, as it was not designed for the additional weight, which will in turn increase the frequency of vehicle maintenance. This fact has been recognised by many armies, including the CA, who have specified that vehicles like the CCV must have “built-in stretch potential to allow for upgrades in the future as the threat of new technology evolves.”¹⁴³ In regards to the drive train of medium weight vehicles, there are significant differences between these and the current CA heavyweight vehicles.

¹⁴⁰ Greg Grant, “US Army Chooses Molded Rubber Tracks for FCS,” NP.

¹⁴¹ *Ibid.*

¹⁴² David Pugliese, “Norway Buys Canadian-made Rubber Tracks for CV90 Afghan Operations.” Ottawa Citizen, 10 February 2011, NP.

¹⁴³ Foss, 7.

The main difference is that a vehicle like the LAV III has multiple transfer cases and drive shafts, which pose their own maintenance challenges in terms of parts and breakage when compared to a MBT, which does not have the same components. Wheeled drive train is also more exposed to battle damage than those of a tracked vehicle.

Earlier, there was some discussion on the fuel consumption of all three fleets. The wheeled LWF and MWF can actually consume 50-100% less fuel than their heavier counterparts, which is not only due to their lighter weight and lower rolling resistance, but is also a result of their smaller more fuel efficient engines.¹⁴⁴ Thus, HWF will require a larger logistical tail to support the conduct of operations as compared to the wheeled vehicles of LWF and MWF. This advantage of MWF was experienced by the US Army's Stryker brigades during their first deployment to Iraq in 2003-2004, who were equipped with a vehicle similar to the LAV III. They commented in their lessons learned report that they were "freed from the large logistic tails that normally accompanied other armored units."¹⁴⁵ These armoured units were normally equipped with heavyweight M1 MBTs and tracked heavyweight M2 Bradley IFVs.¹⁴⁶

Thus, the ability of the CA to support all three types of fleets can be a challenge in terms of training, maintenance and logistics. However, the CA has been able to meet these challenges in the past. The CA continued to do this successfully during recent combat operations in Afghanistan. Lieutenant-Colonel John Conrad, a former CO of the

¹⁴⁴ Unterseher, NP.

¹⁴⁵ Reardon and Charlston, 20.

¹⁴⁶ *Ibid*, 19-20.

National Support Element in Afghanistan summed up the diverse capabilities of his maintenance platoon,

The Canadian Task Force eventually logged some 1,750,000 kilometres, fought in over 100 enemy engagements, and sustained battle damage to over 50 vehicles during our time in country. This necessitated nearly 6,400 repairs to equipment and the battlefield recovery of some 126 broken vehicles. Against the anvil of insatiable equipment demand, from LAV III fighting vehicles to the aging but resilient logistics wagons, the Maintenance Platoon managed to keep serviceability rates at a level that would be the envy of any trucking firm operating on smooth Canadian roads.¹⁴⁷

The point to be learned from LCol Conrad is that it can be done, but it will not be achieved without challenges and cost.

This section has highlighted the advantages and disadvantages between the different types of platforms with many of the advantages being in favour of LWF and MWF in terms of rapid deployability, maintenance and logistical demands. This is the cost of doing business with HWF in order to gain the added triad of superior protection, mobility and firepower of HWF. However, if the CA wants to remain strategically relevant across the spectrum of conflict by being able to achieve operational objectives it must be able to deploy and conduct tactical level operations with HWF as well as LWF and MWF.

RELUCTANCE OF THE INSTITUTION TO EMBRACE HWF

This paper argues that despite the introduction of HWF in the CA there is a reluctance of the institution within the CA to fully embrace the concept of HWF. Instead,

¹⁴⁷ Lieutenant-Colonel John Conrad, *What The Thunder Said: Reflections of a Canadian Officer in Kandahar*. (Kingston: Canadian Defence Academy Press, 2009), 133.

the CA still considers itself a MWF. This view was confirmed in a 2008 interview with the former CA CLS, LGen Andrew Leslie,

the army will still be a medium-weight force, based on light armoured vehicles (LAVs), but a slightly heavier LAV than we have now, probably the same vehicle, but upgraded, re-enforced. The army will have the ability to surge up, in a limited non-sustained fashion, to add on heavier stuff like tanks or infantry assault vehicles in limited numbers and the ability to surge down, for light companies within that core capability of the army.¹⁴⁸

If the CA now has acquired new HWF and is continuing to acquire these forces then why does it continue to insist on being a MWF? The CA has now rebuilt itself with modern state of the art equipment and has more than proved itself as a strategically relevant combat capable force in Afghanistan with LWF, MWF and HWF. The CA should not sell itself short and should consider itself as a multi-purpose combat capable force. It should also not refer to itself as a LWF, MWF, or HWF, but as an army capable of fighting across the spectrum of conflict in order to achieve operational level objectives.

The CA insists in its most recent doctrine, *Land Operations 2021* that “heavy elements reinforce medium and light elements to provide a higher degree of protection and lethality where required by the force.”¹⁴⁹ The institution also continues to maintain their stance that the CA remains a predominately MWF. The CA clearly articulates its MWF doctrine in *Land Operations 2021* and that their reasoning is based on the fact that most deployments in the FSE will require the range of capability inherent in a MWF, which includes the modularity of other resources including elements of LWF and

¹⁴⁸ Sharon Hobson, “Interview: Lt Gen Andrew Leslie, Canada's Chief of Land Staff.” *Jane's Defence Weekly*, 12 August 2008, NP.

¹⁴⁹ Canada, *Land Operations 2021*, 18.

HWF.¹⁵⁰ This doctrine supports the counter-argument that the CA is embracing HWF in that they have included them within their doctrine. This is true, but the fact remains that they insist on remaining a MWF, which can be reinforced with HWF or scale-back to LWF as required. Although this embraces the use of HWF within the CA, it does not fully embrace their use within the FEC. Specifically, *Land Operations 2021* does not indicate that the CA will employ a stand-alone HWF based JTF within the *Army of Tomorrow*. As a result of this observation, it is clear that the CA has not fully embraced the employment of HWF.

The CA, with the introduction of Leopard 2 MBT and the soon to be acquired CCV will soon possess the ability to deploy a HWF in sufficient numbers to sustain combat operations on a rotational basis. The CA now has 82 Leopard 2 MBTs,¹⁵¹ which provides a sufficient number to deploy two tank squadrons of 19 tanks each plus have enough for two tank squadrons of 19 tanks each in Canada for individual and collective training as well as six spares. The CCV project intends to “procure a fleet of 108 CCV, with an option to procure up to 30 additional vehicles.”¹⁵² 138 CCV would be enough to surge, for a limited period, with two infantry BG equipped with 94 CCV and 44 left for training and battlefield spares. It would also possess the ability to sustain the deployment of one infantry BG for extended operations with 47 CCV with 91 remaining for training and battlefield spares. The combination of tank squadrons and infantry battalions would be based on the mission.

¹⁵⁰ *Ibid*, 14.

¹⁵¹ Canada, *Tank Replacement Project Information Brief*, NP.

¹⁵² Canada, *Close Combat Vehicle*, 7.

In closing this section on the reluctance to embrace HWF, it is imperative to note that the CA will soon possess a sufficient number of HWF to deploy two infantry BG each equipped with a tank squadron for a limited period or one armoured BG equipped with two tank squadrons and one infantry battalion. Whatever the combination, there would be enough to have either an armoured or infantry led BG. This would also be an increased force in terms of size and capability as compared to the reinforced infantry BG that deployed to Afghanistan in 2006-2010. With the fielding of the remaining fleet of HWF, the CA will soon have the tactical capability to fight as a stand-alone HWF across the spectrum of conflict in support of operational level objectives in order to ensure their strategic relevancy within the FSE. The time has certainly come for the CA to fully embrace HWF and accept the fact that they are capable of employing a HWF when required.

CONCLUSION

This chapter substantiated the argument that with the introduction of the Leopard 2 MBT and the CCV the CA will be able to participate in full spectrum operations, specifically up to and including high intensity conventional operations against an enemy armed with HWF. This improved capability also has strategic follow-on effects, as the re-introduction of HWF will enable the CA to participate in future multi-national operations on par with its NATO peers, hence strengthening its position on the world stage.

This chapter has highlighted the differences between the primary fighting vehicles of LWF, MWF, and HWF. It provided evidence that HWF possess superior tactical

mobility, but LWF and MWF have better operational and strategic mobility due primarily to their lighter weight. It also discussed the difficulties of supporting three fleets of fighting vehicles and the training, maintenance and logistic challenges that this variety brings. Although these challenges are difficult, they are not insurmountable as was evident during recent operations in Afghanistan. Finally, it discussed the reluctance of the institution within the CA to fully embrace the concept of HWF despite the introduction of increased capabilities that enable the CA to deploy a substantial HWF for sustained operations.

In summation, the CA has determined that it now has the ability to deploy HWF by air with its C17s. Although it will only be able to deploy four vehicles at a time, it can deploy a HWF with integral lift during an extended period. The CA also has the means to maintain HWF, while simultaneously maintaining its LWF and MWF as it has done in Afghanistan. Finally, the CA will soon possess the number of vehicles to properly equip a deployable HWF.

The shift to HWF will have impacts and effects on the modern battlefield. In particular, one wonders what effect these forces will have during a COIN campaign. The next chapter- Heavy Forces in a COIN Campaign, discusses this topic.

CHAPTER 3

HEAVY FORCES IN A COIN CAMPAIGN

“The key to using these platforms [tanks] is using them correctly.”

Lieutenant-General Mark Hertling, US Army and former commander of US Forces in Northern Iraq.¹⁵³

INTRODUCTION

The previous chapter provided evidence to corroborate the argument that with the introduction of the Leopard MBT and the CCV the CA will soon possess the capability to participate in full spectrum operations, specifically up to and including high intensity conventional operations against an enemy armed with heavy mechanized forces. This chapter will examine the other type of warfare that has dominated western military operations for the last decade, COIN. Specifically, this chapter will discuss the impact and effects of HWF employed during a COIN campaign. The main argument of this chapter is that HWF can successfully be employed in support of a COIN campaign, but need to be carefully managed and controlled in order that their impact is only felt by the insurgents and not the people whom you are supporting. This chapter will begin with an examination of the impact of the Leopard MBT had during CA COIN operations in Afghanistan. It will examine only the MBT and not the CCV, as it is not yet in service. The examination will focus on why the Leopard MBT was employed and its tactical success as well as the operational and strategic impacts that resulted from its employment. Next, it will discuss the successes and failures of other armies that have employed HWF in support of a COIN campaign. The primary focus of this discussion

¹⁵³ Wesley Morgan, “Tanks to Afghanistan – Analysis,” *The New York Times*, 23 November 2010, NP.

will be on the lessons learned in regards to the employment of HWF and if their employment made a difference and what impact they had on both the insurgents and the people they were supporting. Finally, it will conclude with a discussion on the likelihood of the CA employing heavy-forces during future COIN campaigns.

IMPACT OF LEOPARD MBT ON COIN OPERATIONS IN AFGHANISTAN

In order to begin an examination of the impact of the Leopard MBT on COIN operations in Afghanistan it is necessary to define COIN within the CA context.

However, it is important to first define the thing for which COIN is counteracting,

“insurgency.” The CA defines an “insurgency” as:

behaviour that attempts to effect or prevent change through the illegal use, or threat, of violence, conducted by ideologically or criminally motivated irregular forces, groups or individuals, as a challenge to authority.¹⁵⁴

COIN within the CA is defined as “those military, paramilitary, political, economic, psychological and civic actions taken to defeat an insurgency.”¹⁵⁵ COIN operations, according to US Army COIN doctrine are comprised of “a broad category of conflict known as irregular warfare.”¹⁵⁶ The US Department of Defense (DOD) defines irregular warfare as:

A violent struggle among state and non-state actors for legitimacy and influence over the relevant population(s). Irregular warfare favors indirect and asymmetric approaches,

¹⁵⁴ Canada. Department of National Defence. B-GL-323-004/FP-003, Counter- Insurgency Operations. 2nd ed. (Chief of the Land Staff, Army Publishing Office, Fort Frontenac, Kingston, ON, 2008), 1-3.

¹⁵⁵ *Ibid*, 1-11.

¹⁵⁶ United States. Department of the Army and Marine Corps Combat Development Command. *Field Manual No. FM 3-24 and MCWP 3-33.5: Counterinsurgency*. (Washington, DC: US Government Printing Office, 15 December 2006), 1-1.

though it may employ the full range of military and other capacities, in order to erode an adversary's power, influence, and will.¹⁵⁷

In Afghanistan, the CA waged a COIN campaign against Taliban insurgents. There were few large scale conventional operations fought against the Taliban as they lacked the conventional means in terms of firepower and protection to go head to head against NATO forces that possessed superior conventional combat power. Instead, the Taliban relied on asymmetrical methods of irregular warfare to wage their campaign. *Asymmetrical warfare*, uses such means as terrorism against “vulnerable military units, population, infrastructure, culture, and institutions.”¹⁵⁸ This method seeks to attack an adversary's weaknesses as opposed to its strengths, as it does not possess the military capability to do otherwise.¹⁵⁹ The Taliban methods included dismounted hit and run attacks, IED's, rockets, mortars and ambushes.¹⁶⁰

If the Taliban lacked any mechanized forces and conducted most of their operations dismounted then why did the CA need tanks in Afghanistan? This question was answered in the first chapter, which pointed primarily to the need for improved protection for CA soldiers. However, not every soldier serving in Afghanistan rode in a tank and not every convoy travelling down a road in Afghanistan was protected by a tank. Instead, the Leopard tanks in Afghanistan were not only used for deliberate offensive operations, they were used as a Quick Reaction Force (QRF), route clearance, and as a

¹⁵⁷ United States. Department of Defense. Department of Defense Directive 3000.07. *Irregular Warfare*. (Washington, DC: US Government Printing Office, 1 December 2008), 11.

¹⁵⁸ Marcus Corbin. Reshaping the Military for Asymmetric Warfare. (Washington, DC: Centre for Defense Information, 5 October 2001), 72-73.

¹⁵⁹ *Ibid.*

¹⁶⁰ Hope, *Dancing with the Dushman*, 33-37.

deterrent to intimidate Taliban insurgents.¹⁶¹ It was the intimidation factor of the Leopard tanks, which provided the greatest impact at improving security and strengthening relationships with the populace during CA operations in Afghanistan.

This paper argues that the deployment of Leopard MBTs not only improved force protection through superior firepower and mobility, but they actually improved the relationship with the Afghan people. It is the people, according to the CA COIN manual, who are the key to success. The COIN manual stipulates:

The fundamental maxim of all COIN is that a strategic centre of gravity is the populace of the threatened state or region. Without the moral support of the people, no COIN campaign can succeed.¹⁶²

This doctrine was confirmed by Major Cadieu, in which he stated in a 2008 Canadian Army journal article: “The deployment of armour to Afghanistan has also reinforced with the local populace the resolve of Canada and NATO to bring stability to the region.”¹⁶³ Therefore, the Leopard MBT helped to not only increase the firepower and protection of the CF deployed to Afghanistan, it also greatly aided in improving the overall security situation within the Canadian Area of Operations (AO) in Kandahar province, while simultaneously gaining the support of the Afghan people.

The Leopard MBT essentially gave the CA the capability to both protect themselves and the Afghan people. With better security, derived from the ability to both deter enemy attack through the intimidation factor of armour combined with its ability to

¹⁶¹ Bill Graveland, “Leopard 2 Tanks a boon for Canadian Troops,” *Canadian Press*, 27 December 2008, NP.

¹⁶² Canada. Department of National Defence. B-GL-323-004/FP-003, *Counter- Insurgency Operations*. 1st ed. (Chief of the Land Staff, Army Publishing Office, Fort Frontenac, Kingston, ON, 2008), 3-1.

¹⁶³ Cadieu, 10-11.

counter any enemy action through superior precision firepower the reconstruction projections could take fruition and the local government and local security forces became more effective, while simultaneously marginalizing the insurgency. It can therefore be said that the introduction of the Leopard MBT had a positive impact not only at the tactical level, but it had an impact at the operational and strategic level by strengthening the support of the Afghan people.¹⁶⁴ This support had a ripple effect in Afghanistan to the point that a level of trust was built with the Canadians as they demonstrated their resolve and their ability to protect the people and legitimize the national government.

A likely counter-argument to the concept of tanks improving the security situation and winning the hearts and minds of the people is the reality that MBTs are large earth shaking monsters that are often more effective at scaring innocent people than they are scaring enemy soldiers. This very type of argument was put forward by Dr. Michael D. Wallace, professor of political science at the University of British Columbia and senior advisor to the Rideau Institute on International Affairs. Wallace put forward his argument in 2007, shortly after Canada deployed Leopard C2 MBTs to Afghanistan, he stated in a *Policy Alternatives* article:

It is entirely understandable that our military commanders will exert every effort to minimize the loss of Canadian lives, but by doing so they risk further alienating a suspicious population that has had no reason to embrace foreigners.¹⁶⁵

¹⁶⁴ Raphael E. Moyer, "Death Before Dismount? Mechanization, Force Employment, and Counterinsurgency Outcomes in Iraq," (Master's thesis, Massachusetts Institute of Technology, February 2011), 22.

¹⁶⁵ Michael D. Wallace, "Leopard Tanks and the Deadly Dilemmas of the Canadian Mission in Afghanistan," Foreign Policy Series, Volume 2, Number 1. February 2007. Journal on-line; available from http://www.policyalternatives.ca/sites/default/files/uploads/publications/National_Office_Pubs/2007/Leopard_Tanks.pdf; Internet; accessed 4 March 2012.

Dr Wallace's argument does indeed have merit, but it comes back to the main argument of this chapter in that a MBT or any HWF for that matter can successfully be employed in support of a COIN campaign so long as it is carefully managed and controlled in order that their impact is only felt by the insurgents and not the people whom you are supporting. This idea is clearly stated within the CA COIN manual in which it contends:

Armour, and all heavy firepower, must be used most judiciously in COIN so as to avoid the "David versus Goliath" PSYOPS advantage this could give to the enemy, as well as to limit unnecessary collateral destruction.¹⁶⁶

The CA upheld this doctrine during the conduct of operations in Afghanistan and the need to limit collateral damage is always a vital requirement in the planning and conduct of operations. The use of MBTs actually aided in reducing the amount of collateral damage as much of the firepower that was provided before the advent of MBTs in Afghanistan came from close air support and indirect fire. The value of the tank during COIN operations in Afghanistan was advocated by Major Cadieu,

While it is true that the loss of innocent civilians and excessive damage to infrastructure from NATO military operations would impair our ability to achieve a mandate of reconstruction in Afghanistan, suggestions that the use of tanks has alienated the local populace more than other weapon systems have proven completely unfounded. Since commencing combat operations nine months ago, Canadian tanks have killed dozens of insurgents in battles throughout Kandahar Province, yet there has been no suggestion of civilian deaths attributed to tank fire during this entire period. Equipped with a fire control system that allows our soldiers to acquire and engage targets with precision and discrimination, by day and by night, the Leopard tank has in many instances reduced the requirement for aerial bombardment and indirect fire, which have proven to be blunt instruments.¹⁶⁷

¹⁶⁶ Canada, *Counter- Insurgency Operations*, 1st ed., 6-34 to 6-35.

¹⁶⁷ Cadieu, 10.

HWF have other roles to play in a COIN, in particular in high intensity COIN operations. Armour within the CA COIN doctrine states:

Armour in high intensity COIN operations, armour plays a valuable role with its characteristics of firepower and protection. In rural areas, armour provides both breaching capabilities and the power to strike at insurgents outside the effective range of many of the typical insurgent small arms. In urban areas, armour can provide invaluable protection, neutralize strong points and assist in breaching structures.¹⁶⁸

During operations in Afghanistan, the Leopard MBT fulfilled all of these roles admirably with little negative impact at the tactical level. Actually, when unavoidable collateral damage was done to civilian infrastructure in Afghanistan, including that caused by the movement of MBTs, the civilians would be compensated for such damage. In fact, according to the DND the Canadian government “paid \$1,047,946 to 453 people since 2005.”¹⁶⁹ This monetary reparation is crucial to building relationships not only at the tactical level, but also at the operational and strategic level. The problem is that it is almost impossible to completely avoid collateral damage during a COIN campaign, but when collateral damage does occur, it must be dealt with swiftly and appropriately. If this is not done, the insurgents will seize upon this opportunity to exploit the issue in their favour by disseminating the message that the local government and their supporters cannot protect them nor do they care about them. The US military discovered the strategic importance of compensation for collateral damage from their own COIN experiences within Afghanistan and Iraq. Jonathan Tracy, a former U.S. Army Judge

¹⁶⁸ Canada, *Counter- Insurgency Operations*, 1st ed., 6-35.

¹⁶⁹ CBC News World, “Canada paid \$1M compensation to Afghan civilians,” 9 June 2011, <http://www.cbc.ca/news/world/story/2011/06/09/afghan-compensation.html> ; Internet; accessed 4 March 2012.

Advocate General, who is now a military and legal consultant for the Campaign for Innocent Victims in Conflict, maintains that:

An equitable combat claims system helps ensure that victims will not only view the alien army as the harbinger of pain and suffering, but as a force that fairly and justly compensates those they harm.¹⁷⁰

This concept of monetary reparation leads us back to the main argument of this chapter that HWF can be used in support of a COIN campaign, but they need to be carefully managed and controlled in order to ensure that their impact is only felt by the insurgents and not the people whom you are supporting. In summary, it can be said that the Leopard MBT helped improve the overall level of security and enabled the Afghan people to not only feel secure, it weakened the insurgency, strengthened the national security forces and helped legitimize the government. However, the important conclusion is that this could have been all destroyed in a second, if the Leopard MBTs were not carefully employed and if all damages were not quickly rectified with the appropriate level of compensation.

SUCSESSES AND FAILURES OF OTHER ARMIES USING HWF IN A COIN

Canada is only one of many nations, which has an army that has used HWF in COIN. There have been several who have done and continue to use HWF in COIN operations. These include Israel, Russia and the US to name but a few. This section will discuss the successes and failures of these armies in the pursuit of victory in COIN operations through the employment of HWF. In particular, it will briefly discuss the lessons learned and if the employment of HWF made a difference in their success or

¹⁷⁰ Jonathan Tracy, "Responsibility to Pay: Compensating Civilian Casualties of War," <http://www.wcl.american.edu/hrbrief/15/1tracy.pdf?rd=1> ; Internet; accessed 4 March 2012.

failure. As well, it will also present some examples of the impact of HWF on both the insurgents and the people they were supporting.

Israel is a state with a long history of fighting COIN both inside and outside its borders since its inception as a state in 1948. It has employed HWF in both conventional and COIN operations with mixed results. The 1973 Yom Kippur War, although conventional in nature it taught the Israeli Defence Forces (IDF) many valuable lessons that would be applicable to the unconventional warfare of COIN operations. During the 1973 Yom Kippur War there was a mass proliferation of man-portable anti-tank weapons used by the enemy, which were capable of destroying MBTs.¹⁷¹ The most commonly used anti-tank weapon of the time was the Rocket Propelled Grenade or RPG, which is “an easily portable, cheap killing tool [that] can cut through 350mm of rolled homogenous armour.”¹⁷² These weapons exposed the weaknesses of IDF HWF, which in the 1970s lacked sufficient protection against the RPG. The most modern MBT of the IDF at the time was the US built M60, which had only 108mm of armour at its thickest point in the front with a mere 73mm on the sides.¹⁷³

Today, the RPG endures as a popular weapon of insurgents throughout the world. The proliferation of man portable anti-armour weapons like the RPG caused the Israelis to adapt to this threat by initiating the up-armour of their AFVs and the development of new heavy weight vehicles.¹⁷⁴ Israel even developed its own MBT (Merkava) and a

¹⁷¹ Marsh Gelbart, *Modern Israeli Tanks and Infantry Carriers: 1985-2004*. (Wellingborough, UK: Osprey Publishing, 2004), 3.

¹⁷² *Ibid*, 5.

¹⁷³ George F. Hofmann and Donn A. Starry, *Camp Colt to Desert Storm: The History of US Armored Forces*. (Lexington: The University Press of Kentucky, 1999), 310.

¹⁷⁴ Gelbart, 5-8.

heavy IFV (Namer), based on the Merkava tank chassis.¹⁷⁵ The IDF also learned from many years of conducting COIN operations that HWF are an invaluable asset, claiming that MBTs and heavily armoured APCs,

can do a good job of protecting against ambushes by irregular forces with anti-tank weapons and provide better protection against roadside bombs-discouraging such attacks and reducing their numbers in the process.¹⁷⁶

The Israelis learned well from their experiences and adapted their HWF to match the tactics of the insurgent enabling them to better-protect the people and soldiers of Israel. Israel is a small state with a small army that fights for its survival every day and it cannot afford to lose significant numbers of soldiers or equipment. Therefore, Israel continues to adapt their HWF to meet the threats posed by insurgents. However, not all armies have been as successful as the Israelis in adapting to insurgent tactics.

The Russians fought a long and protracted COIN campaign in Afghanistan 1979-1989 against the Mujahedeen insurgent. The Russian Army invaded Afghanistan during the Cold War with a “highly centralized armor-heavy”¹⁷⁷ army. Unfortunately, they quickly discovered that their tactics were unsound in the rugged terrain of Afghanistan and according to Soviet General Staff recollections, translated by military historian Lester Grau and former Soviet Afghan veteran, Michael Gress, “the practice of massing a large number of regular forces against a small group of irregular forces to fight guerrilla war on

¹⁷⁵ David E. Johnson and John Gordon IV, “Observations on Recent Trends in Armored Forces,” Report for the United States Army. (Santa Monica: The RAND Corporation, 2010), 5.

¹⁷⁶ Anthony H. Cordesman, *Arab-Israeli Military Forces in an Era of Asymmetric Wars*. (Westport, CT: Greenwood Publishing Group, 2006), 109.

¹⁷⁷ Major James T. McGhee, “The Soviet Experience in Afghanistan: Lessons Learned,” Military History Online; available from <http://www.militaryhistoryonline.com/20thcentury/articles/sovietexperience.aspx> ; Internet; accessed 6 March 2012.

rough terrain was bankrupt.”¹⁷⁸ Instead, the MBTs “often became stationary pillboxes positioned at Soviet base camps.”¹⁷⁹ The Soviets eventually changed their tactics to deal with the insurgents:

Greater emphasis was placed on the use of light armored, wheeled vehicles such as the Soviet family of BMDs. These vehicles proved to be well suited for Soviet operations in Afghanistan. They were twice as light, and shorter than the Soviet BMP. They were well armed with a 73mm cannon, a coaxial machine gun, and two bow-mount machine guns. They had a low silhouette, which enabled them to hide in terrain folds or behind rock formations. Their lightweight proved desirable in a war where there was a wide use of mines, and it allowed the vehicle to be air transportable by a variety of aircraft to include helicopters.¹⁸⁰

The Soviet change in tactics could be seen as similar to that *modus operandi* originally employed by the CA in Afghanistan of not needing tanks. It could be argued that the Soviets adapted well from their experiences, so why did not the CA adapt these lessons learned? Well, the CA did learn from these lessons and MBTs were not seen as a weapon required for COIN operations in Afghanistan as discussed earlier in Chapter 1. Instead, the CA brought LWF and MWF, but the insurgents changed their tactics and began to employ IEDs in greater numbers, which increased casualties and placed political and public pressure on the CA to find a solution. The solution was to send tanks. The Soviets never faced the same situation as the CA faced in Afghanistan, which was the massive proliferation and employment of IEDs. The Soviets used their tanks extensively in Afghanistan to fight the insurgents, especially during the initial stages of the war. The Mujahedeen insurgents had no tanks and limited weapons to match the Soviets; as a

¹⁷⁸ Lester W. Grau and Michael A. Gress, *The Soviet Afghan War: How a Superpower Fought and Lost*, (Lawrence: University Press of Kansas, 2002), 91.

¹⁷⁹ McGhee, NP.

result, they were forced to take refuge in the mountains from which they would launch their attacks. These mountains in most cases were inaccessible to armour and the main armament of soviet tanks was unsuited for engaging these elevated positions, as it was limited to an elevation of 30°. ¹⁸¹ It was this rugged terrain combined with the limitations of Soviet armour that were the underlying causes for the change in Soviet tactics.

The Soviets, unlike NATO, invaded Afghanistan and were not there to fight an insurgency, but to expand the Soviet Union. It was this invasion that actually created the insurgency. The Mujahedeen insurgents were Muslims who rose up against the secular Soviet communist invaders, who they considered as “invading infidels.” ¹⁸² It was this commonly held belief amongst the Afghans that was the major unifying force of the Mujahedeen. ¹⁸³ As an invading army, the Soviets and their armour were not in Afghanistan to protect the people, instead they were there to conquer the Afghan people. The Soviets massive employment and indiscriminate use of armour did more to fuel the insurgency than it did to defeat it. Further fuel to the fire was the fact that if any damage was caused by Soviet forces the people were never compensated for their losses. In short, armour was not used carefully by the Soviets in Afghanistan and its impact was felt negatively by both the insurgent and the Afghan people, which would eventually contribute to their defeat. However, the Soviets would not be the only army to fight an insurgency in Afghanistan.

¹⁸⁰ *Ibid.*

¹⁸¹ Grau and Gress, 190-191.

¹⁸² Brigadier Mohammad Yousaf and Major Mark Adkin, *The Bear Trap: Afghanistan's Untold Story*. (Leo Cooper: London, 1992), 33.

¹⁸³ *Ibid.*

The US military has fought a COIN campaign alongside the CA in Afghanistan since their intervention against the Taliban regime in 2001, but unlike the CA, they have not deployed IFVs or MBTs, until 2010. In 2010, as discussed in Chapter 2 the US Marines did deploy M1 Abrams MBTs to Helmand province, but this remains the only deployment of heavy weight fighting vehicles during the US military's 11 year COIN campaign in Afghanistan. Why did the US military not send in tanks earlier and why did it change its view after nine years of fighting? There is no known public statement on why the US military chose not to send any tanks to Afghanistan until 2010 and in fact, some senior officers in the US military have sought to understand the logic behind the delay. One such senior officer is retired General Jack Keane, former Vice Chief of Staff for the US Army and now a defense analyst and Chairman of the Board for the Institute for the Study of War. In a 2010 interview with the *Washington Times* he commented, "Many of us had been scratching our heads over why [tanks] hadn't been sent before, given the success we enjoyed with them during the counterinsurgency in Iraq."¹⁸⁴ There are many reasons to speculate as to why tanks were not employed in Afghanistan and these include the vast mountainous terrain was unsuited for tanks, the enemy was not armed with tanks, and the experience of the Soviet Army had proven the MBT was of little use in Afghanistan. The author of this paper, while serving in Afghanistan in 2010 even questioned this policy on the lack of Bradleys and M1 MBTs to a senior commander in the US Army's 4th Infantry Division and was told that they considered the Afghan theatre a "light theatre" and that tanks and Bradleys were not required.

¹⁸⁴ Ashish Kumar Sen, "Pentagon's decision to send tanks to Afghanistan praised," *The Washington Times*, 19 November 2010, NP.

If the US military saw no substantiation for MBTs for nine years then why did they change their mind in late 2010? It is asserted that it was the successful employment of tanks by its NATO allies in Afghanistan that changed the mind of the US military in sending tanks to Afghanistan. Specifically, it can be pointed directly at the CA, who had successfully employed MBTs for over four years. When the American troops began to surge into Kandahar province, they gained an appreciation for the firepower and long-range observation capabilities of the CA Leopard MBTs.¹⁸⁵ In fact the US Army was even supported by CA Leopard MBTs on some operations as was attested by US Army battalion commander, LCol Johnny Davis,

Within a couple days, one of the Canadian tanks picked up a Taliban team moving to attack a coalition base from over 2,000 meters away. That has become common, keeping Taliban fighters farther from the allied outposts. On four or five occasions, too, the tanks have fired their main gun rounds while supporting the Americans.¹⁸⁶

The Americans were no stranger to the employment of tanks during COIN operations; in fact, they had refined their employment in Iraq and they had been used quite successfully during the insurgency phase of the Iraq War.¹⁸⁷ US Army Brigadier General H.R. McMaster, commander of the 3rd Armored Cavalry Regiment in Tal Afar, Iraq in 2005, remarked on the lessons learned on the employment of M1 Abrams MBTs during COIN operations in Iraq,

What the mobile, protective firepower of a tank allows you to do is obviously protect your own troops, but also to take more risk to close with the enemy while protecting civilian populations.¹⁸⁸

¹⁸⁵ Morgan, NP.

¹⁸⁶ *Ibid.*

¹⁸⁷ Michael Hoffman, "Army eyes use of tanks in Afghanistan," *Army Times*, 5 December 2010, NP.

It was the use of the MBT in a supportive role that contributed greatly to mission success in Iraq. Essentially, the MBT in Iraq allowed the US Army to take the fight directly to the enemy, while simultaneously protecting their own troops and the Iraqi people. This paper asserts that the CA's MBTs in Afghanistan confirmed that the COIN lessons learned by the US military in Iraq would work in Afghanistan. It was a result of their observations of CA operations combined with tank support received from the CA, while in Afghanistan that was the major contributing factor for their decision to deploy tanks to the Afghan theatre.

EMPLOYING HWF IN FUTURE CA COIN CAMPAIGNS

The CA has gained many invaluable lessons from its COIN campaign in Afghanistan, particularly the value of HWF such as MBTs. These lessons combined with those of the US military have proved that HWF such as the tank have an important role to play in a COIN campaign, even if in a limited role. The war in Iraq and Afghanistan has proved that a MBT does more to quell an insurgency than it does to entice it. The key to this is to ensure that these powerful tools are employed properly. Their precision firepower and superior observation capabilities must be employed carefully to find, fix and strike insurgents, while ensuring they do not cause collateral damage or generate fear in the very people you are protecting. The Soviets learned that massed armour used indiscriminately does nothing to gain the trust and confidence of a people and in their experience in Afghanistan did more to inspire a people to rise up against them than to defeat them.

¹⁸⁸ Morgan, NP.

The likelihood of fighting more COIN campaigns within the timeline of the *Army of the Future* is more probable than ever before according to American COIN expert, John A. Nagl:

A host of trends from globalization to population growth to weapons proliferation, which the [US] Army has recognized in its latest [2009] posture statement, suggests that the “era of persistent conflict” against lethal non-state irregular foes will not end anytime soon.¹⁸⁹

As a result of this increased likelihood of fighting further COIN campaigns in the *Army of the Future*, the CA must ensure it institutionalizes the vital lessons learned in Afghanistan. In particular, the CA must not forget the lessons learned on the employment of MBTs in that they helped reduce CF casualties, precisely eliminated and intimidated insurgents, while simultaneously protecting the Afghan people. HWF such as the MBT and the soon to be acquired CCV will definitely be needed to contribute to the mission success of future COIN campaigns.

CONCLUSION

This chapter substantiated the argument that HWF can successfully be employed in support of a COIN campaign as long as they are carefully managed and controlled in order that their impact is only felt by the insurgents and not the people whom you are supporting. This chapter also examined the impact of the Leopard MBT had made during CA COIN operations in Afghanistan and has provided evidence to support the argument that the tactical success of the CA employment of the Leopard MBT in Afghanistan had far reaching strategic effects. In fact, the CA’s ability to carefully employ their MBTs

¹⁸⁹ John A. Nagl, "Let's Win the Wars we're in," *Joint Force Quarterly*, First Quarter 2009, Issue 52 (January 2009), 21.

helped to protect CA soldiers and reduce casualties, while giving the CA the ability to take the fight to the insurgents at the time and location of their choosing. MBTs also contributed greatly to improving the overall security situation within the Canadian AO enabling reconstruction efforts to move forward and to move closer to a more stable state. The improved security situation and reconstruction efforts actually had a positive impact at the operational level by assisting greatly in strengthening the bond between the Afghan people and the CF operating throughout Afghanistan, which better enabled the CA to achieve its operational level objectives. The reduction in Canadian casualties also had a positive impact at the strategic level by strengthening the political resolve for the mission.

This chapter also discussed the successes and failures of other armies that have employed HWF in support of a COIN campaign. This section corroborated the argument on the importance of the proper use of HWF in a COIN campaign with a focus on the lessons learned on recent operations of the US military in Afghanistan and Iraq as well as the constant evolution of Israeli HWF to match the insurgent threat. It has also shown the historical example of the Soviet failure to judiciously employ their armour and the subsequent negative impact it had on them and the Afghan people. Finally, it concluded with a discussion on the likelihood of the CA employing HWF during future COIN campaigns as being probable as they will remain part of the FSE for the foreseeable future. It also determined that the lessons learned on the importance of HWF must be institutionalized in CA doctrine and that HWF will definitely be required to contribute to the mission success of future COIN campaigns.

In summation, the CA's employment of MBTs in Afghanistan has validated their vital importance in a COIN campaign. Operations in Afghanistan and Iraq have proven

that MBTs when used carefully can definitely contribute to mission success from the tactical to the strategic level. Finally, as the CA's MBT have been withdrawn from Afghanistan it is imperative that the lessons learned be institutionalized within CA doctrine so they are not forgotten and that HWF will be an immediate consideration in any future planning for a COIN campaign.

CONCLUSION

“A careful look at the past should convince even the skeptic that the tank idea has been pronounced obsolete many times yet has undergone a renaissance, time and again proving its value in combat. It really was not reborn nor had it died except in the minds of those who failed to recognize that the tank is more than just a vehicle. It is an idea. Tanks by themselves are merely complex pieces of machinery. The skill and morale of their crews and the imagination of those who direct them are what make them effectively military weapons.”

Colonel (Ret'd) Robert J. Icks, Australian Army.¹⁹⁰

SUMMARY OF DEDUCTIONS

This paper has provided substantiation through a wide array of sources to corroborate the argument that the introduction of the Leopard 2 MBT and the CCV will provide the CA with a heavyweight tactical capability, which will enable it to fight across the complete spectrum of conflict in order to achieve operational level objectives. In summarizing the deductions of each chapter, Chapter 1- “Defining the Requirement,” began with a discussion on the origin of the driving force behind the shift towards reinvigorating HWF within the CA in which the main reason for the shift contends that it was primarily based on the operational experience of the CA in Afghanistan and the need for enhanced protection. It also presented evidence that HWF provided the CA with improved tactical capability due to their enhanced firepower, mobility, and protection, which better enables it to fight across the spectrum of conflict up to and including high intensity operations against a peer or near-peer adversary. This in turn improves the capability of the CA to achieve operational level objectives across the full spectrum of conflict, which has not able to undertake since the end of the Cold War.

¹⁹⁰ Colonel (Ret'd) Robert J. Icks, *Famous Tank Battles*. (New York: Doubleday and Company, 1972), 20.

The second chapter, “A Shift from Light and Medium Forces,” validated the argument that with the introduction of the Leopard 2 MBT and the CCV the CA will be able to participate in full spectrum operations, specifically up to and including high intensity conventional operations against an enemy armed with HWF. This chapter also highlighted the differences between the primary fighting vehicles of LWF, MWF, and HWF. As well, it established the superior tactical capability of HWF and the strategic follow-on effects that this improved tactical capability means for the CA and the Government of Canada. As this improved tactical capability would not only greatly strengthen the ties between Canada and the US, but it would help advance Canada’s position as a middle power by empowering the CA to exercise the political will of the government across the spectrum of conflict.

Chapter 2 also provided evidence that HWF possess superior tactical mobility due primarily to their tracks, but LWF and MWF have better operational and strategic mobility due to their lighter weight. It is this lighter weight that allows them to be more easily transported, especially by aircraft. It also discussed the difficulties of supporting three fleets of fighting vehicles and the training, maintenance and logistic challenges that this variety brings. Although these challenges are difficult, they are not insurmountable as was evident during recent operations in Afghanistan. Finally, it discussed the reluctance of the CA to fully embrace the concept of HWF despite the introduction of new HWF and increased capabilities that enable the CA to deploy these forces for sustained operations.

The third and final chapter, “Heavy Forces in a COIN Campaign,” corroborated the argument that HWF can successfully be employed in support of a COIN campaign as

long as they are carefully managed and controlled in order that their impact is only felt by the insurgents and not the people that you are supporting. This chapter also examined the impact of the Leopard MBT had made during CA COIN operations in Afghanistan and has provided evidence to support the argument that the tactical success of the CA's employment of the Leopard MBT in Afghanistan had far reaching strategic effects. In fact, the CA's ability to carefully employ their MBTs helped to protect CA soldiers and reduce casualties, while giving the CA the ability to take the fight to the insurgents at the time and location of their choosing. MBTs also contributed greatly to improving the overall security situation within the Canadian AO enabling reconstruction efforts to move forward and to move closer to a more stable state. The improved security situation and reconstruction efforts actually had a positive impact at the operational level by assisting greatly in strengthening the bond between the Afghan people and the CF operating throughout Afghanistan, which better enabled the CA to achieve its operational level objectives. The reduction in Canadian casualties also had a positive impact at the strategic level by strengthening the political resolve for the mission.

Chapter 3 also discussed the successes and failures of other armies that have employed HWF in support of a COIN campaign with a particular focus on the valuable lessons learned on recent operations of the US military in Afghanistan and Iraq as well as an examination of the constant evolution of Israeli HWF to match the insurgent threat. It has also presented the historical example of the Soviet failure to judiciously employ their armour and the subsequent negative impact it had on them and the Afghan people. Finally, it concluded with a discussion on the likelihood of the CA employing HWF during future COIN campaigns as being probable as they will remain part of the FSE for

the foreseeable future. It also determined that the lessons learned on the importance of HWF must be institutionalized in CA doctrine and that HWF will definitely be required to contribute to the mission success of future COIN campaigns.

FISCAL AND POLITICAL LIKELIHOOD OF MAINTAINING HWF

At the time of writing this paper, the Canadian government faces a budget deficit of 33.4 billion¹⁹¹ and as a result, the 2012 Federal Budget released on 29 March 2012 has been forced to make cuts to all departments, including DND.¹⁹² These cuts will be aimed at streamlining internal management procedures as well as delays in some major equipment purchases. According to a recent article in the *Globe and Mail*,

It means that by 2014-15, \$1.1-billion will be slashed from the roughly \$20-billion defence budget – just over 5 per cent. In addition, the government will delay the purchase of \$3.5-billion in equipment for seven years, allowing it to trim hundreds of millions of dollars more each year.¹⁹³

The delay in equipment purchases would cause Canadians to assume that this would likely include the purchase of the CCV and the TAPV as both projects are still in the evaluation phase and a final selection of either vehicle has not yet been selected or a contract awarded. This assumption is supported by defence columnist, David Pugliese who commented in a pre-budget column that, “contents of the budget will likely require

¹⁹¹ Canada. Public Works and Government Services Canada. *Jobs Growth and Long-Term Prosperity: Economic Action Plan 2012*. (Ottawa: Publishing and Depository Services, 2012), 22.

¹⁹² *Ibid*, 210.

¹⁹³ Campbell Clark, “Deep cuts to military mark reversal for Harper,” *The Globe and Mail*, 29 March 2012, NP.

DND to push off by 6-12 months the CCV schedule.”¹⁹⁴ However, according to DND spokesperson Josée Hunter, “The procurement of the Close Combat Vehicle project is moving forward as planned.”¹⁹⁵ Although, it is not known if the TAPV will be delayed, it is safe to say at this point that the CCV project is moving forward as planned. It is also certain that the Leopard 2 MBT will not be affected as it has already been acquired and is in the process of entering service within field units.

Politically, it is doubtful at this point that the Harper Conservative government will cancel any of its major capital equipment purchases, as it would run counter to its *Canada First Defence Strategy*. In this key government of Canada defence strategy, the government has clearly articulated its commitment of “ensuring that Canada can return to the international stage as a credible and influential country, ready to do its part.”¹⁹⁶ It has also indicated, “rebuilding the Canadian Forces into a first-class, modern military is a fundamental requirement if we are to deliver on these goals”.¹⁹⁷ One of the areas the government has chosen to rebuild the CF is within the CA through the acquisition of a new family of land combat vehicles and systems.¹⁹⁸ The CCV and the Leopard 2 MBT fall into this category of new family of land combat vehicles and systems.

¹⁹⁴ Pugliese, David, “Close Combat Vehicle Bidders Called to a Meeting With the Defence Department’s ADM Materiel Officials the Day After the Federal Budget-Problems on the Horizon?” *Ottawa Citizen*, 27 March 2012, NP.

¹⁹⁵ Pugliese, David, “Land Warfare: The Canadian Army bulks up with added armour,” *Esprit de Corps Magazine*, Volume 19, Issue 2, March 2012, 8.

¹⁹⁶ Canada. Department of National Defence. *Canada First Defence Strategy*. (Ottawa: DND Canada, May 2008), 1.

¹⁹⁷ *Ibid.*

¹⁹⁸ *Ibid.*, 17.

In short, if the Harper Conservative government cancelled the CCV or decided to eliminate the Leopard 2 MBT it would be a complete reversal of the government's platform of rebuilding the CF into a modern and strategically relevant force. Therefore, the likelihood of maintaining HWF within the *Army of Tomorrow*, both fiscally and politically is very likely.

RECOMMENDATIONS ON THE WAY AHEAD FOR HWF IN THE CA

In closing this discussion on HWF, it is important to make some final recommendations on the employment of HWF within the *Army of Tomorrow* as part of the CA Managed Readiness Plan (MRP). There has been some discussion of how a new HWF structure will fit into the MRP, but nothing has yet to be announced on the way ahead. It is especially perplexing on what the plan will be when the Commander of the CA, Lieutenant-General Peter Devlin stated in 2011 that,

The army will continue to be an infantry-based, medium-weight force, capable of full-spectrum operations, which exploits the concepts and culture of the combined arms team.¹⁹⁹

It is understood that the CA will continue to possess a range of capabilities ranging from light to heavy, but in order to do this all three types of forces must be included within the MRP of the CA in order to be ready to meet the challenges across the spectrum of conflict in which the Canadian government may call upon the CA to conduct operations in pursuit of its strategic goals. It is therefore imperative that once the CCV is acquired that its distribution be organized so that a CCV equipped BG will always be ready to deploy. This would require a reorganization and redistribution of the CCV fleet

¹⁹⁹ Vanguard Canada, "Planning the Army's future," <http://www.vanguardcanada.com/PlanningTheArmysFutureDevlin> ; Internet; accessed 1 April 2012.

as well as exercising the option of purchasing the additional 30 CCV. As discussed earlier in Chapter 2, there would be sufficient number of CCV (138) to allow one CCV equipped BG to deploy for an eight month deployment and still have enough CCV left for a replacement BG and individual training. In regards to the deployment of Leopard 2 MBTs, there are sufficient numbers to deploy up to two squadrons in support of an infantry BG in keeping with the CA's view of being an infantry-based force. Therefore, there should be at least one tank squadron always ready to deploy within the MRP.

Despite the fact that the CA will soon have the capabilities to deploy a LWF, MWF, or a HWF it will need to be carefully balanced in relation to operational tempo. If the CA were to get involved in another extended commitment similar to Afghanistan or a high-intensity operation it would be hard pressed to maintain the operational tempo on a rotational basis with its small army. An extended combat deployment is not only hard on equipment it is also hard on the soldiers who have to redeploy to the same theatre continually. The need to carefully manage operational tempo is even more important when casualties begin to mount, vehicles become destroyed and a second simultaneous mission is thrown into the mix. The CA has learned many hard lessons from its recent combat operations in Afghanistan and will be hard pressed to do this again without a sound plan. Therefore, any future MRP must be done carefully to ensure a manageable level of operational tempo without sacrificing the ability to deploy a LWF, MWF, HWF or a combination of these forces.

This paper has demonstrated the relevancy, capabilities, and requirement for HWF within the CA, but it will be interesting to see if the CA fully embraces HWF and employs them as a stand-alone force within the *Army of Tomorrow* or will they merely be

relegated to the pages of CA history as a concept that could have been. Therefore, the next few years when the CCV reaches initial operational capability in concert with the Leopard 2 MBT will be crucial in establishing HWF as a unique capability within the CA that needs to be embraced and exploited to its full potential.

BIBLIOGRAPHY

Primary Sources

Books

Connors, Shaun C. and Christopher F. Foss. *Jane's Military Vehicles and Logistics: 2010-2011*. 31st ed. Alexandria, Virginia: Jane's Information Group Inc., 2010.

Conrad, Lieutenant-Colonel John. *What The Thunder Said: Reflections of a Canadian Officer in Kandahar*. Kingston: Canadian Defence Academy Press, 2009.

Cordesman, Anthony H. *Arab-Israeli Military Forces in an Era of Asymmetric Wars*. Westport, CT: Greenwood Publishing Group, 2006.

Dunstan, Simon. *Modern Tanks and Armoured Fighting Vehicles*. Shrewsbury, England: Airline Publishing Ltd, 2002.

Foss, Christopher F. *Jane's Armour and Artillery: 2011-2012*. 32nd ed. Alexandria, Virginia: Jane's Information Group Inc., 2011.

Gelbart, Marsh. *Modern Israeli Tanks and Infantry Carriers: 1985-2004*. Wellingborough, UK: Osprey Publishing, 2004.

Grau, Lester W. and Michael A. Gress. *The Soviet Afghan War: How a Superpower Fought and Lost*. Lawrence: University Press of Kansas, 2002.

Hofmann, George F. and Donn A. Starry, *Camp Colt to Desert Storm: The History of US Armored Forces*. Lexington: The University Press of Kentucky, 1999.

Hope, Lieutenant-Colonel Ian. *Dancing with the Dushman: Command Imperatives for the Counter-Insurgency Fight in Afghanistan*. Department of National Defence. Kingston, ON: Canadian Defence Academy, 2008.

Horn, Colonel Bernd. *From Cold War to New Millennium: The History of the Royal Canadian Regiment, 1953-2008*. Toronto: Dundurn Press, 2011.

.... *No Lack of Courage: Operation Medusa, Afghanistan*. Toronto: Dundurn Press, 2010.

Icks, Colonel (Ret'd) Robert J. *Famous Tank Battles*. New York: Doubleday and Company, 1972.

Yousaf, Brigadier Mohammad and Major Mark Adkin, *The Bear Trap: Afghanistan's Untold Story*. Leo Cooper: London, 1992.

Interviews

Lipsey, Lieutenant-Colonel Martin. Former DCO of 1st Battalion, The Royal Canadian Regiment Battle Group 2006-2007, telephone conversation with author, 4 February 2012.

Journal, Magazine and Newspaper Articles

Bergen, Bob. "Military is Banking On Tanks," *Embassy Magazine*, 10 February 2012 [journal on-line]; available from <http://embassymag.ca/dailyupdate/view/194> ; Internet; accessed 12 February 2012.

Bratt, Duane. "Mr. Harper Goes to War: Canada, Afghanistan, and the Return of "High Politics" in Canadian Foreign Policy." Department of Policy Studies Mount Royal College Calgary, Alberta. <http://www.cpsa-acsp.ca/papers-2007/Bratt.pdf> ; Internet; accessed 11 February 2012.

Cadieu, Major Trevor. "Canadian Armour in Afghanistan." *Canadian Army Journal*, Volume 10.4, Winter 2008, 5-25.

Clark, Campbell. "Deep cuts to military mark reversal for Harper," *The Globe and Mail*, 29 March 2012.

Day, Adam. "Operation Medusa: The Battle for Panjwai - Part 1: The Charge of Charles Company." *Legion Magazine*, January/February 2008, 24-28.

.... "Operation Medusa: The Battle for Panjwai - Part 3: The Fall of Objective Rugby." *Legion Magazine*, January/February 2008, 22-29.

DeSilva-Ranasinghe, Sergei. "Interview: Major General Alan Howard, Assistant Chief of the Land Staff, Canadian Army." *Jane's Defence Weekly*, January 7, 2011, NP.

Godefroy, Andrew B. "Chasing The Silver Bullet: The Evolution of Capability Development in The Canadian Army," *Canadian Military Journal*, Spring 2007.

Graveland, Bill. "Leopard 2 Tanks a boon for Canadian Troops," *Canadian Press*, 27 December 2008.

Hobson, Sharon. "Canada seeks Leopard solution for Afghanistan." *Jane's Defence Weekly*, 18 April 2007, NP.

Hobson, Sharon. "Interview: Lt Gen Andrew Leslie, Canada's Chief of Land Staff." *Jane's Defence Weekly*, 12 August 2008.

Hoffman, Michael. "Army eyes use of tanks in Afghanistan," *Army Times*, 5 December 2010.

Hornback, Paul. "The Wheeled Versus Track Dilemma," *Armor Magazine*, U.S. Army, March-April 1998. 33-34.

Hunt, Captain Christopher. "Beyond The Next Bound: One Captain's View on the Army of Tomorrow," *Canadian Army Journal*, Volume 7.1, Spring 2004.

Morgan, Wesley. "Tanks to Afghanistan – Analysis," *The New York Times*, 23 November 2010.

Nagl, John A. "Let's Win the Wars We're In," *Joint Force Quarterly*, First Quarter 2009, Issue 52, January 2009.

Pugliese, David. "Canada Sending Leopard Tanks To Afghanistan," *The Ottawa Citizen*, 29 December 2009.

.... "Close Combat Vehicle Bidders called to a Meeting with the Defence Department's ADM Materiel Officials the Day after the Federal Budget-Problems on the Horizon?" *Ottawa Citizen*, 27 March 2012.

.... "Land Warfare: The Canadian Army bulks up with added armour," *Esprit de Corps Magazine*, Volume 19, Issue 2, March 2012.

.... "LAV-3 Upgrade Still a Priority for Canada," Defense News. Monday, July 18, 2011, [journal on-line]; available from <http://www.defensenews.com/article/20110717/DEFFEAT06/%20107170309/LAV-3-Upgrade-Still-a-Priority-for-Canada> ; Internet; accessed 3 February 2012.

.... "Norway Buys Canadian-made Rubber Tracks for CV90 Afghan Operations." *Ottawa Citizen*, 10 February 2011.

Roosevelt, Ann. "Canada Cancels Plans for Mobile Gun System, Turns to Tanks," *Defence Daily*, 17 April 2007, [journal on-line]; available from http://findarticles.com/p/articles/mi_6712/is_11_234/ai_n29345528/ ; Internet; accessed 28 January 2012.

.... "Canada to Negotiate with General Dynamics to Buy Mobile Gun Systems," *Defence Daily*, 16 April 2004, [journal on-line]; available from http://findarticles.com/p/articles/mi_6712/is_12_222/ai_n29091338/ ; Internet; accessed 28 January 2012.

Sen, Ashish Kumar. "Pentagon's decision to send tanks to Afghanistan praised," *The Washington Times*, 19 November 2010.

Standard: Freeholder, "German tanks for Canadian use won't cut casualties much in Afghanistan," <http://www.standard-freeholder.com/ArticleDisplay.aspx?archive=true&e=653448> ; Internet; accessed 11 February 2012.

The Ottawa Citizen, "DND seeks more than \$2B for vehicles for Afghanistan," 17 November 2008, NP.

Tracy, Jonathan. "Responsibility to Pay: Compensating Civilian Casualties of War," <http://www.wcl.american.edu/hrbrief/15/1tracy.pdf?rd=1> ; Internet; accessed 4 March 2012.

Wallace, Michael D. "Leopard Tanks and the Deadly Dilemmas of the Canadian Mission in Afghanistan," Foreign Policy Series, Volume 2, Number 1. February 2007. Journal on-line; available from http://www.policyalternatives.ca/sites/default/files/uploads/publications/National_Office_Pubs/2007/Leopard_Tanks.pdf ; Internet; accessed 4 March 2012.

Wasserbly, Daniel. "M1A1 Abrams makes positive impact in Afghanistan." *Jane's Defence Weekly*, February 21, 2011, NP.

Wings Magazine, "The Standard for Strategic Airlift," Journal on-line; available from <http://www.wingsmagazine.com/content/view/3604/38/> ; Internet; accessed 19 February 2012.

Official Publications

Canada. Department of National Defence. *Advancing With Purpose: The Army Strategy*. Director of Land Strategic Planning. Ottawa, ON: DND Canada, May 2002.

.... *Advancing With Purpose: The Army Strategy*. 2nd Edition (2009). 4th Draft 2008. Director of Land Strategic Planning. Ottawa, ON: DND Canada, December 2008.

.... B-GJ-005-315/FP-001, *Countering Improvised Explosive Devices*. Joint Doctrine Branch. Canadian Forces Counter-IED Task Force. Ottawa, ON, September 2011.

.... B-GJ-005-502/FP-000, *Risk Management for CF Operations (Change 1)*. CFEC Joint Doctrine Branch. Ottawa, ON, November 2007.

.... B-GL-300-001/FP-001, *Firepower*. Directorate of Army Doctrine. Kingston, ON, 9 February 1999.

Canada. Department of National Defence. B-GL-305-001/FT-001, *The Armoured Regiment in Battle (Volume 1)*. Mobile Command Headquarters. St-Hubert, Quebec, 31 December 1990.

.... B-GL-310-001/AF-001, *Toward Land Operations 2021: Studies In Support of the Army of Tomorrow Force Employment Concept*, edited by Major Andrew B. Godefroy and Peter Gizewski. Directorate of Land Concepts and Design. Kingston, ON: DND Canada, 2009.

.... B-GL-310-001/AG-001, *Land Operations 2021: Adaptive Dispersed Operations for the Force Employment Concept for Canada's Army of Tomorrow*. Directorate of Land Concepts and Design. Kingston, Ontario, 2007.

.... B-GL-321-006/FP-001, *Combat Team Operations (Interim)*. Directorate of Army Doctrine. Kingston, ON, 2004.

.... B-GL-321-007/FP-001, *LAV Company Tactics (Interim)*. Directorate of Army Doctrine. Kingston, ON, 14 October 2003.

.... B-GL-323-004/FP-003, *Counter- Insurgency Operations*. 1st ed. Chief of the Land Staff, Army Publishing Office, Fort Frontenac, Kingston, ON, 2008.

.... B-GL-323-004/FP-003, *Counter- Insurgency Operations*. 2nd ed. Chief of the Land Staff, Army Publishing Office, Fort Frontenac, Kingston, ON, 2008.

.... *Canada First Defence Strategy*. Ottawa: DND Canada, May 2008.

.... *Land Operations 2021 (Adaptive Dispersed Operations): The Force Employment Concept for Canada's Army of Tomorrow*, ed. Major Andrew B. Godefroy. Directorate of Land Concepts and Design. Kingston, ON: DND Canada, 2007.

.... Public Works and Government Services Canada. Jobs Growth and Long-Term Prosperity: Economic Action Plan 2012. Ottawa: Publishing and Depository Services, 2012.

United States. Department of Defense. Department of Defense Directive 3000.07. *Irregular Warfare*. Washington, DC: US Government Printing Office, 1 December 2008.

.... Department of the Army and Marine Corps Combat Development Command. *Field Manual No. FM 3-24 and MCWP 3-33.5: Counterinsurgency*. Washington, DC: US Government Printing Office, 15 December 2006.

.... Training and Doctrine Command, "Operation Enduring Freedom: Tactics, Techniques and Procedures Handbook No 02-8," <http://www.strategypage.com/articles/operationenduringfreedom/chap1.asp> ; Internet; accessed 20 February 2012.

Briefings, Papers and Reports

Canada. Department of National Defence. *Land Forces Central Area: Commander's Update Briefing from Army Council November 2010*, 4-5 December 2010.

.... *Preliminary Statement of Operational Requirement: Close Combat Vehicle*, Version 1.1, Director of Land Requirements. Ottawa, ON: DND Canada, June 2010.

.... *Statement of Operational Requirement: Tank Replacement Project*, Director of Land Requirements. Ottawa, ON: DND Canada, 21 August 2008.

.... *Tank Replacement Project Information Brief to Combat Training Centre, CA* Director of Land Requirements, 14 February 2012.

Fletcher, Joseph F. and Jennifer Hove, "Emotional Determinants of Support for the Canadian Mission in Afghanistan: A View from the Bridge." Discussion Paper on Afghanistan, University of Toronto, 2010.

Johnson, David E. and John Gordon IV, "Observations on Recent Trends in Armored Forces," Report for the United States Army. Santa Monica: The RAND Corporation, 2010.

Moyer, Raphael E. "Death before Dismount?: Mechanization, Force Employment, and Counterinsurgency Outcomes in Iraq," Master's thesis, Massachusetts Institute of Technology, February 2011.

Reardon Mark J. and Jeffery A. Charlston, *From Transformation to Combat: The First Stryker Brigade at War*. Center of Military History, United States Army. Washington: Center of Military History, 2007.

Tremblay, Lieutenant-Colonel Dean and Major R.C. Bouchard, "Close Combat Vehicle (CCV)," Army presentation, Director of Land Requirements 10, Fall 2011.

Websites

Army News, "Army to upgrade combat vehicle fleets," <http://www.army.forces.gc.ca/land-terre/news-nouvelles/story-reportage-eng.asp?id=3655> ; Internet; accessed 19 February 2012.

Canada. Department of National Defence Backgrounder. "Close Combat Vehicle," BG 09.016, 8 July 2009, <http://www.forces.gc.ca/site/news-nouvelles/news-nouvelles-eng.asp?id=3036> ; Internet; accessed 21 January 2012.

Canada. Department of National Defence Backgrounder. "Force Mobility Enhancement," BG 09.018, 8 July 2009, <http://www.forces.gc.ca/site/mobil/news-nouvelles-eng.asp?id=3038> ; Internet; accessed 20 February 2012.

Canadian American Strategic Review, "Army Announces the Delivery of Upgraded Leopard 2 tanks to Afghanistan – Hybrid CF Leopard 2A4M CANs to fill in the gaps," <http://www.casr.ca/doc-dnd-leopard-2a4m.htm> ; Internet; accessed 8 February 2012.

...., "Canadian Forces Armour - Leopard 2A6M CAN Main Battle Tank," <http://www.casr.ca/101-army-armour-leopard-2a6m.htm> ; Internet; accessed 26 February 2012.

...., "Tank Replacement Project: Upgrade and Conversion of up to 100 Used Leopard 2 Tanks in Canada- MERX LOI Notice", <http://www.casr.ca/doc-loi-leopard-tank.htm> ; Internet; accessed 21 January 2012.

Canadian Army, "Third Battalion of Princess Patricia's Canadian Light Infantry," <http://www.army.gc.ca/iaol/143000440000292/index-Eng.html> ; Internet; accessed 19 February 2012.

CBC News World, "Canada paid \$1M compensation to Afghan civilians," 9 June 2011, <http://www.cbc.ca/news/world/story/2011/06/09/afghan-compensation.html>; Internet; accessed 4 March 2012.

Combat Reform, "Tracks versus Wheels: The Laws of Physics and What's best for Combat-an extreme activity-an illustrated study of the facts." <http://www.combatreform.org/WHEELSVSTRACKS/> ; Internet; accessed 26 February 2012.

Defense Industry Daily, 20 December 2010, "Tanks for the Lesson: Leopards, too, for Canada", <http://www.defenseindustrydaily.com/tanks-for-the-lesson-leopards-too-for-canada-03208/> ; Internet; accessed 21 January 2012.

Grant, Greg. "US Army Chooses Molded Rubber Tracks for FCS," Defence News.com; available from <http://www.combatreform.org/bandtracks.htm> ; Internet; accessed 26 February 2012.

McGhee, Major James T. "The Soviet Experience in Afghanistan: Lessons Learned," Military History Online; available from <http://www.militaryhistoryonline.com/20thcentury/articles/sovietexperience.aspx> ; Internet; accessed 6 March 2012.

National Defence and the Canadian Forces, "Backgrounder: Renewing the Canadian Forces' Tank Capability, 12 April 2007," <http://www.forces.gc.ca/site/news-nouvelles/news-nouvelles-eng.asp?id=2252> ; Internet; accessed 5 February.

Royal Canadian Air Force Website, "CC-130 Hercules," <http://www.rcaf-arc.forces.gc.ca/v2/equip/cc130/index-eng.asp> ; Internet; accessed 19 February 2012.

Royal Canadian Air Force Website, "CC-177 Globemaster III," <http://www.rcfarc.forces.gc.ca/v2/equip/cc177/index-eng.asp> ; Internet; accessed 19 February 2012.

The Ottawa Citizen, "Canada's Fallen: Canadians Killed in the Mission to Afghanistan since 2002," <http://www.ottawacitizennews.com/soldiers/> ; Internet; accessed 12 February 2012.

Unterseher, Lutz. "Wheels or Tracks? On the 'Lightness' of Military Expeditions," *Project on Defense Alternatives*, Briefing Memo #16 July 2000 (revised December 2001) available from <http://www.comw.org/pda/0007wheels.html#2.1.1> ; Internet accessed 19 February 2012.

Vanguard Canada, "Planning the Army's future," <http://www.vanguardcanada.com/PlanningTheArmysFutureDevlin> ; Internet; accessed 1 April 2012.

Secondary Sources

Books

Corbin, Marcus. *Reshaping the Military for Asymmetric Warfare*. Washington, DC: Centre for Defense Information, 5 October 2001.

DiNardo, R.L. *Germany's Panzer Arm in WW II*. Mechanicsburg, PA: Stackpole Books, 1997.

Dunstan, Simon. *Challenger Main Battle Tank: 1982-1997*. London: Osprey Publishing, 1998.

.... *The M113 Series*. London: Osprey Publishing, 1983.

English, Lieutenant-Colonel J.A., Major J. Addicott, and Major P.J. Kramers. *The Mechanized Battlefield: A Tactical Analysis*. New York: Pergamon-Brassey's, 1985.

Hogg, Ian. *Tank Killing: Anti-Tank Warfare by Men and Machines*. London: Sidgwick and Jackson, 1996.

Icks, Robert J. *Famous Tank Battles*. New York: Doubleday and Company, 1972.

Jorgensen, Christopher and Chris Mann. *Strategy and Tactics: Tank Warfare*. WI, USA: MBI Publishing Company, 2001.

Lathrop, R. and McDonald J. *M60 Main Battle Tank: 1960-1991*. London: Osprey Publishing, 2003.

MacKsey, Kenneth. *Guderian: Panzer General*. London: MacDonald and Jane's, 1975.

.... *Tank versus Tanks*. Toronto: Totem, 1988.

Marshall, Lieutenant-Colonel S.L.A. *Blitzkrieg: Armies on Wheels*. Washington: The Infantry Journal, 1943.

Messenger, Charles. *Anti-Armour Warfare*. Shepperton: Ian Allan Ltd, 1985.

Ogorkiewicz, Richard. *Technology of Tanks II*, Jane's Information Group Ltd, 1991.

Rommel, Field Marshall Erwin. *Attacks*. Virginia: Athena Press, 1979.

Simpkin, Richard. *Tank Warfare: An Analysis of Soviet and NATO Tank Philosophy*. London: Brassey's Publishers Ltd, 1979.

Zalgora, Steven J., Michael Jerchell, and Stephen Sewell. *T-72 Main Battle Tank: 1974-1993*. Osprey Publishing, 1993.

Zalgora, Steven J. *Armour of the Middle East Wars: 1948-1978*. London: Osprey Publishing, 1981.

.... *BMP: Infantry Fighting Vehicle: 1967-1994*. London: Osprey Publishing, 1994.

.... *The M1 Abrams Battle Tank*. London: Osprey Publishing, 1985.

.... *The M2 Bradley Infantry Fighting Vehicle*. London: Osprey Publishing, 1986.

Journal, Magazine and Newspaper Articles

Bernard, Alain. "Leopard 2A4M CAN Roll-out," *Armour Bulletin*, 2010, 29-31.

Day, Adam. "Operation Medusa: The Battle for Panjwai - Part 2: Death in a Free Fire Zone." *Legion Magazine*, November/December 2007, 30-37.

Habington, Captain Stephen. "Tanks and Infantry," *Infantry Journal (Canada)*, Volume 11, Summer 1983, 20-22.

Hunt, Captain Christopher. "Beyond The Next Bound: One Captain's View On The Army of Tomorrow," *Canadian Army Journal*, Volume 7.1, Spring 2004.

"LAV Doctrine Cell Update," *Infantry Journal (Canada)*, Number 31, Spring 1997, 43-45.

“LAV Doctrine Cell Update,” *Infantry Journal* (Canada), Number 32, Summer 1997, 30-41.

Petney, Lieutenant-Colonel D. “The LAV III Company- The Fifth Option,” *Infantry Journal* (Canada), Number 34, Spring 2000, 9-15.

Official Publications

Canada. Department of National Defence. B-GL-310-001/AG-001, *Land Operations 2021: Adaptive Dispersed Operations for the Force Employment Concept for Canada’s Army of Tomorrow*. Directorate of Land Concepts and Design. Kingston, Ontario, 2007.

.... B-GL-321-006/FP-001, *Combat Team Operations (Interim)*. Directorate of Army Doctrine. Kingston, ON, 2004.

Websites

Canadian American Strategic Review, “Army Announces the Delivery of Upgraded Leopard 2 tanks to Afghanistan – Hybrid CF Leopard 2A4M CANs to fill in the gaps,” <http://www.casr.ca/doc-dnd-leopard-2a4m.htm> ; Internet; accessed 8 February 2012.