Reflections of War: Changes in Tactics and Technology in the Diaries and Memoirs of Canadian Soldiers 1916-1918

by

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ABSTRACT

The Great War was in many ways a conflict defined by technology. The rapid advancements in technology over the decades leading up to 1914 coupled with the outdated tactics employed by all sides created the stalemate of Trench Warfare. Improvements to the existing technology, the addition of new technology, as well as an evolution in tactics led to the breakout, and eventual Allied victory**,** of 1918. These changes in tactics and technology significantly affected the lives of frontline soldiers.

This thesis asks if the tactical and technological changes, in the final two years of the war**,** were reflected in diaries and memoirs of Canadian soldiers serving at the front. The diaries and memoirs of the soldiers do reflect many of the changes found in the secondary sources. **S**urprisingly, however**,** the primary sources often provide more detail about how these weapons were employed by the Germans. Unless the soldier in question was directly involved in their use, or was witnessing a spectacular event, accounts of Canadian artillery, machine gun and poison gas use are often short and lacking in detail.

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Dedication

For Sarah

Chapter 1
Introduction

World War I has maintained a hold on the public imagination. For many, trench warfare has served as a metaphor for the futility and horror of the war in which the war on the Western Front was little more than a series of large scale battles of attrition. The Battles of the Somme and of Passchendaele reinforced those views. Contrary to popular beliefs, historians have shown that while some aspects of the war did remain unchanged, the character of the war was anything but static. A view of the war that does not take these changes into account is overly simplistic. Though popular memory would often portray the unchanging horror of trench warfare, this was not the case. It is impossible to portray a universal wartime experience because this simply did not exist.[1]

According to Tony Ashworth, a soldier's experience was dramatically affected not only by the unit in which he was serving but also where the unit was serving.[2] Throughout the war, technological and tactical innovations served to alter the character of a soldier's combat experience. For the Allies, these changes, coupled with a growing superiority in manpower, culminated in the breakout of 1918 and the end of the war. This thesis examines some of the technological and tactical changes that influenced the course of the war and particularly, how these changes affected the soldiers' experiences of the war.

Ideally the soldiers whose experiences are to be studied should have fought in

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[1]Tony Ashworth, Trench Warfare 1914-1918: The Live and Let Live System (London: The MacMillan Press Ltd, 1980), 15-17.

[2]Ashworth, Trench Warfare 1914-1918.

many of the same battles, served in the same regions, and used the same tactics. The soldiers of the Canadian Corps meet those criteria. Unlike their British counterparts, the Canadian Corps had a fairly consistent makeup.[3] The Canadian Corps also had certain advantages over most British units. "The officers and men of the Canadian Corps were members of a relatively small formation - when compared with the huge armies of the British and French - and required less time to disseminate the lessons of the battlefield."[4] Because of their ability to rapidly adopt new tactics, the Canadians "were a little more free to make innovations than their UK colleagues, which encouraged a certain spirit of criticism and independence."[5]

This thesis will focus mainly on the experiences of those who served in the Canadian Corps between 1916 and 1918. This choice of dates reflects Paddy Griffith's statement that the war consisted of two phases: from 1914 until the Battle of the Somme, which set the stage for later victories by teaching the Allies valuable lessons, and the period after the Somme when the Allies attempted to put those lessons to use.[6] While this thesis will look at some technological innovations that predate 1916, generally it will focus on how those changes influenced the experiences of the soldiers from 1916 to 1918.

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[3]British Divisions were often rotated through various Corps and Army formations. Ibid., 11-12.

[4]Bill Rawlings, Surviving Trench Warfare: Technology and the Canadian Corps, 1914-1918 (Toronto: University of Toronto Press, 1992), 6-7.

[5]This quote deals specifically with 'Colonial' units. Paddy Griffith, Battle Tactics of the Western Front: The British Army's Art of Attack 1916-18 (New Haven:Yale University Press, 1994), 12.

[6] Griffith, Battle Tactics of the Western Front, 12.

This thesis will focus on three important examples of technical change: machine guns, artillery and poison gas. These three weapons, more than any other, shaped the soldiers' experience of the First World War. In the case of artillery, not only did its use dramatically reshape the very terrain over which the war was fought, it also caused the highest casualties of any group of weapons. Though machine guns caused fewer casualties than artillery, according to Tim Cook, "the image of the deadly machine gun, firing in scythe-like arcs as it mowed down troops, remains paramount in the popular memory of the Great War.".[7] Machine guns are also a striking example of technology that had advanced beyond the tactics of the day. Poison gas was one of only a handful of new weapons that were introduced during the war.[8] Gas changed the face of warfare. Not only did a soldier have to dodge bullets and shells, he also had to be wary of the air he breathed, and after the introduction of mustard gas in 1917, the earth and water around him.

This thesis will also consider how tactical innovations were introduced to make more efficient use of the technology. It was, as Bill Rawlings explains, as important to know how the technology could best be used, and how it fit in with other technology, that "Soldiers had to be technicians, not just rifle carriers."[9] The discussion of tactics will generally be limited to changes in how technology was used on the battlefield, though

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[7]Tim Cook, At the Sharp End: Canadians Fighting the Great War 1914-1916 (Toronto: Viking Canada, 2007), 256-258.

[8]Tanks were another possibility but were much rarer at the front and few primary sources mention them more than once or twice.

[9]Bill Rawlings, Surviving Trench Warfare, 4-7.

there will be some discussion of more general tactical training.

Much of the technology being used was not new at all. While artillery had existed for centuries it had become far deadlier in the fifty years before the conflict. Rifling, breech loading, new propellents and hydraulic recoil mechanisms dramatically increased the range, power and rate of fire of the guns. Early hand-powered variants of the machine gun were used during the American Civil War and the Franco-Prussian War. Automatic machine guns had been used in numerous colonial wars to great effect, as well as during the Russo-Japanese War.

The powers that bled each other white on the Western Front should have known about the effectiveness of at least some of these weapons. It can be argued that to some extent the American Civil War should have served as the first warning of what the combatants in the First World War could expect. The similarities between the two wars have been explored to some degree in the works of John Terraine and to a greater extent in Michael Howard's "Men Against Fire".[10] It is from the Russo-Japanese War that the lessons of the impact that quick-firing artillery and the automatic machine gun would have on combat should have been drawn. The British, as well as other European powers, did in fact have observers in-theatre to monitor the war. Those observers had taken the lessons of that war back to Britain with them.

General Alymer Haldane had witnessed the effectiveness of modern machine guns in Manchuria and noted in 1909 that it was "impossible to take a position which is well

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[10]John Terraine, White Heat: The New Warfare 1914-1918 (London: Sidgwick &Jackson, 1982); Michael Howard, "Men against Fire: Expectations of War in 1914" International Security, Vol 9, No 1(Summer, 1984): 41-57.

defended by machine guns until these guns have been put out of action."[11] In hindsight, Haldane's comment notwithstanding, the British did not completely grasp what they had witnessed in Manchuria. Haldane himself seems to have only partially accepted the implications of what he saw. At the same conference at which he admitted the absurdity of attempting to take a position defended by machine guns, he spoke out against a thin firing line, noting that "it is by obtaining superiority of fire and not by avoiding loss that infantry alone can win battles."[12] Haldane was not alone in his beliefs. At that time it was believed that more men, not more technology, would give the British superiority of fire. According to some historians, the British were willing enough to accept new technology, but had problems finding the proper ways to use it.

Tim Travers, for example, points out that the British Army was often slow to adopt new technology. The Lewis Gun had been in use with the air corps as early as 1912. In January 1914, however, the Army's Committee on Automatic Rifles had reported that there were no suitable weapons available. The Lewis Gun did not enter service with the Army until late 1914 but became an important addition to the British and Canadian arsenals.[13]

Even when it adopted new technology, the Army struggled to fully accept it. The problem, according to Travers, was its unwillingness to implement a doctrine on the

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[11]Tim Travers, The Killing Ground: The British Army, The Western Front and the Emergence of Modern Warfare, 1900-18 (London: Unwin Hyman, 1990), 68.

[12]Travers, The Killing Ground, 68.

[13]Travers, The Killing Ground, 65.

proper use of machine guns because a doctrine that emphasised firepower "damaged the morale or human factor in war, and deprived men in the attack of their desire to close with the enemy at all costs."[14] This reaffirmation of the human aspect of war and the importance of courage at all cost would have disastrous effects in the opening years of the War.

Bidwell and Graham agree that there was a lack of doctrine when it came to the use of firepower in the British Army and illustrate the struggle within the British Army to find a role for its new weapons. Yet, they do note that many of the choices that the Royal Artillery made in purchasing equipment "showed considerable foresight."[15] Having the technology itself was not enough; one had to be able to use it to the greatest advantage. The debates over how best to employ the various technologies will be further examined in the following chapters.

While the machine gun and artillery had evolved rapidly in the pre-war years they at least had precedents. The same can not be said for gas warfare. This technology made its first appearance during the Great War, and any doctrine dealing with its use had to be created from scratch. Gas did not fit into most soldiers view of what war should be, and for that reason was reviled. When it became obvious that gas could be a powerful weapon, both sides used it in ever increasing quantities. The combatants continued to argue that they used gas only in retaliation for earlier attacks by the other side. Although there is some debate as to which side first used non-lethal gas as a weapon it is clear that

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[14]Travers, The Killing Ground, 67.

[15]Bidwell and Graham, Fire-Power, 14.

the Germans were the first to use lethal gas.

From its introduction onto the battlefield until the end of the war, both sides raced to produce more effective forms of gas, to improve deployment methods and to improve gas protection for the troops. These attempts involved either mask upgrades or improved training. Foulkes' book, "GAS!": The Story of the Special Brigade, is almost entirely concerned with the offensive uses of gas by the British. Moore's Gas Attack! and Haber's The Poisonous Cloud, on the other hand, deal with how both sides developed their abilities to wage gas warfare. Focussing primarily on Britain, Germany and France they deal with both the offensive and defensive steps taken to achieve dominance in gas warfare. Haber also provided a slightly more scientific approach to the subject.

In "Creating the Faith: The Canadian Gas Services in the First World War," Tim Cook traces the development of the Canadian Gas Services and their successful efforts to reduce gas casualties among Canadian units. In April 1918 the British Gas Services noted that Canadian anti-gas training was superior and attempted to emulate Canadian doctrine.[16] The attempts to impose an effective anti-gas doctrine made a strong impression on the frontline soldier.

This thesis will deal with both the introduction of each of the technologies onto the battlefield as well as the debates that surrounded their deployment and, especially in the case of gas, how one could defend against it. Changes in how the technology was used, and the introduction of new methods of use will also be explored but the main

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[16]Tim Cook, "Creating the Faith: The Canadian Gas Services in the First World War." Journal of Military History 62 (October 1998): 785.

concern is to examine whether or not the use of these technologies, and their changing roles is reflected in the experiences of Canadian soldiers between 1916 and 1918.

When looking at the tactics of the Canadian Corps one must start with the tactics of the British. Initially Canadian tactics were based on British training manuals and British doctrine, such as it was. Historians generally agree that the Canadian Corps adopted changes in tactics at a faster rate than the average British unit. This was not a unique occurrence. The Australian Corps developed along similar lines. By the end of the war both forces were viewed by many and not least by themselves, as elite.

British tactics in World War I have been extensively studied. The works of Bidwell and Graham, Travers, and Griffith provide a solid starting point for our discussion and a frame of reference for tactical change within the Canadian Corps. Though there have not been as many works produced about Canadian tactics during the war, there has been some progress in this area. Rawling's work highlights the Canadian Corps' struggle to adapt its tactics to a new style of warfare. William Stewart explored the changing attack doctrine of the Canadian Corps in his Master's Thesis "Attack Doctrine In The Canadian Corps, 1916-1918."[17] Like Griffith he divided the war into two tactical periods, split roughly by the battle of the Somme. Stewart believes that by the end of the war the units of the Canadian Corps were much more effective than their average British counterparts.

How does one gauge the impact that technology and tactical change had on the

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[17]Stewart places the change over in the winter of 1916. William Stewart, "Attack Doctrine in the Canadian Corps, 1915-1918" (M.A. thesis, University of New Brunswick, 1982).

lives of the soldiers? Some of the more traditional histories, both official and regimental, provide context, but the accounts of the actual combatants really show the impact of the technological and tactical changes. This focus on the soldier is in many ways a reflection of a growing trend in military history to look beyond the commanders and grand strategy. By the 1960s the traditional "drum and trumpet" school of military history was coming under increasing criticism. The "new" military history increasingly examined the "non-combative aspects of conflict and society."[18]

Though it may not have been the first work to focus on the experience of the soldier in battle, John Keegan's The Face of Battle[19] is often seen as the progenitor of a new form of battle history which views the experiences of the soldiers as just as important, if not more so, than those of the commanders. According to Keegan "'[a]llowing the combatants to speak for themselves' is not merely a permissible but, when and where possible, an essential ingredient of battle narratives and battle analysis."[20] Why did the soldiers react the way they did, and, in the case of the Great War, why did they keep going?

In the section of The Face of Battle that focuses on the Somme, Keegan states that as the level of technology on the battlefield rose, the effective vision of the soldier on the battlefield decreased. This does not simply mean that soldiers could not see as far as they

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[18]Benjamin Franklin Cooling, "Towards a More usable Past: A Modest Plea for A newer Typology of Military History."Military Affairs, 52 (January 1988): 29.

[19]John Keegan, The Face of Battle (United States: Penguin Books, 1978).

[20]Keegan, The Face of Battle, 31.

could on the battlefield in previous wars, though this was often the case, but also that in the chaos of battle soldiers did not always properly understand what they were seeing.[21] Many of the primary sources consulted for this thesis support that idea.

Since the publication of The Face of Battle historians have begun to realize that in many ways the experiences of those who were there were much more powerful than any description that the historian could provide.

From a strictly Canadian standpoint, Desmond Morton's When Your Number's Up and Tim Cook's At the Sharp End are quite useful. Morton, who has written or co-written a number of books about the First World War, admits that "I have written about masses; I have always wanted to write about people I got to know on the way."[22] Morton tackles a number of components of the wartime experience, including trench warfare and changes in tactics. It is clear that the Canadians needed to adapt - and they did. By the time A.W. Currie was promoted to command the Canadian Corps, Morton believes that "infantry tactics were probably about as good as they would get, given technology, provided always that officers, sergeants, and the men themselves could be persuaded to take risks, use initiative and push ahead."[23] While Stewart might disagree with the date on which the Canadian infantry reached its tactical peak, there is some validity to this

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[21]Keegan, The Face of Battle, 262-4.

[22]Desmond Morton, When Your Number's Up: The Canadian Soldier in the First World War (United States: Random House Canada, 1993), vii.

[23]Morton, When Your Number's Up, 172.

statement.[24]

The final question that needs to be dealt with here is the nature of the relevant primary sources. In total, thirty-seven firsthand accounts were consulted for this thesis of which eight had previously been published. Twenty-nine accounts dealt with the infantry, four with the artillery and the remaining four covered various non-combat, though not risk free, occupations. A few were unsuitable for use in this thesis. Two accounts were fictionalized and as such were impossible to verify.[25] One of the diaries, though in the Canadian Archives, recounted the experiences of a British soldier.[26] Finally, two of the non-combatant diaries were discarded as the authors had no first hand experience of the front.[27]

Of the published diaries and memoirs, perhaps the most detailed is The Journal of Private Fraser. Wilfred Kerr's Shrieks and Crashes and Arms and the Maple Leaf provided a view of life with the artillery in 1917 and 1918. This thesis will also make use of Arthur Lapointe's Soldier of Quebec, and Canon Scott's The Great War as I Saw It. Scott's work is mainly useful for providing context, since he was only rarely in the front

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[24]Cook also incorporates a great deal of primary material into his book. Since At the Sharp End is the first book in a two volume history, however, it is focussed on the years 1914-1916. As such most of the material in the book is outside the scope of this thesis.

[25]George Godwin, Why Stay We Here? Odyssey of a Canadian officer in France in World War I (Victoria: Godwin Books, 2002), Library and Archives of Canada (hereafter LAC), Harry H. Howland fonds, MG30 E204.

[26]LAC, Cameron Ross fonds, MG30 E477.

[27]LAC, Anne E. Ross fonds, MG30 E446. The Canadian Letters and Images Project, http://www.canadianletters.ca (hereafter CLIP), Harold Wilcox Scales, diary.

lines.[28] Fred Bagnall's Not Mentioned in Despatches provided a useful view of the early years of the war but he returned to Canada in 1916 due to wounds. Victor Wheeler's The 50th Battalion in No Man's Land provided very detailed accounts of several key events, but also highlighted some of the potential problems with memoirs. Because Wheeler consulted a number of secondary sources, his memoirs are interspersed with information from outside his personal experiences. On at least one occasion, Wheeler misinterprets what he has read in the secondary sources and this leads to a factual error in his own work.[29]

Aside from the published memoirs, diaries, and accounts found in other historical works, this thesis uses first hand accounts, both diaries and memoirs, drawn from a number of collections in the National Library and Archives of Canada and the Canadian Letters and Images Project. While some collections were fairly brief others ran to hundreds of pages in length.

The collections consulted vary in length and in content. Some were no more than a diary or a typed copy. Others diaries were accompanied by later observations or even unpublished memoirs. Some authors wrote on a rather consistent basis, while other diaries seem to fade out to little more than a few scattered and incoherent entries as time went on. The diaries of John McNab and William Woods both contain regular entries of a detailed nature, while Frank Fox's diary quickly degenerates into little more than a series of seemingly random words. Some diaries have regular entries throughout the war; others

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[28]Scott was the senior chaplain for the First Canadian Division.

[29]This is covered in the chapter on gas warfare.

have gaps in some key areas. These differences may reflect the importance placed on the diary by the author or it may simply be that some authors did not have the time to make regular entries. Generally, the diaries with longer and more detailed entries tended to provide more concrete information for this thesis, though this was not always the case.

The unpublished memoirs generally contain more detail and context than the original diaries. Memoirs by George Bell, Ernest Russell, Frank Baxter and Charles Savage can fill in some of the gaps left in the diaries but also raise some questions. One must consider when, how, and why these memoirs were written. While diaries are generally not subject to revision the same cannot be said of memoirs. While these may be based on short diary entries, they also depend on memories which can change as the facts are either forgotten or are altered by events that occurred, or information that was gained after the fact. What one reads in memoirs is not then how events really occurred, or even as they were perceived at the time, but a reflection of how events were perceived at the time of writing. This does not make them invalid as sources. They must, however, like any other source, be approached with a measure of caution.[30]

The authors of the primary sources mainly served with the infantry and artillery.[31] Several were officers, though not all began their service that way. Alfred Andrews and George Thorpe were both commissioned from the ranks. Robert Brown also became an

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[30]For more on the creation of the public history of the First World War see: Jonathan F. Vance, Death So Noble: Memory, Meaning and the First World War (Vancouver: UBC Press, 2000); Paul Fussell, The Great War And Modern Memory, (New York: Oxford University Press, 2000)

[31]A few served in the medical services or in other non combat roles.

officer though he joined the Royal Flying Corps. Several authors served in the same units. Ivan Maharg, Thomas Gosford and Alan Crossman all served in the 1st battalion Canadian Mounted Rifles. Frank Baxter and Frank Tilbury both served in the 116th battalion, though Tilbury also served with the 60th battalion. William Woods and George Bell both served in the 1st battalion, Aubrey Griffiths and Ernest Russel in the 5th battalion and Arthur Foster and John McNab were in the 38th battalion. More than ten other infantry battalions were also represented in the sources. John Newton, Robert Brown, Wilfred Kerr and Byron Ferguson served in the artillery. Fred Bagnall and Donald Fraser were both injured seriously enough that their service at the front ended. Several authors including John McNab and Alfred Andrews were awarded the Military Medal. Ivan Maharg and Kenneth Duggan were killed in action.

The next three chapters will look at how tactics and technology changed in regards to artillery, the machine gun and gas warfare and how they affected the frontline experience of Canadian soldiers serving on the Western front between 1916 and 1918.

Chapter 2
A Constant Threat: Artillery

In many ways, the nature of World War I was shaped by new technologies and the attempts to find out how they could best be used on the battlefield. The available firepower had increased tremendously in the preceding fifty years but the armies had not amended their tactics to allow for the destructive power that they would be facing. That failure helped to shape the nature of trench warfare which had emerged by the end of 1914. Only near the end of the war did the opposing sides learn how to adapt to the new technology. The long years of trench warfare were the testing ground for the tactics that would eventually lead to the breakout and victory of 1918. Many of these tactical changes, however, passed unnoticed, or at least unrecorded by the men at the front.

This chapter deals with the changing role of artillery in the First World War and how those changes were perceived by Canadian soldiers at the front. It will be necessary to look quickly at the state of British artillery doctrine in the pre-war years. We will then briefly deal with the period between 1914 and 1916, when the first attempts were made to harness the new capabilities of the artillery. This chapter will recount how artillery was employed in the final years of the war and how artillery was portrayed in the diaries and memoirs of the front line soldiers. The soldiers' accounts are informative both in what they contain and what they leave out.

Of the three weapon types that are discussed in this paper, artillery is by far the oldest. Cannons had been in use for centuries and were a fixture of warfare but slowly evolved over this time. For the most part, however, these changes did not dramatically

change how artillery was used. The introduction of the modern quick-firing Puteaux 75mm gun by the French in 1897 dramatically increased accuracy and firepower.[32] Its recoil mechanism allowed the gun to stay on target and its lack of kick back permitted a dramatic increase in the rate of fire.[33] Other nations were quick to copy elements of the design into their own weapons. How to use this technology remained open for debate.

Before the war the British army did not accept the fact that new technology had made the old methods of warfare impossible, and so it generally lacked any sort of combined firepower doctrine. There was little pre-war cooperation between the various arms. There seemed to be a lack of appreciation for the fire-power potential of the artillery arm. The artillery, which would play such a pivotal role in World War I was seen as little more than an accessory. The future commander of the British armies in France, Douglas Haig himself declared in 1896. "Infantry wins battles, and artillery is the auxiliary arm."[34] Despite having new technology available to them, the British were still training their gunners to fight in the old style.

Both the French and the British continued to believe that artillery was best used in a direct fire role. In doing so, they ignored the lessons of the Russo-Japanese War that the tendency to position the guns in the front line had resulted in the "rapid loss of

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[32]Shelford Bidwell and Dominick Graham, Fire-Power: British Army Weapons and Theories of War 1904-1915 (London: George Allen & Unwin, 1982), 8.

[33]The 75mm was capable of firing 25 rounds a minute in the hands of a well trained crew. John Terraine, White Heat: The New Warfare 1914-1918 (London: Sidgwick & Jackson, 1982), 68.

[34]Tim Travers, The Killing Ground: The British Army, The Western front and the Emergence of Modern Warfare, 1900-1918 (London: Unwin Hyman, 1990), 72.

equipment, and so of firepower."[35] Ignoring the lessons of previous conflicts, or learning the wrong lessons, played a large role in shaping the faulty artillery doctrines of the early war years.

While the British put a great deal of emphasis on the direct fire role of the artillery in the pre-war years, some in the Royal Garrison Artillery pushed for more training in the areas of indirect and predicted shooting.[36] By 1914 the Garrison Artillery "was firing from cover and laying guns on line with instruments on calculated data. It shot from maps and corrected for weather before firing."[37] The old doctrines of artillery use were not undisputed but remained dominant in the pre-war years. Many officers in the Artillery believed that those officers "who advocated a complex system of fire support were windbags who complicated what was a simple matter explained in the manuals."[38]

While the British artillery began the war with an artillery doctrine that was badly out of date, it at least had modern equipment. Aside from the standard 18 pounder field gun, the British could also call on a variety of heavier weapons including the 60 pounder gun and the 4.5 inch howitzer and the even heavier 9.2 inch howitzer that was in development when the war began. According to Bidwell and Graham, the artillery

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[35]Jonathan Bailey, "British Artillery in the Great War" in British Fighting Methods in the Great War, ed. Paddy Griffith (London: Frank Cass, 1996), 24.

[36]Indirect fire was fire on a position that the guns themselves could not see, but which was visible to an observer. Predicted shooting was shooting off a map with no direct observations.

[37]Bailey, "British Artillery in the Great War," 24.

[38]Shelford Bidwell and Domininick Graham Fire-Power: British Army Weapons and Theories of War 1904-1915 (London: George Allen & Unwin, 1982), 24.

already "considered weight of shell to be decisive" and that "plunging fire and heavier shells were needed for destructive shoots."[39] The availability of a variety of heavy weapons seems to indicate that the artillery was not quite as backward as it would at first seem. It also appears that there was conflict inside the artillery branch as to what weapons would be needed and how they should be used. Contrary to Bidwell and Graham, Jonathan Bailey believes that "The importance of heavier weapons was seriously underrated. Shortly before war broke out, the number of 60-pounders was reduced, as these were considered unsuitable for use with an expeditionary force."[40] There appears to have been a clash of views as to how the war would unfold. At the very least, however, it can be said that the British had the right types of weapons available. France and Germany were both lacking in certain key areas of their artillery arsenals.

Borrowing a metaphor from Bidwell and Graham, the artillery war can be seen as a game of chess. At the start of the war, the British had most of their pieces on the board, but did not know the rules, or were trying to play a different game. To find a solution to trench warfare, the artillery would have to have the right pieces and know how to use them. The British, and by extension the Canadian artillery, had most of the right pieces; they just needed more of them and they needed to learn how to use them to the best effect.[41]

Once the war started it was soon evident that there were not enough modern guns

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[39]Bidwell and Graham, Fire-Power, 13.

[40]Bailey, "British Artillery in the Great War," 25.

[41]Bidwell and Graham, Fire-Power, 15

to go around. Some units were initially sent to war with older, out of date guns. Gunner Ferguson of the 1st Canadian Siege Battery noticed the lack of modern guns while training in England. On 23 December 1915 he started training on "old, obsolete muzzle loaders that were second hand when Oliver Cromwell was a lance corporal." On 17 February 1916 his unit was drilling with wooden guns. Though these were mock ups of the new six inch howitzers that his battery would be using, Ferguson admits that it was difficult to take the training seriously. On 4 April 1916 his battery fired their test on old eight inch muzzle loaders, which according to Ferguson "were in vogue when Waterloo was a village." His diary suggests that Ferguson and his unit did not actually fire their modern guns until they were in combat.[42] The Battle of the Somme was less than two weeks away.

Even worse than the shortage of guns, was the lack of ammunition, especially in the early years of the war, despite the fact that the Russo-Japanese War had shown that artillery ammunition expenditure could be extremely high. Bailey, Bidwell and Graham argue that the British failed to realize that spending shells would save lives. As an example of how high ammunition expenditure could be, John Newton's diary records an instance in which his battery fired over 3600 rounds in the span of twenty-four hours.[43] The British and Canadians faced a shell shortage throughout most of the opening years of the conflict. By 1916, however, Wilfred Kerr, a signaller with the Canadian field artillery,

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[42]Peter G. Rogers ed., Gunner Ferguson's Diary (Hantsport: Lancelot Press, 1985), 22, 24, 29, 37.

[43]CLIP, John Newton, diary, 16 August 1917.

noted that the Canadians who "enjoyed an abundance of that commodity and were entirely pleased to be able to transfer large quantities of it to Fritzie's side of the line without his returning the compliment."[44]

Aside from gun and shell shortages, once the war began, it quickly became obvious to all sides that the artillery doctrines that had been put in place in the pre-war years were inadequate. Trench warfare was largely a result of the triumph of firepower over mobility. According to Bailey: "Infantry mobility was halted by the power of opposing infantry weapons, and neither side possessed the artillery firepower to silence the later and restore mobility."[45] The process of digging in, and the construction of wire obstacles had basically ended any chance of strategic surprise. The British believed that before any assault on an enemy position could be mounted, the wire obstacles would have to be cut. In the early years of the war it was impossible to do this without employing a long preliminary bombardment.

Unfortunately for the infantry, the same bombardment that was used to clear a path through enemy obstacles also largely destroyed any real chance at surprise. The battles of 1915, however, seemed to reinforce the view that obstacles had to be destroyed before an assault could succeed. At Neuve Chappelle the preliminary bombardment lasted only thirty-five minutes, in order to give the Germans as little time to prepare as possible. While the field guns did manage to cut through the enemy wire, the howitzers,

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[44]Wilfred Kerr, Shrieks and Crashes: The Memoir of Wilfred Kerr, Canadian Field Artillery, 1917 (Ottawa: CEF Books, 2005), 14.

[45]Bailey, "British Artillery in the Great War", 27.

which were being used to bombard the German positions, "were wildly inaccurate and the trenches were barely touched." After initial gains the attack ground to a halt. According to Bailey, the successes that were achieved were gained "through the 'neutralisation' of the defence with a short, intense bombardment, not through the 'destruction' of obstacles alone."[46] Once again, Bailey feels that the British learned the wrong lesson from the battle.

> The failure of the attack was put down to obstacles remaining intact, rather than to the failure of howitzers to hit enemy infantry in their trenches. This experience led to a belief in the need for the total destruction of everything that stood in the path of attacking infantry, irrespective of damage to the terrain and loss of surprise.[47]

Preliminary bombardments would get longer and virtually all chance of a surprise attack would disappear. The bombardment that preceded the Battle of Loos lasted four days, probably because the British were attacking on a much wider front than they had at Neuve Chappelle with only a slight increase in the number of guns available. This attack also failed to achieve its goals, partly due to the failure of the supporting gas attack. The battles of 1915 had not taught the British the lessons that would allow them to break the stalemate. At year's end the artillery was directed to "produce larger and heavier 'destructive' bombardments, and a better barrage to shield the infantry."[48]

The Battle of the Somme in 1916 was to put those directives into practice. The

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[46]Bailey, "British Artillery in the Great War," 28-29

[47]Bailey, "British Artillery in the Great War," 29.

[48]Bailey, "British Artillery in the Great War," 29.

preliminary bombardment lasted for seven days. As well as attempting to destroy the wire obstacles in the path of the ground troops, the bombardment was supposed to destroy German machine guns and communications. The results of the bombardment varied greatly along the line. In some areas the wire was cut, in others it remained largely intact. The British artillery also failed to destroy the German guns: mainly because many of the German guns had remained silent throughout the bombardment and thus went undetected.[49]

While no Canadian infantry units were involved on the first day of the Battle of the Somme, one Canadian heavy artillery battery was involved.[50] Gunner Ferguson's diary does not contain any direct mention of the preliminary bombardment. While the battery was in action for days before the assault there is no real sense that it was leading up to anything. He first mentions the attack in his diary entry for 1 July 1916, the day of the first infantry assault:

> Big British offensive commenced this morning. Boy talk about noise, the ground really shook with the shock of gunfire. We fired on Caterpillar Wood, Willow Trench and Fricourt Wood. The Infantry went over the top at 7:30. [51]

Ferguson believed that, at least during the initial stages of the battle, all seemed to be going well. He notes that by ten o'clock his battery was out of range of the enemy.

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[49]The original plan called for five days. The date of the attack was pushed back due to the weather extending it to seven days. Martin Middlebrook, The First Day on the Somme: 1 July 1916 (London: Penguin Books, 2001), 102.

[50]The Newfoundland Regiment did fight on the first day of the Battle of the Somme and was almost completely wiped out.

[51]Rogers, Gunner Ferguson's Diary, 39.

Watching the wounded and the prisoners come in, he remarked that he regretted not joining up earlier as he "fully expected the war to be over this afternoon so great is the number of wounded and prisoners coming in."[52] While the attack may have made progress in Ferguson's area, in general the first day of the Somme was a costly failure.[53]

While the Battle of the Somme did not become the breakout battle that the generals had hoped for, it did lead to some innovations in tactics. The creeping barrage made its first appearance at the Somme and was refined as the battle progressed leading to more effective protection for the advancing soldiers.[54] Before the Somme, and during the early battles on the Somme, the creeping barrage would lift from one objective to the next rather than staying near the troops. This proved to be largely ineffective.[55] This tactic was later altered so that it would make one hundred yard lifts every three minutes. The focus of the barrage was no longer the destruction of the defences, instead it "concentrated on keeping defenders from their machine-guns and parapets until it was too late."[56] This new tactic protected the soldiers from enemy machine gun and rifle fire, but did little to protect them from the effects of German artillery. At the Somme, effective counter battery techniques had yet to be implemented. "German artillery was still,

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[52]Rogers, Gunner Ferguson's Diary, 39.

[53] The British took roughly 60,000 casualties on the first day of the battle.

[54]There is some argument as to whether this actually was the first time a creeping barrage was used.

[55]Bill Rawlings, Surviving Trench Warfare: Technology and the Canadian Corps, 1914-1918 (Toronto: University of Toronto Press, 1992), 69.

[56]Rawlings, Surviving Trench Warfare, 77.

essentially, unassailable."[57]

While it was impossible to silence the German guns, some officers did take steps to protect their troops from the inevitable counter barrage. For the opening battle of the Somme the 18th Division's soldiers were ordered to "lie out in no man's land close to their first objective so they could jump enemy defences the moment the standing bombardment ended. They then made their way to subsequent objectives by following the barrage as closely as possible."[58] Even though the creeping barrage on 1 July generally failed to protect the British troops, the 18th Division reached all of its objectives for the day, at the cost of thirty percent casualties.[59] This tactic of having the assaulting troops lie out in no man's land before the attack was adopted by the Canadians for later battles. Aubrey Wyndham Griffiths of the 5th Battalion mentions the tactic of starting attacks from no man's land while discussing the later battles on the Somme.

> We learned to creep into No Man's Land and wait for the "Zero, hour." The reason for that was when our artillery started a barrage on the enemy front line, their artillery would retaliate on our front line. But we would not be there, thereby saving a lot of casualties.[60]

John McNab of the 38th battalion also recalled heading into no man's land roughly an hour before the attack began. While the original motivation behind this tactic was to allow the assaulting infantry to reach the enemy more quickly, it also protected the

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[57]Rawlings, Surviving Trench Warfare, 71.

[58]Rawlings, Surviving Trench Warfare, 68.

[59]Rawlings, Surviving Trench Warfare, 69.

[60]LAC, Aubry Wyndham Griffiths fonds, MG30 E442, p2.

infantry from German defensive barrages. In either case this tactic seems to have been adopted on a relatively wide scale.

The Canadians only entered the battle in earnest in September 1916. They fought a series of savage and costly battles which altered the way the Corps waged future battles. The series of attacks on Regina trench were typical of many of the operations during the battle of the Somme. "Instead of flexibility and manoeuvre, the battle was fought with artless intensity. It was simply the application of enormous quantities of raw firepower."[61] A series of reports dealing with one attack on Regina trench on 1 October 1916 gives some idea of the ferocity of the fighting. Corporal Hutchison noted that the preliminary bombardment had begun at 3:14 pm and that the attack went in at 3:16. He reported that "the wire in front of the German trench was very well cut up"[62] and that enemy machine gun fire was very heavy, though it did not last. Corporal Dixon indicated that the artillery bombardment started at 11:00 am but had increased dramatically at 3:14 pm. He also wrote that the attack met heavy enemy machine gun fire, and that they were also under artillery fire. While the attack succeeded in taking 500 yards of trench, things began to turn against the Canadians. With both flanks open to enemy attack, the Canadians began to run short of ammunition, and despite several requests for reinforcements, few arrived. Corporal Hutchison reported that the Canadians were "just like a snowball in a baker's

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[61] William Stewart, "Attack Doctrine in the Canadian Corps, 1915-1918" (M.A. thesis, University of New Brunswick, 1982), 50.

[62]LAC, Kenneth L. Duggan fonds, MG30 E304, Operations Reports, Sector Map 1916.

oven."[63] They were forced to retire after German counter attacks. Lieutenant Kenneth Duggan confirms the accounts of the two corporals. On 3 October, after being relieved, A Company only paraded 39 men.[64]

These reports tell the reader a few things. First, it appears that the preliminary bombardment had been shortened to allow for some semblance of surprise. The artillery did a good job of cutting the German wire but did not silence the German machine guns. Although the initial attack itself was reasonably effective, holding onto the ground gained proved to be impossible after the greater attack by the Canadian 2nd Division failed. While Corporal Hutchison claims that the wire in front of his company was cut, this was generally not the case, few units even reached the German trench and only one withstood the counter attacks that followed. Fifth Brigade had entered the line on 27 September with 1717 men. On 2 October they were down to 773.

Regina trench was eventually taken and the Battle of the Somme trickled to an end. The Battle of the Somme had been a failure, but in that failure a number of lessons had been learned. According to Stewart: "It usually requires a shattering experience to energize reform and the Somme campaign was just such an event for the British Army and the Canadian Corps."[65] The lessons learned on the Somme, and the reforms that would occur after it would lead to the successes of the final years of the war.

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[63]LAC, Kenneth L. Duggan fonds, MG30 E304, Operations Reports, Sector Map 1916.

[64]All three men were from the same company.

[65]William Stewart, "Attack Doctrine in the Canadian Corps, 1915-1918", 58.

By the time of the battle for Vimy Ridge the Canadian Corps had developed "a system of tactics, based on available technology, that would allow the infantry to capture its objectives and hold them without the heavy casualties characteristic of earlier battles."[66] The focus of the change was to allow the infantry to do their jobs more effectively. The artillery, which had at times been very inaccurate on the Somme, would have to find ways to bring its shells down on target more often, to create gaps in the enemy wire, and to suppress or silence enemy strong points. At the same time, the Canadian artillery had to find a way to also silence or destroy the German artillery.

It had always been a part of the artillery's task to cut holes in the German wire. This task, however, was often beyond the means of the technology at hand. The shrapnel shells fired by the 18-pounders were unsuited to the task. As Victor Wheeler noted: "Our 18-pounders were about as efficient in tearing open necessary gaps in the ripsaw-tooth wire as a bullwhip lashing a prairie fence post."[67] Shells from the heavier guns were more effective in cutting wire; however, since the British artillery initially lacked a fuse which was sensitive enough to detonate a shell on contact with the ground, these shells often buried themselves before exploding. The resulting explosions tore up the ground, often leaving the German wire intact.

The introduction of the No.106 fuse changed the way in which wire was cut[68]

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[66]Rawlings, Surviving Trench Warfare, 87-88.

[67]Victor Wheeler, The 50th Battalion in No Man's Land (Ottawa: CEF Books, 2000), 23

[68]For information on the development of the 106 fuse see:
Guy Hartcup, The War of Invention: Scientific Developments, 1914-18 (New York: Brassey's Defence Publishers, 1988), 57-60.

since the shell would detonate "when it hit the wire or just as it struck the ground, in either case exploding within the barrier."[69] This greatly reduced the amount of time and firepower that had to be dedicated to cutting enemy wire and as Haig himself noted, allowed for an increased possibility of achieving surprise.[70]

To the soldiers, the 106 fuse was of sufficient interest that in discussing an attack during the Battle of Ancre on 13 November 1916 Victor Wheeler wrote that: "This was the first time, to my knowledge, that we began to use the No.106 fuse on our shells. The device was a mushroom shaped cap with an explosive behind it that accelerated the detonation of the main explosive on impact."[71] Wheeler's description of the No.106 fuse is accurate. The No. 106 fuse may not have been used at the time however. Rawlings mentions that it had been in development since 1915 but "was first used on a large scale during the Arras offensive."[72] In discussing the Canadian preparations before the Battle of Vimy Ridge, Nicholson notes that "a new fuse (No. 106), specially designed for use with high explosive shell where splinter effect was required above ground, was to prove highly satisfactory."[73] Hartcup places the first use of the 106 fuse during the Arras offensive in April of 1917.[74] Nicholson makes no mention of the No. 106 fuse in his

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[69]Rawlings, Surviving Trench Warfare, 109.

[70]Hartcup, The War of Invention, 58.

[71]Wheeler, The 50th Battalion in No Man's Land, 31.

[72]Rawlings, Surviving Trench Warfare, 109.

[73]Colonel G.W.L. Nicholson Canadian Expeditionary Force 1914-1919 (Ottawa: Queen's Printer and Controller of Stationary, 1964), 249.

[74]Hartcup, The War of Invention, 58.

coverage of the attack of 13 November 1916.[75] It seems likely that Wheeler was wrong about the timing of the introduction of the No.106 fuse.

Mentions of the No. 106 fuse are rare even after its initial use. John Newton's diary, however mentions that his battery cut German wire with the No. 106 on 20 August 1917.[76] This is the only time when he mentions the fuse by name, though it is not the only time his diary mentions that his battery was attempting to cut German wire.

A second major change in artillery operations between the Somme offensive and the attack on Vimy Ridge was in counter-battery techniques. According to most secondary sources, attempts to silence enemy artillery in previous battles had generally failed. One gets a different view of counter-battery efforts from the diary of Gunner Ferguson, who makes several mentions of counter-battery shoots during the Somme Campaign, some of which according to Ferguson were successful.

On 14 September 1916, Ferguson's battery fired 150 rounds at an enemy battery. Like many of the other shoots that Ferguson mentions he does not mention the result. A single line entry for 13 October records another attempt to knock out German artillery: "A 200 round aeroplane shoot on a German battery today was successful."[77] An aeroplane shoot was directed from observers in the air. Aerial observers were increasingly used to pinpoint enemy positions. Ferguson's diary lists aeroplane shoots on 6 and 9 November,

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[75]Hartcup, The War of Invention, 192-4.

[76]CLIP, John Newton, diary, 20 August 1917.

[77]Rogers, Gunner Ferguson's Diary, 53.

but he does not indicate the result, possibly because as Kerr recalled: [78] "As for the shells we fired, we had little means of knowing exactly what damage they did..."[79] Though Ferguson's battery was firing much heavier guns, it seems likely that at times they also had little idea what kind of damage they were inflicting on the Germans.

The outcome from counter-battery shoots on 28 and 31 December 1916 was less ambiguous. The aeroplane shoot on the 28th was listed as a success, while the entry for the 31st is even more definitive: "Another counter-battery shoot of 150 rounds. Destroyed said battery."[80] Judging by Ferguson's diary, one might be surprised by the rather bleak accounts of counter-battery efforts before the Battle of Vimy Ridge. The apparent difference is not, however, as large at it might seem. From Ferguson's account it is clear that the artillery could at times silence enemy batteries once they had been located. One of the main reasons that counter-battery fire had often been so ineffective was simply because it was difficult to actually locate enemy guns.

Starting on 27 January 1917, the task of locating and silencing German artillery fell to Lieutenant-Colonel Andrew McNaughton, who was appointed the Canadian Corps first counter-battery staff officer.[81] McNaughton used reports from forward observers and snipers, joined reports from aerial observers, translated German radio messages and information gained during raids. He also had access to the relatively new technique of

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[78]Rogers, Gunner Ferguson's Diary, 55.

[79]Kerr, Shrieks and Crashes, 96.

[80]Rogers, Gunner Ferguson's Diary, 59.

[81]Rawlings, Surviving Trench Warfare, 111.

detecting enemy guns through sound ranging that was adopted after the Somme campaign.[82] By working through the various sources the Canadians located 176 of the roughly 212 guns that the Germans had available at Vimy Ridge. In the months before the attack, the Canadian artillery "gained partial mastery over the battlefield, a position they had never achieved before."[83]

Counter-battery fire continued to be a focus of the artillery after the battle of Vimy Ridge. John Newton noted several instances in which his battery attempted to silence enemy guns in July and August 1917. German trench mortars seem to have been especially common targets as noted in his diary on 13, 16, 17 and 18 July 1917. Newton also made a passing reference to a counter-battery shoot on 12 August but did not mention the target or outcome.[84] Despite the fact that Newton was an officer, he rarely mentioned the results of his battery's work, probably because he did not know the exact results. Despite a lack of recorded results, the artillery was finding ways to suppress the enemy artillery, thus protecting the Canadian infantry. For most men at the front, however, these changes went unnoticed, or at least unrecorded.

The battle for Vimy Ridge was to a large degree an artillery battle. The artillery plan was detailed and comprehensive. Vast quantities of guns and ammunition had been brought into play. The gunners had been preparing the path for the infantry for months

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[82]For information on how this technique worked see: Rawlings, Surviving Trench Warfare, 94.

[83]Rawlings, Surviving Trench Warfare, 111.

[84]CLIP, Jonathan Newton, diary 13 July - 12 August 1917.

before the actual attack. At Vimy Ridge Julian Byng, the commander of the Canadian Corps, "hoped, as much as possible, to replace blood and muscle with explosive and steel"[85] yet few diaries mention any part of the artillery battle beyond the barrage on the morning of the battle.[86] One exception was George Bell who noted that the artillery had been battering the German lines for two days before the battle.[87] The preliminary bombardment had in fact lasted more than two days. To many of the front line soldiers, the preparatory work of the days and weeks before the battle may have simply faded into the background of the day-to-day artillery war. The same cannot be said for everyone who witnessed the preparation. Another diarist, John Newton witnessed a trial barrage on 3 April that "was most pretty to see. The Hun line is being battered to a pulp. Watching the shells burst and seeing the upheavals of earth one wonders how the Hun can possibly exist." Newton listed the variety of guns used in the bombardment. Speaking of the number of guns in the area he noted that "The place is filled right up with them. I'm told there is a bigger concentration here than on the Somme."[88]

While the preparatory artillery bombardment may have gone largely unrecorded, the same cannot be said of the barrage on 9 April 1917. Gunner Ferguson's diary entry for 8 April reported the arrival of 1420 shells at his battery. While some were used in the

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[85]Rawlings, Surviving Trench Warfare, 107.

[86]For an account of the Canadian plan see: Rawlings, Surviving Trench Warfare, 107-114., Nicholson, Canadian Expeditionary Force, 247-252.

[87]LAC, MG30 E113 File #2

[88]CLIP, John Newton, diary, 3 April 1917.

preparatory bombardment, most were used on the day of the battle. His diary also contained one of several accounts of the barrage which woke him up on the day of the attack.

> What a sight in the dim light as the guns put down the barrage for the boys to go over and try for Vimy Ridge. What a terrible racket as all the guns on the front blended into one continuous roar and the flashes from them made the effect of a great electrical storm. Away out in front the rise in front of Monchy is nothing but a hill of shellbursts.[89]

After mentioning some of the targets that his battery fired on, Ferguson deemed the attack a success and that "according to the infantry they could have gone clear to Berlin if the artillery could have been brought up to cover them."[90] This sentiment was overly optimistic, as the assault on Vimy Ridge was not uniformly a success. It was a fact, however, that the infantry did out-distance their artillery coverage in places. Wilfred Kerr noted that several hours into the attack "our guns quit firing, having reached the limit of their range; the other Field guns also ceased; the noise diminished and presently only the Heavy guns were in action."[91] Shortly after that, Kerr's battery was ordered to move forward. Newton, who missed the actual attack because he had duty in a telephone dugout, noted that his battery remained in range until 11 April.[92]

Private Fraser also recorded his impressions of the barrage.

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[89]Rogers, Gunner Ferguson's Diary, 75.

[90]Rogers, Gunner Ferguson's Diary, 76.

[91]Kerr, Shrieks and Crashes, 24.

[92]CLIP, John Newton papers, diary, 11 April 1917.

> A constant stream of 18-pounder shells was sent pouring down on the enemy front line amidst ear-splitting explosions and smashed and scattered the trench to the winds. Heavy shells would rock the earth and create enormous craters. The noise was bedlam. The Germans frantically fired their S.O.S. lights into the sky vainly calling to their guns for help... Their trench and the vicinity was alive with fire and appeared a blazing inferno as the shell bursts spat out long tongues and jets of flame. It was a pretty although grim sight to watch a regular fireworks deluxe. Our eyes were glued in wonderment to the line and we felt that ungodly havoc was being wrought on the Hun. The shelling was so intense that the line was illuminated nearly all the time.[93]

It is interesting to note that Fraser says that the calls by the German infantry for artillery assistance were in vain. Does Fraser mean that due to the ferocity of the assault German artillery could not turn the Canadians back, or does he mean that the German artillery did not answer in any meaningful way?[94] This could be a hint as to the effectiveness of the counter-battery campaign, though this is by no means certain.

While many sources describe the barrage itself, few actually mention its effectiveness, probably because the soldiers were too busy trying to survive to pay much attention to such details. Canon Frederick Scott, a non-combatant, viewed the remains of the German trenches on 9 April.[95]

> The sight of the German trenches was something never to be forgotten. They had been strongly held and had been

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[93]Reginald H. Roy ed., The Journal of Private Fraser (Victoria: Sono Nis Press, 1985), 262-3.

[94] Fraser came under artillery fire later on 9 April. Luckily the Germans were not firing conventional munitions.

[95]Scott was the Senior Chaplain of the 1st Canadian Division.

> fortified with an immense maze of wire. But now they were ploughed and shattered by enormous shell holes. The wire was twisted and torn, and the whole of that region looked as if a volcanic upheaval had broken the crust of the earth.[96]

While most soldiers would have been too busy trying to achieve their objectives on the day of the battle, Scott, as a chaplain, was able to move about, thus giving him the ability at times to be more aware of his surroundings and the effects of the allied artillery on the German defences. Scott, the only source to mention the ongoing efforts of the artillery after the assault had begun, noted that after the attack reached its objectives, the allied artillery was firing long instead of protecting the newly gained Canadian positions.[97] Most other accounts end with the initial barrage.

The Battle of Vimy Ridge continued until 14 April. While the battle did not lead to a strategic breakthrough, it was without a doubt a tactical victory in that it "resulted in the capture of more ground, more prisoners and more guns than any previous British offensive on the Western Front." Nicholson attributes the victory as at least partially due to the effectiveness of the artillery which "in unprecedented strength with adequate supplies of ammunition, coupled with the gaining of tactical surprise, had paid good dividends."[98]

The artillery tactics used at Vimy Ridge were still the tactics of destruction. While it had been suggested by some in the army that in future battles hurricane bombardments

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[96]Canon Frederick George Scott, The Great War as I saw it (Vancouver: Clarke & Stuart Co. Limited, 1934), 169.

[97]Scott, The Great War as I saw it, 171.

[98]Nicholson, Canadian Expeditionary Force, 266.

might replace the long drawn out bombardments of previous attacks, this notion was rejected. "'Destructive' firepower had become like an addictive drug. Armies preferred the near certainty of limited, if costly success to the political and military risks of operations which reduced 'destruction' even though they might have achieved greater penetration and mobility." British tactics may have been flawed, but by this point "the strength of Allied artillery ensured that, in a duel, it would defeat German artillery."[99] While the tactics of destruction were both limiting and costly, by 1917 they offered a reasonable chance of success to the allies. These tactics were again used in the fall of 1917 during the third Battle of Ypres.[100] During this battle, the cost of using destructive artillery tactics was multiplied by the poorly drained terrain over which the battle was fought. "There could have been few less promising choices for an offensive marking the zenith of the tactics of 'destruction'."[101] The heavy artillery fire disrupted the drainage system, turning the region into a nightmarish landscape of water and mud. Movement was difficult at best and normal infantry tactics were rendered virtually impossible.[102] Nevertheless, the attacks continued. The British opened the Campaign in July 1917; it would be 18 October before the Canadian Corps entered the line.

Generally speaking the Canadian artillery employed the same tactics as it had at

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[99]Bailey, "British Artillery in the Great War", 35.

[100]Also knows as Passchendaele

[101]Bailey, "British Artillery in the Great War", 35.

[102]Philip Warner, Passchendaele: The Story Behind the Tragic Victory of 1917 (London: Sidgwick & Jackson, 1987), 70.

Vimy Ridge but was less well prepared and did not achieve the same level of excellence. Moreover, the nature and condition of the ground over which the battles were fought and changes in the German defensive tactics somewhat reduced the effectiveness of the artillery. At Passchendaele the Germans made extensive use of concrete pill boxes. They had also deepened their defences while keeping fewer men in the front lines.[103] The Canadian Corps launched its first attack of the campaign on 26 October and captured the town of Passchendaele on 6 November 1917. The Third Battle of Ypres ended on 10 November 1917. Like so many previous campaigns, limited gains had been made at a high cost.[104] The artillery tactic of destruction could provide limited victory but could not deliver a breakthrough. As Bailey notes, however, destruction may have been the only chance of success at Passchendaele given the heavy wire that protected the German positions.[105]

Passchendaele was to be the last major battle in which the artillery used destructive tactics. Starting with the Battle of Cambrai on 20 November 1917, the emphasis began to shift towards neutralisation.

By the end of 1917 the artillery was ready to change its tactics. The lessons and experience gained over the previous three years of war made it clear that changes had to be

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[103]For more on the changes in German Defensive Tactics see:
Nicholson, Canadian Expeditionary Force, 316-8.

[104]According to Nicholson, the Canadian Corps alone took 15, 654 battle casualties during its short involvement in the campaign.
Nicholson, Canadian Expeditionary Force, 327.

[105]Bailey, "British Artillery in the Great War", 35.

made in order to break the stalemate.[106] Improvements in predicted fire made many of the changes possible. It was now possible to fire from a map without previously registering the guns.[107] The availability of tanks in large numbers also contributed to the change in tactics. By eliminating the need for a preliminary bombardment to cut wire obstacles, tanks allowed for an element of surprise.[108]

Moreover, the artillery could now concentrate on aiding infantry "mobility by destroying or 'neutralising' enemy artillery and whatever infantry firepower might escape the tank."[109] Increased quantities of smoke and gas rounds "made 'neutralisation' with these munitions a feasible alternative to 'destruction' with HE."[110] Once surprise had been lost, the artillery largely reverted to the same roles it had carried out in previous campaigns.

Few Canadians were actually involved in the Battle of Cambrai, that in its initial phases was a success. Surprise was achieved, and the British made large advances.[111] While the gains made during the Battle of Cambrai would be lost during the German Spring Offensive of 1918, the ground work had been laid for the final battles of the war.

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[106]Bailey, "British Artillery in the Great War", 37.

[107]Registering a gun involved firing a number of rounds from a newly placed gun. The fall of the rounds would be observed so that fall of following rounds could be accurately predicted. This unfortunately also gave away the presence of the gun to the enemy.

[108]Rawlings, Surviving Trench Warfare, 168.

[109]Bailey, "British Artillery in the Great War", 37.

[110]Bailey, "British Artillery in the Great War", 37.

[111]By the standards of trench warfare.

The new tactics employed at Cambrai were not merely different for the artillery but can, to some degree, be seen as the birthplace of all arms tactics.[112] The successful integration of armour, artillery and infantry had shown that the deadlock of trench warfare could be overcome.

The Canadian Corps was first involved in an attack using these new combined tactics at Amiens in August 1918. By this time, the German offensive that had made such impressive gains in the spring of 1918 had worn itself out. While the Canadian Corps had been split up to provide reserves for the attempts to stem the tide of the German offensive, the Canadians had stayed out of the major fighting. By the time of the Amiens attack, the Corps was back together. At Amiens, the Canadians, for the most part, employed the same tactics that had been used at Cambrai. The units involved were assembled with great secrecy, a fact commented on in several sources. In his memoirs, Frank Baxter mentions both the orders received by the infantry in their pay books to "Keep Your Mouth Shut"[113] during the movement to the front, and the steps taken by the military to hide the build up of men and tanks. "To drown the curses of the weary troops, as well as the approach of the tanks, it had been arranged with great forethought for a flight of heavy bombing planes to operate during the night in this area."[114] While Baxter obviously saw the message in his

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[112]This was the first time that the infantry, artillery and armoured tactics had all been successfully integrated into a battle plan.

[113]LAC, Frank Baxter fonds, MG30 E417, p8, "Memoirs of World War".
For the full text of the message see also: CLIP, Charles Savage, Memoir.

[114]Baxter's memoirs are supported by the information in Charles Henry Savage's Memoirs as well as by Nicholson's official history. LAC, Frank Baxter fonds, MG30 E417, p8.

pay book, he may not have known that the bombers were meant to cover up the sounds of the tanks at the time. Savage, who also wrote his memoir after the war, also benefited from a certain amount of hindsight.

The battle began with a hurricane bombardment at 4:20 on the morning of 8 August 1918. As in most major battles, many soldiers recorded their impressions of the bombardment. Albert West, who was left out of the battle, wrote:

> About 4 or 4.30 we were awakened by a terrific burst of gun fire on our front. The roar was awful and constant. Men who came down from the line in the evening said that the barrage of heavier, medium light artillery and machine guns opened at 4.30 as one gun. The shelling was brief and our men leaped to the assault.[115]

Though it is somewhat unclear in this account, the infantry began their advance as soon as the bombardment began, not afterwards.[116] Victor Wheeler also recalled the opening moments of the Battle of Amiens.

> Promptly at Zero Hour, 4:20 A.M., Thursday, 8 August, forty-five miles of the Western Front erupted with volcanic explosions. ... In the uncertain light of dawn our Canadian artillery had opened up with hundreds of guns of many calibres as a shattering barrage to flatten everything in its path.[117]

Wheeler, like West, conveys some sense of the magnitude of the barrage. It is clear from the quotation, however, that Wheeler had not fully grasped the goals of the artillery, for he seemed to believe that the focus of the artillery bombardment was still to destroy the

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[115]LAC, Albert C. West fonds, MG30 G32, p.33.

[116]Nicholson, Canadian Expeditionary Force, 398.

[117]Wheeler, The 50th Battalion in No Man's Land, 231.

German positions and obstacles.

Much as in the cases of previous battles, several sources mention the artillery's role at the beginning of the Battle of Amiens but they are often the only mentions of the role of the allied artillery in accounts of the battle.[118] The Battle of Amiens was a success. On the first day of the battle the Canadians advanced eight kilometres. The advances over the next three days slowed and the attack came to a halt. The tactics used at Cambrai and Amiens had paved the way for a return to some semblance of open warfare and the final string of allied offensives which would become known as the Hundred Days.

Most narratives of the use of artillery in set-piece battles cover the opening bombardments and the barrage. Once the battle had started, and the infantry had begun to advance, mentions of allied artillery either dwindle, or vanish all together. There are a number of possible reasons for this. One explanation is simply that once an attack began the soldiers had no time to pay much attention to what the other arms were doing unless it had a direct influence on them. Rawlings may be correct when he states that as long as the artillery support was doing its job, it was largely ignored in accounts of battles "since infantrymen took their artillery support for granted."[119] While Rawlings' comment refers to unit accounts, the diaries of soldiers serving with the artillery are filled with accounts of the day to day activities of an artillery battery. These activities included digging gun pits, moving ammunition up to the guns and performing a variety of shoots. Though brief and lacking detail, these accounts give us some idea of how artillery was employed outside of

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[118]Especially in accounts from the infantry.

[119]Rawlings, Surviving Trench Warfare, 210.

major battles.

Both John Newton and Robert Gordon Brown mention firing in response to S.O.S. signals from the infantry. Newton's diary for 27 May 1917 records the following: "At 1 A.M. Monday an S.O.S. went up to which we responded, firing about 320 rounds. The Hun untook [sic] to raid our trenches but was driven back leaving quite a number of killed behind him."[120] Newton also included several instances of his battery firing to destroy German trenches. Between 26 and 29 July 1917, Newton made three entries recording shoots of five hundred to six hundred rounds onto specific trenches but did not indicate the result of the various shoots.[121] The artillery also supported the numerous raids launched by the Canadians against the German trenches. On 13 February 1918, Brown noted that his battery fired "a barrage of 120 rounds. HE for brigade raid."[122] These are just some of the examples of the day to day actions of the artillery found in the diaries of the gunners.

Aside from pre-battle bombardments, many of the accounts of allied artillery use in the diaries of the infantry focus either on mishaps concerning allied artillery or situations in which the artillery simply failed to make a visible impact. Many accounts of artillery accidents concern barrages that fell short. Both Ernest Russell and George Bell mention losses due to creeping barrages. Bell noted how the British ran into their own creeping barrage when it was first used at Neuve Chappelle.[123] Ernest Russell's experience was

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[120]CLIP, John Newton, diary, 27 May 1917.

[121]CLIP, John Newton, diary, July 1917.

[122]CLIP, Robert Brown, diary, 13 February 1918.

[123]LAC, "Back to Blighty",MG30 E113, p.15-16.

more direct. His unit took losses because some soldiers were following a creeping barrage too closely.[124] A third soldier, William Woods had a dim view of the creeping barrage after the third wave at Vimy Ridge ran into the allied barrage.[125] The infantry, however, was not the only victim of the barrage. Wood also remarked,"When we moved forward again after the machine gun stopped I noticed a tank several hundred yards to the left and another to the right both immobilized apparently more victims of the foolish creeping barrage."[126] While a number of soldiers reported accidental deaths caused by creeping barrages, most did not adopt Woods' negative view of the tactic. Even in static positions, however, the risk of friendly fire remained. Referring to an incident late in the war, Charles Savage noted that "we were shelled moderately by the Germans and intensively by our own people."[127] Luckily in this particular case Savage's unit suffered only one casualty. Losing your own soldiers to friendly fire must have been hard; however, at least in those situations it was clear that the artillery was active in the battle.

While they are rarer than instances of friendly fire, on several instances the artillery was seen to have failed completely in supporting the troops. Captain Alan Crossman's report of the action leading to his capture on 2 June 1916 at Sanctuary Wood is filled with mentions of German shelling of his unit's position. According to Crossman

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[124]LAC, A Private soldiers view on the Great War, 1914-1918, MG30 E220, p.25, Reminiscences of E.W. Russell.

[125]LAC, William B. Woods fonds, MG31 G30, p.8, "A Private's Own Story of the First World War".

[126]LAC, William B. Woods fonds, MG31 G30, p.9.

[127]CLIP, Charles Savage, memoir.

the "officers and men stood about six hours terrific bombardment without any practical reply from our guns - and without being able to do anything themselves..."[128] Because the infantry had no means of striking back at the Germans the lack of friendly artillery support was even more telling. After his capture, Crossman learned that the lack of support had been unavoidable: "We all were waiting anxiously for our Artillery to reply but of course as we afterwards found out that was quite impossible as it wasn't there."[129] Frank Baxter also wrote about a failure of the allied artillery to respond to an S.O.S. signal sent up on 17 September 1917 while his infantry unit was under attack. "Our artillery was sound asleep for they never responded at all."[130]

Mentions of incoming German artillery fire and close encounters with German shells far outweigh the mentions of friendly artillery in the diaries of the infantry. Even on the quietest days the opposing sides kept up their shelling. For the soldier at the front, whether he was stationed in an active or quiet sector, the danger from enemy artillery was almost constant. Only the degree of risk changed. The threat posed by a sustained enemy bombardment was greater than light shelling, but there was still the constant risk of being killed or wounded. The soldiers at the front had to learn to adapt to that danger.

The light bombardment that accompanied day-to-day life at the front could at least be dealt with to some degree. Soldiers learned to recognize the various types of German shells and gave them nicknames, based either on their sound or their appearance. This

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[128]LAC, Alan Fairfax Crossman, MG30 E36, p.2.

[129]LAC, Alan Fairfax Crossman, MG30 E36, p.1.

[130] LAC, Frank Baxter fonds, MG30 E 417, p.4.

tendency to refer to enemy rounds by their nicknames gives us a much more detailed view of what was being fired at the authors. In his entry for 26 December 1917, Albert West, after noting that the Germans were using more mortars, complained that there were "[t]o many "rum jars' coming over to suit me."[131] Private Fraser's diary entry for 14 January 1916 also gives examples of some of the nicknames given to German shells: "coal boxes, whiz-bangs and aerial torpedoes."[132] Being able to recognize the type of round being fired could often be helpful, but it could also cause stress as Fraser discovered. After being shelled with aerial torpedoes, a type of German trench mortar round, for the first time he noted that first impressions could be misleading.

> At first I figured this missile was a bit alright. You could see it coming and consequently a decided improvement on artillery fire. Later on I changed my opinion. It can safely be said that trench mortars create more nerves than any other explosive. When it is fired you hear a dull pop from your opponents' lines. It goes a considerable height, turning end over end in flight, like a rugby football, and one is kept guessing as to where it will fall. It is charged with a powerful explosive and fairly rends the heavens when it bursts. The hole it creates is of alarming proportions. It was not long before these missiles began to get our goat and gazing skywards rapidly became a steady occupation.[133]

In the case of trench mortar shells, the soldiers had some warning and, if they managed to guess the path of the shell, could escape the threatened section of trench. On 9 July 1916

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[131]LAC, Albert C. West fonds, MG30 G32, p.6.

[132]Roy, The Journal of Private Fraser, 83.
Coal boxes were heavy shells named for the cloud of black smoke they created when exploding, Whiz-bangs were small calibre shrapnel shells named for the sounds they made and Aerial torpedoes were a type of trench mortar round.

[133]Roy, The Journal of Private Fraser, 53.

Private Fraser and his companions were saved because of that. Throughout a light bombardment the German rounds had been falling well behind their position so the soldiers had begun to ignore the shelling. "Scarcely had Jack Macartney and Plummer joined our little bunch" he wrote, " when a report from a Hun gun instinctively told us that a shell was going to fall short, and we immediately scattered...."[134] In this case the soldiers escaped with only slight injuries. Unfortunately, there was often little or no warning of incoming shells, and in some cases no realistic means of escape.

If a section of the front came under heavy fire, soldiers could often do little except endure their ordeal and hope that they were lucky enough not to get hit. One soldier claimed that it took more courage to sit under shell fire than it did to attack.[135] At least in an attack you were not simply passively awaiting your fate. Private Fraser agreed that sitting out an artillery bombardment could test a man's nerves. While describing a particularly accurate bombardment he noted that "[g]unfire so precise and methodical in its execution strikes terror, even into the bravest hearts."[136]

When forced to endure a heavy artillery bombardment, Canadian soldiers were usually at a distinct disadvantage when compared to their German opponents who were, for the most part, conducting a defensive war. They were able to fortify to a greater extent than the Allies. German positions were often well provided with deep dug-outs which provided protection from anything except for a direct hit from allied artillery. Canadian

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[134]Roy, The Journal of Private Fraser, 170.

[135]LAC, "A Private soldier's views on the Great War, 1914-1918", MG 30 E220.

[136]Roy, The Journal of Private Fraser, 150.

soldiers waiting out a German artillery bombardment were generally less fortunate. Private Fraser commented on the differences between Canadian and German positions in his entry for 10 September 1916, when he came across a series of captured dug-outs built into the edges of a sunken road.

> The Germans appear to be very partial to sunken roads. In fact the first thing that appears to strike the enemy is to construct a deep dug-out, a contrast to our men who evince no desire to do so, being quite content to grovel around the surface and take chances.[137]

Four days later, Fraser observed that a German trench that had been captured during that day's fighting "was hardly touched by our bombardment. It was deeper and much better constructed than ours... ."[138] On two occasions John Newton found that a captured German position had probably saved his life. On 2 June 1917 four German shells hit his dugout "but thanks be! The Hun builds strong dugouts."[139] On 22 July his battery again came under heavy fire but suffered no casualties "thanks to Fritz's concrete work."[140] Unfortunately not all Canadians were lucky enough to be defending old German positions. Charles Savage recalled how "At about ten o'clock, I was wakened by a terrific explosion and part of my dugout fell in, [sic] Before I could get into the trench there were four or five more explosions, but fortunately for me, not so near."[141] In his account of the events

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[137]Roy, The Journal of Private Fraser, 196.

[138]Roy, The Journal of Private Fraser, 209.

[139]CLIP, John Newton, diary, 2 June 1917.

[140]CLIP, John Newton, diary, 22 July 1917.

[141]CLIP, Charles Savage, memoir.

leading up to his capture, Captain Cressman wrote that heavy shelling had forced his men to switch positions once. Later, "Men were being hit on all sides - a thing absolutely unavoidable owing to the fact that we had no dugouts."[142] In this case there simply was no place for the Canadians to safely wait out the German shelling.

As Cressman's report indicated, it was at times necessary to abandon certain parts of the line due to heavy fire. In his journal entry for 6 February 1916, Fraser notes that during a particularly strong enemy bombardment the "men had to retire behind for three hours till the storm subsided."[143] E.W. Russell had a similar experience at Passchendaele. He commented about a very accurate bombardment: "I noticed practically all the trench had been hit by shells and we were now ordered to move our position."[144] Where it was possible, temporarily abandoning a position may have been the best protection against heavy artillery fire. This practice, however, was not all that common, nor was it possible under some circumstances. Artillery fire was a constant at the front. Even on relatively peaceful days, shellfire was exchanged between the two sides. When out of the lines, the danger was not over. Owing to their proximity to the front lines, billets and rest areas could also become targets for German artillery.[145]

Not every soldier was lucky enough to escape the effects of incoming artillery fire.

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[142]LAC, Alan Fairfax Crossman,MG30 E36.

[143]Roy, The Journal of Private Fraser, 91.

[144]LAC, "A Private soldier's views on the Great War, 1914-1918", MG30 E220, p.19.

[145]LAC, George Edmond Thorpe fonds, MG30 E550, p.10, "Diary of my Military Service."

The sources contain multiple instances of close calls involving enemy artillery. These events always left an impression on the soldiers involved, even if they were lucky enough to walk away unharmed. Private Fraser was slightly wounded during his escape from the short round mentioned above. At Passchendaele a German artillery round ended Fraser's war. He was in a party bringing supplies up to the front at night when a shell exploded near him.

> I was thrown by the force of the explosion on to my face into the gutter at the side with the rest of me sprawled around the edge. The first thing that surged through my mind was "Am I dead, am I dead?" I was badly dazed and partially choked by mud and water when I went face first into the ditch but my mind quickly cleared and I looked around and saw my horse lying dead half over my right thigh and pinning me down.[146]

Several men with him were killed in the explosion. Fraser only noticed how badly he was hurt as he was attempting to get help for another injured soldier.

> I started down the road feeling as strong as an ox, not even the least bit sickened, and after going about twenty yards, looking down I observed my tunic and pants were streaming with blood. I never noticed until I had gone a few yards further that my right arm was shattered at the shoulder, completely twisted around and dangling.[147]

While he survived his wounds and returned to Canada, Fraser's injured arm plagued him for the rest of his life.

Many other sources contain accounts of run-ins with German artillery. George Bell was buried by a German shell around the time of the Battle of Mt. Sorel. Due to the

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[146]Roy, The Journal of Private Fraser, 314.

[147]Roy, The Journal of Private Fraser, 315.

injuries from the concussion of the explosion he was unable to speak for two days.[148] At the Somme, John McNab was lucky enough to survive when a "coal-box" landed thirty feet ahead of him in a trench. He described the effect: "[W]hen we got round the turn in the trench it was all blown in, and right in the middle was a lad named McDonald. His head was shot off and his clothes torn nearly off, and he was buried to the waist."[149] McNab claimed that, horrible as it was, the sight did not bother him as he was used to it by that point in the war.[150] On 1 November 1917 McNab himself was buried by shellfire three times in what he described as "the worst shelling I have ever seen." Felix Cullen also had his share of close encounters with German artillery. On 23 April 1916 he was knocked down by German shell fire three times, but escaped without injury.[151] In February 1917 he was buried by another exploding shell.[152] John Newton was nearly buried by a German shell on 10 May 1917. On 2 June, the same day he escaped injury or death due to the strength of a German dugout, his battery was heavily shelled. One gun was put out of commission and fifty cartridges were destroyed.[153] Brown's diary records that his battery came under fire on 1 August 1917. A German shell scored a direct hit on the "No. 2 gun pit. Shell came thru the roof, smashed the gun to splinters and crushed the two men

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[148]LAC, "Back to Blighty", MG30 E113, File 2, p.80.

[149]LAC, John Peter Mcnab fonds, MG30 E42, p.5.

[150]LAC, John Peter Mcnab fonds, MG30 E42, p.5.

[151]LAC, Felix Cullen, MG30 E452, p.20, Diaries 1914-1919.

[152]LAC, Felix Cullen, MG30 E452, p.20.

[153]CLIP, John Newton, diary, 2 June 1917.

sleeping in it, almost beyond recognition."[154] While all of the soldiers who escaped close encounters with German artillery were lucky to have done so, perhaps none was as lucky as Alfred Andrews on 2 September 1918. While following an attack on Buissy Switch, Andrews had a German shell land at his feet. It failed to explode.[155]

Wilfred Kerr's battery came under fire time and again. Although at one point Kerr noted that the field batteries had a limited immunity from many of the threats of the front line due to range, his memoir is still filled with accounts of coming under fire.[156] Oddly, Kerr was not afraid the first time he had to sit through an enemy bombardment, possibly because "I did not know enough about shells to be properly afraid of them..."[157] Kerr's memoirs recount several incidents when his battery came under German counter-battery fire. Life in a battery that had been located by the enemy was never easy. "Over a position which had once been located accurately by heinie, there hung an atmosphere of gloom and fearful expectancy; no one could breathe freely, and life was full of apprehension until the order to move was given."[158]

It should come as no surprise that Gunner Ferguson's diary contains numerous accounts of the battery coming under fire, as well as accounts of shelling while the men were behind the lines. The worst incident came on 9 August 1917 when a German shell

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[154]CLIP, Robert Brown, diary, 1 August 1917.

[155]CLIP, Alfred Andrews, diary/memoir, 2 September 1918.

[156]Kerr, Shrieks and Crashes, 93.

[157]Kerr, Shrieks and Crashes, 30.

[158]Kerr, Shrieks and Crashes, 78.

ignited a number of fused shells stacked behind one of the guns. Ferguson had not been there when the round hit but witnessed some of the aftermath.

> Just then Mike Hubbard stumbled down the steps to where I was, and if I live to be a thousand I'll never forget the look on his face. Crying laughing and sobbing at the same time and shaking like a man gone crazy he sat there, and head in hands, blurted out, "Oh my God Fergy, a dozen of the best boys in the battery, all blown to hell, oh my God, it's terrible, both gun crews killed, not a man left." And all the time he cried and sobbed as though his heart would break.[159]

Sixteen men were killed by the initial blast and another twelve were injured. Of the injured, two more died of their wounds.[160] Ferguson's account shows both the terrible damage that could be inflicted by artillery fire, and the strain that artillery fire and its effects had on the soldiers.

Not only are there numerous accounts of the physical effects of artillery fire on the soldiers, but many also detail mental effects. In the case of Private Fraser, his physical injuries most likely caused him to go into shock. The soldier mentioned in Ferguson's account also appears to have been in shock, though this was probably caused by what he had witnessed. When a shell exploded near Arthur Foster's head at Passchendaele he also seems to have been put into shock by the concussion: "I sat there on my knees with a piece of meat between my teeth for possibly fifteen minutes while eight more shells cracked the

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[159]Rogers, Gunner Ferguson's Diary, 105.

[160]Rogers, Gunner Ferguson's Diary, 105.

trench all around and very near covered me with dust and dirt."[161] Foster was finally roused by a dog and continued his meal. Foster was possibly on the verge of shell shock as his stretcher bearer partner had been killed before this incident. While the instances listed above are fairly mild, the diaries and memoirs also contain examples of soldiers who snapped under the mental strain caused by enemy artillery fire.

While many of the accounts talk about the strain of living under the incessant shellfire, instances of soldiers breaking down completely were relatively rare. Victor Wheeler recounts how one soldier snapped when the position he was in collapsed due to shell fire, even though he was not hurt. "Without steel helmet on his head or boots on his feet, the pitifully shell-shocked signaller leaped through an opening that had been blasted in the parados, and raced back from the line like a madman - into oblivion."[162] Fraser also described cases of soldiers who were broken by the continuous strain of life under fire.

> During a spell in the "Glory Hole," when Fritz was particularly active with his trench mortars, one of our fellows, Butson, lost his nerve and went semi-insane. After the fireworks quietened down a bit Butson was found crawling round the trench on his hands and knees quite demented He was taken out. Returning to the Company a few months later, when word was announced that the Company was leaving Scottish Wood for the line, Butson became unnerved again and threatened to shoot himself. He said he could not face the music.[163]

The soldier in question was returned to the base and Fraser does not mention him again.

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[161]LAC, Arthur James Foster fonds, MG3 E393, p.10.

[162]Wheeler, The 50th Battalion in No Man's Land, 56.

[163]Roy, The Journal of Private Fraser, 80.

Shell shock posed a number of challenges to the medical branch of the army. Doctors were obliged to look after the well being of the soldiers suffering from the condition. They were also, however, duty bound to keep as many soldiers as possible at the front.[164] The treatments for shell shock ranged from rest and relaxation to electric shock therapy.[165] In general there was a struggle to understand the causes and possible cures of psychological trauma during the war.

There can be no doubt that artillery affected the frontline experiences of Canadian soldiers. Several sources recount some of the changes in how the Canadians used artillery. Most of the accounts from the infantry focus on the barrages preceding major battles. Less visible changes went unnoticed. Even men in the artillery might miss the significance of small changes. Each soldier had only a narrow view of the war. Many of the tactical changes that affected the use of artillery went unnoticed, or unrecorded.

Every soldier at the front noticed German artillery use, a constant threat at the front. Because soldiers had a tendency to record events that had a direct impact on their lives, accounts of German bombardments are numerous. At the same time, however, the accounts of coming under German shell fire do not change in any dramatic fashion from 1916 to 1918. A soldier did not notice why he was under fire, he only noticed that he was. The experience of trying to survive under a German bombardment only varied with the intensity of the shelling.

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[164]Cook, At the Sharp End, 203-4.

[165]Cook, At the Sharp End, 203-5., Morton, When Your Number's Up, 197-8.

Chapter 3
Infantry Firepower: The Machine Gun

While machine guns did not cause as many casualties as artillery fire during the Great War, they played a large role in shaping the nature of trench warfare. The machine gun was arguably the most powerful weapon available to the infantry. Machine guns had helped to tip the balance in favour of the defenders and thus helped to create the stalemate of trench warfare. Their firepower made assaults on prepared enemy positions extremely costly. The increasing availability of more portable light machine guns later in the war helped the infantry break the deadlock of trench warfare by giving the infantry the ability to cover its own attacks. Whether in attack or defence, the machine gun and its employment had a large impact on the lives of the soldiers at the front.

This chapter will focus on the role of the machine gun in the second half of World War I. It will be necessary to examine briefly the British view of the machine gun in the prewar years as well as the Canadian situation. By 1916, the weapons that would be used until the end of the war were in place. The remainder of the chapter will show how soldiers at the front dealt with encounters with German machine gun fire.

Much like artillery, the machine gun was not a new arrival on the battlefield. Despite having proven their worth time and again in colonial conflicts, “European policy makers and staff officers insisted that just because machine guns had cut down Zulu impis or Dervish cavalry did not mean they would be effective against naturally “superior” white

troops."[166] While the Russo-Japanese War showed that machine guns could be effective against modern armies if used in static positions, the British were slow to adopt such weapons.[167] As all sides would discover during the war, bullets did not discriminate.

The British attitude towards machine guns in the pre-war years was decidedly strange. As Tim Travers noted, the machine gun "was accepted as a piece of technology, but not as a part of the army."[168] The army was willing to concede that the weapons themselves might be useful, but seemed to be unclear about what those uses were. Not only were the British seemingly unsure of the role of the machine gun, they also seemed to have no real idea as to its possible effectiveness. Pre-war military exercises carried out by the army illustrated the strange tactical limbo in which the machine gun existed. While the weapons were taken on these exercises, they seem to have played no role in the outcomes as they were often ignored by the Umpires.[169]

While the British artillery may have been unclear on how to best use its weapons in the pre-war years, it, at least, was more than happy to procure as many modern weapons as possible. The British Army was somewhat less enthusiastic when it came to the procurement of modern machine guns. The Vickers medium machine gun, which was to serve throughout the war, was in fact first tested by the Royal Navy and entered Army

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[166]Bill Rawling, "Technology in Search of a Role: The Machine Gun and the CEF in the First World War," Material History Review 42 (Fall 1995): 87.

[167]Rawlings, "technology in Search of a Role," 88.

[168]Tim Travers, The Killing Ground: The British Army, The Western front and the Emergence of Modern Warfare, 1900-1918 (London: Unwin Hyman, 1990), 64.

[169]Travers, The Killing Ground, 64.

service in 1912 as a weapon first issued to the cavalry. The first Canadian units to go into battle were not so well equipped. At the second battle of Ypres the Canadian battalions had to rely on the inferior Colt machine gun, as the British were unable to supply them with the newer Vickers guns. Much like the much maligned Ross Rifle, the Colt was plagued with problems. Private Fraser described the Colt as

> a useless weapon that was discarded later. It was air cooled and heated up quickly. When a stoppage occurred, it had practically to be taken to pieces to have the stoppage rectified. For front line work it was superseded by the mobile Lewis gun and as a defensive weapon it gave way to the Vickers, a much more dependable gun.[170]

By the summer of 1916 the Vickers had replaced the troublesome Colts as the primary medium machine gun. Many battalions, however, kept the Colt as a supplementary source of firepower.

According to Travers, the British Army was also slow to adopt the Lewis gun. A report released by the "Committee on Automatic Rifles" in January 1914 noted that a suitable automatic rifle would not be available for several years.[171] Strangely, the Lewis had entered service with the Royal Air Corps in 1912. The Lewis only began to enter Army service in late 1914 and was not widely available until the spring and summer of 1915. Paddy Griffith and Tim Travers agree on the dates and events leading up to the adoption of the Lewis gun, but have interpreted them differently. While Travers indicates that the Army was slow to adopt the weapon, Griffith notes that the British were far ahead

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[170]Reginald H. Roy ed., The Journal of Private Fraser: 1914-1918 Canadian Expeditionary Force (Victoria: Sono Nis Press, 1985), 69.

[171]Travers, The Killing Ground, 65.

of other nations in adopting automatic rifles, and did so in greater numbers than any other nation.[172] Both authors would agree that even when the weapons had been adopted, the Army struggled to find the best way to employ them.

There were significant differences between the Vickers and the Lewis machine guns. The Vickers, like the Colt machine gun that it replaced, was a tripod mounted, belt fed, machine gun. It was water cooled, which allowed the gun to maintain a high rate of fire. The Lewis, on the other hand, was a bipod mounted, magazine fed weapon. Unlike the Vickers, the Lewis gun was air cooled and was incapable of sustained fire, as the barrel could overheat.[173] The Lewis' magazine held a mere forty-seven rounds, while the belts used by the Vickers could be linked together creating a constant flow of ammunition. Due to its tripod mounting, the Vickers was capable of firing at a higher angle, and thus a longer range than the Lewis and made it well suited to use in machine gun barrages. Its tripod gave the Vickers a greater range of motion, thus allowing it to cover a greater area. The biggest advantage of the Lewis gun was its lower weight, which translated into increased mobility and the ability to carry the Lewis into combat was often a substantial advantage.[174]

In the pre-war years the British tended to see the machine gun as an extension of

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[172]Paddy Griffith, Battle Tactics of the Western Front: The British Army's Art of Attack 1916-18 (New Haven: Yale University Press, 1994), 129.

[173]The Lewis was usually fired in bursts, rather than continuous streams.

[174]Bill Rawling, Surviving Trench Warfare: Technology and the Canadian Corps, 1914-1918 (Toronto: University of Toronto Press, 1992), 72.

the artillery.[175] This view was not uncontested. A small group of British officers pointed out that machine guns had served well as a dedicated infantry weapon.[176] The actual role of the machine gun remained unclear, and the debate continued into the war. As it turned out, some of the roles that the Vickers guns were called on to play during the war were quite similar to those carried out by the artillery.

At the beginning of the war, machine guns were not seen as a defensive weapon "since one could not foresee the actions of the enemy and the machine-gun's arc of fire was limited."[177] While this belief does reflect the pre war expectation of a mobile war, it also ignores the fact that machine guns had already proven their worth in defence. By the close of 1914 the onset of trench warfare had changed this evaluation. Static warfare had made the enemy's direction of approach clear. Machine guns became a key element in both defensive and offensive tactics.

After the introduction of the Lewis gun in 1915, the Vickers were pulled out of the infantry battalions and organised into Brigade machine gun companies. While, as Fraser stated, the Vickers was at first seen as a primarily defensive weapon, its role changed greatly during the course of the war. Perhaps the biggest shift was the introduction of the machine gun barrage.[178] The father of the machine gun barrage was Brigadier E. Brutinel,

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[175]Rawling, Surviving Trench Warfare, 18.

[176]Griffith, Battle Tactics of the Western Front, 132.

[177]Rawling, Surviving Trench Warfare, 18.

[178]The term machine gun barrage appears to have also been used to simply describe the firing of massed machine guns. For the purposes of this paper it will be used to describe the use of massed machine guns in an indirect fire role

the machine gun officer for the Canadian Corps.[179] While Brutinel was not the only officer exploring the idea of a machine gun barrage, he was the first to actually employ one on 2 September 1915. While the machine gun barrage quickly became an important part of Canadian assault tactics, Brutinel believed that the majority of British units failed to recognize the effectiveness of this tactic until after the Battle of Vimy Ridge when one hundred and fifty Vickers machine guns were used in the barrage.[180]

In many ways the machine gun barrage closely mirrored the role of the artillery. Massed machine guns fired at unseen targets using "overhead predicted and plunging fire."[181] Rawlings describes how the machine gun barrage was used at Vimy Ridge. "Locking the gun into a high elevation, a stream of bullets could be sent over forward infantry positions and observation posts toward German communication trenches, tracks and cross-roads, to hinder the movement of ammunition, food, water and personnel."[182] Indirect fire was also used to cover advancing infantry in conjunction with the more traditional artillery barrage.

Perhaps not surprisingly, not everyone viewed the machine gun barrage in a positive light. While few soldiers questioned that blanketing an area in machine gun fire was an effective means of interdiction, they did question whether it was a more effective method than dropping a few shrapnel shells on the same area. Private Donald Fraser, who

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[179]Griffith, Battle Tactics of the Western Front, 124.

[180]Rawling, Surviving Trench Warfare, 115.

[181]Rawling, Surviving Trench Warfare, 115.

[182]Rawling, "Technology in Search of a Role," 93.

had joined the 6th Brigade Machine Gun Company in September 1916, was not convinced of the effectiveness of indirect fire. His diary entry for 25 February 1917 sums up his concerns.

> Tonight I shot away a couple thousand rounds of indirect fire. Indirect firing is not very satisfactory - you cannot see your target and, of course, do not know what damage, if any, is done. Besides, the belts have to be refilled and it is a blistery job forcing the shells in with the palm of the hand without a protective covering.[183]

Quite aside from the physical discomfort of having to refill the ammunition belts, the lack of obvious effect bothered Fraser. This experience must have been much like the day to day experience of being a gunner in the artillery. Just as Gunner Fergusson often gave no indication of the effectiveness of the shoots in which his battery participated, machine gunners like Fraser had little idea if their work had accomplished anything. At least the artillery had the benefit of having their shoots observed.

Mentions of machine gun barrages occasionally made it into the diaries and memoirs of the soldiers. Albert West noted that machine guns were used in the barrage that preceded the Amiens attack on 8 August 1918.[184] Three weeks later he mentioned a machine gun barrage during action near Remy Wood.[185] Frank Baxter also noted the use of a machine gun barrage in his account of the opening phase of the Battle of Amiens.[186]

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[183]Roy, The Journal of Private Fraser, 251.

[184]LAC, Albert C. West fonds, MG30 E304, 33.

[185]LAC, Albert C. West fonds, MG30 E304, 39.

[186]LAC, Frank Baxter fonds, MG30 E417, 12.

Victor Wheeler first mentioned a machine gun barrage during the Canadian involvement in the Battle of the Somme.

> The creeping machine-gun barrage, magnificently and accurately laid down, paced us across No Man's Land as it slowly rolled forward, only a few dangerous feet ahead of us - like an invisible armour-clad guardian angel. It was, I believe, the finest piece of machine-gunnery of the war up to that time.[187]

Wheeler was clearly impressed by the effectiveness of the machine gun barrage. He was equally impressed by a machine gun barrage laid down to cover a raid put on by a neighbouring battalion in December 1916. He once again mentions the accuracy of the fire, before stating that the barrage was "one of the most beautiful sounds I had ever heard."[188] Wheeler clearly felt that the machine gun barrage, and indirect machine gun fire played an important role in offensive operations.

The soldiers' diaries and memoirs seldom comment on the use of Vickers at the front possibly because the weapons had been withdrawn from the direct control of the infantry battalions. The members of the machine gun companies were specialists who filled a particular role outside the workings of the regular infantry. Unlike what would occur with the Lewis gun, there does not appear to have been any real attempt to give the infantry even the most basic training on the Vickers. Much like the artillery, the Vickers guns and their crews tended to fade into the background unless they had a direct impact on life in the trenches. However, the use of the Vickers may be under reported because

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[187]Victor W. Wheeler, The 50th Battalion in No Man's Land (Ottawa: CEF Books, 2000), 32.

[188]Wheeler, The 50th Battalion in No Man's Land, 61.

soldiers often simply referred to 'machine guns', with no real indication as to what type was meant.

Even in Private Fraser's diary, actual mentions of the Vickers guns in action are relatively rare and can be months apart. Fraser's account of the taking of Vimy Ridge does not include a single instance of actually firing the Vickers at the enemy. The sum total of his actions on that day, according to his journal, was moving the gun forward and then digging it in. The entry for 3 May 1917 when Fraser's gun section was supporting an attack is an exception:

> Promptly at 3:45 a.m. our guns roared out their fury and our machine-guns cracked the air in unison. The infantry climbed the parapet and over they went. Before many minutes had passed, about sixteen Huns came running towards our gun with their hands up. This looked very promising. As they approached closer and saw our guns spitting fire, up went their hands still higher.[189]

Even this account lacks any real detail about the fighting. Most of Fraser's accounts of machine guns deal with taking up new positions and digging new emplacements or in serving as a sort of anti-aircraft defence, or skyguard. Fraser's diary for 12 May 1917 explains what is meant by skyguard: "This means that I have to keep a sharp lookout for enemy aircraft and have to fire at them if they come within range."[190] While both Vickers and Lewis guns where used in an anti-aircraft role the tripod mounted Vickers was likely

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[189]Roy, The Journal of Private Fraser, 280.

[190]Roy, The Journal of Private Fraser, 285.

somewhat more effective.[191] The simple fact that the machine gun crews were employed in an anti-aircraft role gives some indication of the growing role of aircraft in war. This is further emphasized by the number of times that Fraser comments on aerial combat in his journals. For the soldiers in the trenches the spectacle of the air war must have been a welcome diversion at times.

While the removal of the Vickers gun to the rear meant they were out of sight of the infantry, the Lewis gun was present. The Lewis guns began to enter service with the Canadians in July 1915. They were at first only issued at the rate of four per battalion. This number increased dramatically during the war. The number of guns doubled by October of the same year and again by early 1917.[192] Infantry battalions wanted more Lewis guns. Once the Vickers were withdrawn from the infantry battalions, the Lewis guns served as the main, and often, only source of direct machine gun support for the infantry. Private McNab recorded the arrival of another Lewis gun for his section on 4 May 1918. "We sure must be a gun section; they have given us another gun that is two guns to our section. We will be some fighting unit."[193] The second Lewis gun significantly increased the fire-power of McNab's section and of the platoon of which it was a part. What is not clear from the account is whether this strengthening of the Lewis gun section at this time was an isolated incident, or whether it was a more widespread occurrence.

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[191]McNab mentioned doing Anti-aircraft duty with his Lewis gun.
LAC, John Peter McNab fonds, MG30 E42, 18.

[192]Rawlings, "Technology in Search of a Role," 96.

[193]LAC, John Peter McNab fonds, MG30 E42, 23.

At the time of its introduction into the infantry battalions, the role of the Lewis gun was generally the same as that of the Vickers gun that it replaced. After the Vickers guns were withdrawn from the control of the infantry battalions, and as the war went on, the roles of the two weapons began to diverge.

The Lewis guns provided the infantry with a serious increase to its defensive firepower. In many cases the soldiers at the front saw them as one of the key elements of their defence. George Bell described how during a dawn attack by the Germans during the Passchendaele campaign, "The crash of machine gun fire is interspersed with rapid rifle fire. No aim is taken - just directional fire."While Vickers guns were used to support the defenders, it is likely that the Lewis guns would have been most heavily involved. Bell described the aftermath:

> The attack has failed. No Man's Land is strewn with gray clad bodies. At the barbed wire the stream has been damned. Scores, yes hundreds of bodies are piled against it. Men are tangled in the wire, lying over it in grotesque positions. One feebly waves his arm as he tries to extricate himself. A machine gun is levelled in his direction.

The wounded German was shot dead, an act that Bell describes as being merciful. According to Bell there was no other option. "There is no truce to relieve suffering."[194] Regardless of the morality of killing the wounded, it seems clear that the machine gun had played an important role in the defence of the Canadian position. John McNab believed that the Lewis guns had been the key to stopping a German attack against his position on

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[194]LAC, "Back to Blighty," MG30 E113, 108-110.

21 April 1918.[195] Of course McNab may have been somewhat biassed as he was a member of a Lewis gun section.

The Lewis gun, as Rawlings points out, was especially important for the consolidation and defence of newly captured positions.[196] The infantry was especially vulnerable after it had captured an enemy position. Weakened and disorganized by the actual assault it had to try and consolidate its position and prepare for the inevitable counter-attack. The additional fire-power provided by the portable Lewis gun was a welcome addition. Lewis guns, like all machine guns, however, were only effective as long as they could be supplied with ammunition.

The importance of maintaining a supply of ammunition for the guns is a common theme. Corporal Dixon reported that after taking the German position his unit was assaulting, that the "Lewis guns quickly ran out of ammunition"[197] and his unit was forced to withdraw to its original positions. John McNab recounts having to strip ammunition for the machine gun from the wounded during the course of an attack on the Somme.[198]

Keeping the Lewis guns operational was just as important as maintaining a supply of ammunition. During an attack on 28 August 1918, Corporal Albert West and an officer somehow became separated from the rest of their unit. Presumably in an attempt to be able

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[195]LAC, John Peter McNab fonds, MG30 E42, 21.

[196]Rawling, Surviving Trench Warfare, 79.

[197]LAC, Kenneth L. Duggan fonds, MG30 E304, Operation Report for 30 Sept - 2 October 1916 by Corporal D.C. Dixon, 4.

[198]LAC, John Peter McNab fonds, MG30 E42, 11.

to move faster, the officer advised West to lighten his load. West was instructed to retain only "belt and revolver and the tin box of minute repairs for the L.G.."[199] The fact that a box of spare parts for the Lewis gun was a vital piece of equipment speaks to its relative importance.

The Lewis also could be carried forward in an attack and suppress an enemy strong point until it could be assaulted by the infantry. This became especially important when the Germans began using pill boxes. During a raid on 26 April 1918, John McNab's unit encountered a German strong point. McNab's quick action with the Lewis gun saved the raid. "I dropped on one knee and opened fire, and I am glad I am a good shot. I shut up his guns..."[200] He then used the Lewis gun to help hold the ground they had gained. McNab later won the Military Medal for his actions during this raid.

Aside from being used in major attacks, Lewis guns were taken on raids and on patrols. Albert West mentioned being part of a patrol that had gone out with a Lewis gun, but he gives few details as nothing of note occurred.[201]

On the whole, the Lewis gun appears to have made a greater personal impact on the frontline soldiers than the Vickers gun because most had more experience with them. As has already been stated, the removal of the Vickers guns from the infantry battalions lessened the amount of exposure that the normal soldier would have had with them. As the Lewis gun was retained at the battalion level soldiers would have been more likely to

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[199]LAC, Albert C. West fonds, MG30 E32, 39.

[200]LAC, John Peter McNab fonds, MG30 E42, 22.

[201]LAC, Albert C. West fonds, MG30 E32, 12.

see them in action on a continuous basis. Moreover, the Canadians tried to cross-train their frontline soldiers on the various weapons available. The average soldier would not have been as proficient with the Lewis gun as a fully trained gunner, but he would have been able to "take a gunner's place if the gunner went down."[202] Most infantry soldiers then, had at least a basic familiarity with the Lewis gun.

These attempts to give every soldier a basic familiarity with the Lewis gun are reflected in the diary of Alfred Andrews. After a five day Lewis gun course in February 1917, he was made the battalion Lewis gun officer. As part of this assignment, it was Andrews' job to make sure that all of the battalion's Lewis guns were in good repair and that the gunners received proper training.[203] On 22 April he was ordered to report to "the Divisional school at Ferfay as Lewis gun officer in charge of instruction."[204] By 9 May, however, he was back with his unit. He set out to train every soldier on the Lewis. "By the time the Batt. went back in the line" he remarked, "every man could strip and assemble the gun and had fired it. The regular crews of course had intensive courses."[205] Not only was Andrews trying to make his regular gunners better, he was also trying to make sure, that if needed, every soldier could use the Lewis gun. Some soldiers such as Ivan Maharg had several training sessions with the Lewis gun before they were even sent up to the front.

While only some soldiers noted their use of machine guns, many recorded

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[202]Rawling, Surviving Trench Warfare, 75.

[203]CLIP, Alfred Andrews, diary, 17 February 1917.

[204]CLIP, Alfred Andrews, diary, 22 April 1917.

[205]CLIP, Alfred Andrews, diary, 9 May 1917.

instances of coming under machine gun fire. Although they killed fewer men than artillery, machine guns were a constant danger on the battlefield. At times many soldiers viewed small arms and machine gun fire as the most dangerous threat on the battlefield.[206] This was especially true around the time of the Battle of Passchendaele, the nature of the German defences as well as the reduced effectiveness of the artillery due to ground conditions added to this view.

Describing German machine gun fire during the Battle of the Somme, Victor Wheeler noted that the bullets "were as thick as gnats on a summer's eve."[207] Ernest Russell missed the battle of Amiens, which may very well have saved his life since his section "got completely wiped out by machine gun fire on the 8th August when the attack went in."[208] Just before he was captured at Sanctuary Wood Alan Crossman recorded: "We found ourselves in Hill Street with six men four of whom (including Sergt P. Stoneham) were almost immediately killed by machine gun fire."[209] George Bell noted that in the days following the Vimy Ridge attack the Highland division encountered an advanced section of the Hindenburg line and were "cut to pieces by the terrific fire of numerous machine guns placed in camouflaged concrete pill boxes."[210] German machine guns were often the bane of advancing Canadian soldiers. Any machine guns that survived the

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[206]Rawling, Surviving Trench Warfare, 155.

[207]Wheeler, The 50th Battalion in No Man's Land, 33.

[208]LAC, "A Private soldier's views on the Great War, 1914-1918," MG30 E220, Reminiscences of E.W. Russell, 27.

[209]LAC, Alan Fairfax Crossman, MG30 E36, 1-2.

[210]LAC, "Back to Blighty," MG30 E113, File 2, 99.

artillery preparation could seriously delay or even stop an advance. In his description of the assault on Vimy Ridge, William Woods noted that the German machine guns were more effective in stopping the Canadian advance than their artillery.[211] This may have had less to do with the skill of the German machine gunners than it does with effectiveness of the Canadian counter-battery program at Vimy. Most of the German artillery had been effectively suppressed at Vimy Ridge. Arthur Foster noted on several occasions how enemy machine guns caused havoc with an advance.[212] It should be noted, however, that some of these events occurred when the Canadian troops had outdistanced their artillery support.

Machine guns were not just a threat during an attack. Any time a soldier was above ground near the front he was at risk. Private Fraser's diaries contain at least two examples of work parties being hit by machine gun fire. The first incident on 24 January 1916 resulted in twelve Canadian casualties including four dead.[213] On 12 August of the same year, however, Fraser reported: "The enemy have been getting working parties of late. A report reached us that a hostile machine-gun obtained forty of our men with one sweep."[214] Charles Savage had a run in with a German machine gun while out in No Man's Land one night. While working through some barbed wire one of his companions

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[211]LAC, William B. Woods fonds, MG 31 G30, "A Private's Own Story of the First World War," 8.

[212]LAC, Arthur James Foster fonds, MG30 E393, 26, 32-33.

[213]Roy, The Journal of Private Fraser, 87.

[214]Roy, The Journal of Private Fraser, 188.

stepped on a piece of corrugated iron. "A machine gun opened up - but not quite on us. Fortunately the wire was fairly high and we were all able to get flat on the ground before the gun swung in our direction."[215] While neither Savage nor the two men with him were injured, machine gun fire remained a constant threat for those soldiers that were forced to leave the relative safety of the trenches.

Accounts of machine guns strengthen the view that in general soldiers at the front had a very narrow view of the war around them. Because of the removal of the Vickers guns from the infantry battalions, only one author deals with them.[216] Since the Lewis gun remained in service with the infantry battalions, and almost every soldier was cross-trained on it meant that it was frequently mentioned, especially by the actual Lewis gunners.

Many soldiers reported coming under German machine gun fire. It should be noted that these accounts are nowhere near as common as those dealing with German artillery use. This is most likely due to the fact that when a soldier was in the trenches he was relatively safe from machine gun fire. He was most at risk when in the open or during an attack; German artillery on the other hand was a danger until a soldier was far behind the lines. With the exception of their placement in pillboxes late in the war, accounts of German machine gun use did not change over time.

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[215]CLIP, Charles Savage, memoir.

[216]Private Fraser is the obvious exception since he was in a machine gun company.

Chapter 4
The Toxic Battlefield: Gas Warfare

One cannot question the fact that conventional artillery and the machine gun had an enormous impact on the lives of front line soldiers during World War I. Artillery killed more soldiers than any other weapon on the battlefield. To a large degree, the heavy use of machine guns and artillery created the deadlock of trench warfare. Yet, neither weapon was new. By 1915, the combatants looked to both new technology and tactics to break the stalemate. Aside from changing how old weapons were employed, both sides sought new weapons. Poison gas was one of the potential breakthrough weapons.

Unlike the machine gun and modern artillery, gas had not been previously used as a weapon. Despite numerous examples from the classical period onward of crude forms of chemical warfare being used or at the least investigated, gas warfare was without precedent. The British had studied the possibility of using the fumes created during the production of sulphur as a weapon as early as 1811.[217] The scheme, which was put forward by Thomas Cochrane, later Lord Dundonald, was revived in 1854 as a means of ending the siege of Sevastopol. While it was generally accepted that the plan would probably work, it was rejected because "the effects would be 'so horrible that no honourable combatant' would stoop to use such means to achieve the end in view." Combatants during the American Civil War had also called for the use of gas shells but it does not appear that they were ever produced or used. The industrial capacity to produce

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[217]William Moore, Gas Attack!: Chemical Warfare 1915-1918 and afterwards (New York: Hippocrene Books, 1987). 2-6.

the chemical weapons that were unleashed in 1915 did not exist until the end of the nineteenth century. According to Haber, the German gas attack in April 1915 "had no precursors: it sprang, as it were, in its final form, on an unprepared enemy."[218]

While historians generally attribute the first use of lethal gas to the Germans, there is some debate as to which side first brought chemical weapons to the battlefield. The German historian L.F. Haber whose father was a scientist directly involved in developing gas warfare makes the case that the French may have used some *cartouches suffocantes* as early as the autumn of 1914[219] but neither his nor German accounts of French tear gas use in March 1915 have been proven although the French had gas weapons available by 21 February 1915 and placed orders for more tear gas grenades and protective goggles in March. Haber argues that the French had concluded that "chemical substances, in addition to high explosive were needed to drive the enemy from casemates, dug-outs, and trenches and so weaken his defences."[220]

Although gas was seen as a possible breakout weapon, soldiers on both sides distrusted it. Despite the horrors of the Western Front, soldiers believed they had a chance to survive but "If the very air which he breathes is poison, his chance is gone: he is merely

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[218]L.F. Haber, The Poisonous Cloud: Chemical Warfare in the First World War (Oxford: Clarendon Press, 1986). 15.

[219]According to Haber the French had small quantities of tear-gas cartridges and possibly grenades available at the outbreak of war. His belief that these may have been used during the autumn of 1914 is based on the fact that an order for more tear gas rounds were placed that November. Haber, The Poisonous Cloud, 23.

[220]Haber, The Poisonous Cloud, 24.

a destined victim for the slaughter."[221] As Tim Cook notes:

> Although massive artillery bombardments and deadly hails of machine-gun bullets has already reduced warfare to mass murder, gas was viewed as somehow more villainous, more despicable. On the non-gas battlefield, soldiers at least had a chance to stay alive by using their wits and good fieldcraft. With gas there was no bravery, no heroics. Men fell to their knees clutching their throats, gurgling in agony as they coughed up parts of their lungs - slowly asphyxiating to death.[222]

While this statement is perhaps most relevant to the early days of the gas war, it gives some indication of why gas was seen as a dishonorable weapon. The experienced soldier knew how to react to various types of bombardment and minimize the risks of being shot. In the early days of the gas war, there was no escape. Only with training and effective equipment could the soldier protect himself against this new menace.

The stigma of gas warfare, as a dirty weapon seems to have affected not only the soldiers of the time but also the historians who have almost completely ignored gas warfare either because of the stigma attached to it, or because they do not feel it was decisive as a weapon.[223]

In Canadian military history there is one exception to the general rule, namely the initial use of gas by the Germans against the 1st Canadian Division at Ypres. Any other contact with gas, as well as the steps taken by the Canadian Corps to remain effective in the gas environment of World War I have been largely ignored. Tim Cook's study No

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[221]Terraine, White Heat. 158

[222]Tim Cook, "Creating the Faith: The Canadian Gas Services in the First World War," The Journal of Military History 62 (October 1998): 756.

[223]Cook, "Creating the Faith," 755.

Place to Run, which deals not only with the creation and evolution of the Canadian Gas Services, but also with the offensive use of gas in Canadian operations, has addressed this shortcoming of Canadian military history.

In discussing gas warfare we must look at two separate but linked aspects of the gas war: the offensive and defensive. Throughout the war, both sides used increasingly potent gas and improved delivery systems. The British, and by association the Canadians, tended to lag behind the other combatants on the western front when it came to delivery systems. The most common systems of delivery used by the British were gas clouds released from cylinders, gas projectors and gas shells fired by the artillery. While Canadian soldiers witnessed all of these forms of delivery, only artillery men were directly involved in the unleashing of gas upon the enemy. Few diaries and memoirs made more than passing reference to allied uses of gas.

With the exception of gas shells fired by Canadian artillery units, all offensive gas use was handled by the British *Special Brigade*, a unit of specialists which had been set up to mount gas operations. Thus, few Canadian soldiers had more than passing contact with offensive gas use. Canadian soldiers did carry the gas cylinders up to the front before an attack, but were not involved in the actual release of the weapon.

As the war went on, gas was used in increasing quantities. The battlefield became an increasingly toxic environment. The introduction of mustard gas by the Germans in 1917 only made things worse, as it could remain active for days. By 1918 soldiers at the front could expect to have gas used against them daily.[224] Although the memoirs and

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[224]Cook, "Creating the Faith," 756.

diaries of Canadian soldiers frequently mention German uses of gas, they rarely mention Allied gas use. They may have been too busy trying to stay alive to pay much attention to it or to notice its effects. The British noticed that troops, directly involved in an attack supported by gas, often failed to notice how the gas affected the German soldiers. This tendency caused some concern to the Special Brigade.

> Infantry committed to an assault are much too intent on their own immediate tasks to concern themselves with anything outside them; nor are they likely to find many gassed men near the front. As may easily be imagined, soldiers feeling themselves suffocating in gas lose their sense of discipline, abandon their posts and struggle towards the rear...[225]

This meant that extra troops had to go in with the assault to try and measure the effects of the new weapon. General Foulkes, the commander of the Special Brigade, needed to convince people that gas was effective as a weapon. In his book Foulkes makes a point of showing that the British gas attack at Loos was effective, partially because it was the first British use of gas, and "partly to remove the impression which was, unfortunately, general in the army in France as well as among the public at home, that the gas discharge had been a hindrance rather than a help to our troops."[226]

In many ways the British never really closed the gap in the offensive gas warfare race. Germany was the first to introduce a number of gas delivery systems, most notably gas filled artillery shells, and was also the first to introduce various gases onto the battlefield. The Germans may have used gas shells as early as January 1915. The British,

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[225]Major-General C.H. Foulkes, "GAS!" The Story of the Special Brigade (London: William Blackwood & Sons Ltd., 1934), 76.

[226]Foulkes, GAS!, 77.

on the other hand, only began receiving gas shells after the Battle of the Somme had begun in 1916. British commanders "who often lacked trust in such scientific wizardry" were slow to adopt gas shells. [227] Gas shells would only enter widespread use with the British, and by extension, the Canadian artillery in 1917.

While the British may have been behind on certain technological areas, they quickly closed the production gap. In fact the British launched 110 gas cloud attacks in the second half of 1916 alone, the Germans managed 15 in that entire year.[228] While the British had more gas available, the Germans had better delivery systems, namely artillery delivered gas shells rather than the cylinder launched cloud attacks favored, if only by necessity, by the British. The British never really did embrace the use of gas shells to the same extent as the other combatants. As historian John Terraine noted, "by 1918 all the belligerents except the British (who never entirely overcame their munitions problems) were delivering over 90 per cent of their gas in the form of shell."[229] While munitions problems certainly contributed to the slow adoption of gas shells by the British, there may be more to it. Foulkes seemed to favour the cloud attack over other delivery methods[230] and continued to develop new and more convenient ways of deploying gas cloud attacks

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[227]Paddy Griffith, Battle Tactics of the Western Front: The British Army's Art of Attack 1916-18 (New Haven: Yale University Press, 1994), 140.

[228]Griffith, Battle Tactics of the Western Front, 117.

[229]Gas shells would also eventually account for almost 5% of all shells fired. Terraine, White Heat, 160-1.

[230]He favoured the cloud attack over the projector attack, and eventually the projector attack over the artillery shell.

throughout the war. While gas clouds may have served as a stop gap measure to some extent during the munitions shortages of the early war years, they remained in service until the end of the war. The British, however, had the advantage of the prevailing winds on the Western Front which made cloud attacks more effective for them than for the Germans, both in major operations and in what became a fairly regular part of British and Canadian tactics - trench raids.

One of the first mentions of offensive gas use in the official Canadian history of the war deals with a large scale trench raid on the night of 28 February 1917. To achieve surprise, there was to be no preliminary artillery bombardment. It was hoped that a large gas cloud attack would be enough to support the attacking infantry.[231] Unfortunately, and perhaps not surprisingly, the noise of the gas discharge warned the Germans of the impending attack. A shift in the wind also blew some of the gas back into the Canadian lines.

The British also used the gas cloud for surprise attacks that were independent of infantry action.[232] These random gas attacks appear to have inflicted high casualties while costing few Allied lives.

Despite the number of gas cloud attacks, surprisingly few diaries and memoirs refer to them. An exception was Victor Wheeler who wrote the better part of two pages on the gas raid mentioned above. In a position to view some of the preparations for the

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[231]Colonel G.W.L. Nicholson, Canadian Expeditionary Force 1914-1919 (Ottawa: Queens's Printer and Controller of Stationery, 1964), 234.

[232]Griffith, Battle Tactics of the Western Front, 62.

attack, he wrote:

> Tonight everything was in readiness. All the gas cylinders were securely installed in place along the entire line of our front; the gas expert Engineers had made sure that no human or technical consideration had been overlooked; and their only recourse now was to pray that no enemy shells or *minenwerfers* would come over in the night and land on the exact spots where the gas cylinders were poised.[233]

Wheeler described the release of the first wave of gas and then the shift in the wind that prevented the release of the second wave of gas. "We were frantic when the green clouds of poison, blowing back over our own lines, cruelly snuffed out the lives of Canucks instead of the intended *les Allemands*."[234] While Wheeler's description of the preparations are very detailed, one must question how much information he actually had at the time. Private Fraser also referred to this attack in his journal, although he was on guard duty and so not directly involved in the attack. Most of what he recounts of the attack is second hand information.[235]

Given the costly failure of this raid the Canadian Corps ceased "combining gas and infantry attacks,"[236] and used gas only in barrages and counter-battery work. More conventional weapons would be used to directly support infantry attacks.[237]

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[233]Victor W.Wheeler, The 50th Battalion in No Man's Land (Ottawa: CEF Books, 2000),70.

[234]Wheeler, The 50th Battalion in No Man's Land, 71.

[235]Reginald H. Roy ed., The Journal of Private Fraser: 1914-1918 Canadian Expeditionary Force (Victoria: Sono Nis Press, 1985), 252-3.

[236]Tim Cook, No Place To Run: The Canadian Corps and Gas Warfare in the First World War (Vancouver: UBC Press, 1999), 103.

[237]Cook, No Place to Run, 103.

While Wheeler's description of the Canadian gas attack is very vivid and complete, the other eyewitness reference to a gas cloud attack is quite the opposite. George Edmond Thorpe's diary for 16 July 1917 simply states "125 cylinders of gas discharged on our front (right) with good results."[238] What these results were remains a mystery. It is also unclear how Thorpe would have known what results the gas attack had. Diary entries tend to be relatively short and carry only minimal details.

While gas cloud attacks were generally seen as effective, they had some disadvantages. They required favourable wind conditions and a great deal of effort to prepare, and could pose a very real hindrance and threat to the soldiers whom they were supposed to aid. The British continued to seek a more effective way to deliver a concentrated gas attack onto the enemy trenches. While gas rounds for the trench mortars were developed, the most effective way to deliver a gas attack onto an enemy trench with the desired density, was the gas or Livens Projector.[239]

The arrival of the Livens Projector gave the British a much more reliable means of delivering a large quantity of gas onto the target area in a short amount of time. The projectors also reduced the risk posed by the gas to their own infantry. "A Livens projector barrage could transfer massive concentrations of many tons of phosgene from around 600 yards behind the British front on to a selected part of the enemy line, without

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[238] LAC, George Edmund Thorpe fonds MG30 E550, p9, Diary of My Military Service.

[239] A gas projector resembled a metal tube, or mortar, which was dug into the ground in large numbers. Drums of gas were then loaded into the tubes. Fired electronically the drums were launched into the enemy lines where they burst, releasing the gas.

warning, within a quarter of a minute."[240] Projectors could deliver a higher concentration of gas onto a German position in much less time than a cylinder attack required. Foulkes admitted that the weapon was not very accurate. Specific targets "were more suitable for attack by artillery."[241] The gas projector was most suited to make area attacks.

> Nevertheless it proved to be a most effective means of making a gas attack, and the concentrations of gas which could be established with it in a target were such that the German respirators, even when adjusted in plenty of time, were useless against them, and they were far superior to those obtainable by any other means, with the exception, perhaps, of the 4-inch Stokes mortar.[242]

Even if the gas attack did not come as a surprise, the concentration of gas was often enough to overcome the protection offered by German gas masks. The gas projector was a great improvement over earlier delivery systems.[243]

The Canadians first saw the effects of a projector attack in the later stages of the battle for Vimy Ridge. According to Nicholson, on 12 April 1917 a "special company of the Royal Engineers had fired more than forty drums into Givenchy itself, killing a number of Germans in cellars."[244]

The gas projectors were a definite improvement over the conventional gas cloud attacks and Foulkes began to place an increasing emphasis on them. Yet, soldiers' diaries

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[240]Griffith, Battle Tactics of the Western Front, 119.

[241]Foulkes, "GAS!",172.

[242]Foulkes, "GAS!", 172.

[243]The gas projector was eventually copied by the Germans. According to Foulkes, they never achieved the same level of success. Ibid.

[244]Nicholson, Canadian Expeditionary Force 1914-1919, 262.

and memoirs rarely note projector attacks. An exception is John McNab of the 38th Battalion who mentioned a series of gas projector attacks in August 1918 but he simply states that the attacks had taken place, and that the only casualties were Canadians caught by their own gas.[245] Details are once again in short supply.

Donald Fraser also mentioned a gas projector attack on 26 July 1917.

> At 2:45 a.m. a company of Royal Engineers put over gas from 1200 projectors containing $15^{1/2}$ tons of gas, on the suburbs of Cité St. Laurent and Cité St. Theodore. At the same time smoke and gas shells were hurled by Stokes mortars into the enemy trenches.[246]

Fraser, like McNab, makes no mention of enemy casualties. He simply reports what he saw. It is unclear where he learned the statistics.

Victor Wheeler's memoir, again, provides much greater detail about a projector attack. Unfortunately the account is not entirely credible. Wheeler refers to the same projector attack mentioned in Nicholson saying that:

> the British Royal Engineers, with the use of Livens gas projectors, had been busy lobbing great quantities of fifty-pound drums, each containing thirty pounds of "Mustard" gas, into the town of Givenchy with shocking effect.[247]

Although the gas attack itself no doubt occurred, the part of his statement dealing with the type of gas used is untrue. This passage from Wheeler's book illustrates one of the potential problems when dealing with memoirs. As Norm Christie from CEF books

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[245]LAC, John Peter McNab fonds, MG30 E42.

[246]Roy, The Journal of Private Fraser, 301.

[247]Wheeler, The 50th Battalion in No Man's Land, 98.

admits in the preface to the 2000 edition of the book , Wheeler did not base this memoir solely on his diaries. "He also used reference books, war diaries and many anecdotes from constant communications with his comrades."[248] Since Wheeler worked on his book between 1960 and 1975 it seems likely that he read Nicholson's official history which was first published in November 1962.

After stating that this was the first time that Livens projectors had been used, Nicholson adds that the Livens projectors were "capable of firing a 50-lb drum containing 30 lbs of mustard gas distances of from 500 to 1300 yards."[249] The information given is more or less factually accurate, it is also misleading. Nicholson never actually mentioned the type of gas was used. It would appear from the footnote that mustard gas might have been used.[250] This is impossible, as the Germans were the first to use mustard gas, and that only in July of the same year. It seems clear that, in this case, using the official history as a source, inadvertently added a certain amount of inaccuracy to Wheeler's account of events. He took the passage and footnote from Nicholson and combined them into his memoir as fact. It is often hard to distinguish how much of a memoir is based on diaries or memories of the events, and how much of it has been influenced by information obtained after the events occurred. It makes weighing the impact that various weapons had on the lives of front-line soldiers more difficult.

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[248]Wheeler, The 50th Battalion in No Man's Land, np.

[249]Wheeler, The 50th Battalion in No Man's Land, np.

[250]Phosgene was the most common gas used in projector attacks and was probably the gas used here. Foulkes, "GAS!", 169.

The final type of offensive gas delivery system was artillery. The Canadian artillery was the only arm of the Canadian Corps to be directly involved in the use of gas. Canadian artillery first used shells filled with tear gas at the Somme in 1916 in a counter-battery role. At the time lethal gas shells were in short supply for both the British and Canadians.[251] Cook notes that the fact that the artillery fired tear gas shells discouraged Canadian infantrymen who found "that their gas caused eyes to water while the German gas burned out the lungs."[252]

While the type of gas being fired changed as the war went on, the general role of gas shells in the Canadian Corps did not. The Canadians first used lethal gas shells during the Vimy Campaign as part of the counter-battery effort. Though the weather prevented the use of gas shells on the opening day of the attacks, lethal gas shells were fired on the following day. Given their effectiveness in the counter-battery role, the Canadian artillery used them from that point forward.[253] The Canadians were not alone in realizing that gas could greatly hamper the effectiveness of enemy artillery and cause casualties and confusion in the German rear areas. By late 1917 gunners were an almost constant target for gas shells.[254] Even if the gunners were not killed, their effectiveness was greatly reduced by the necessity of consistently having to work while wearing a gas mask.

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[251]Gas shells were available by the end of the Somme battles, but did not enter widespread use until 1917.

[252]Cook, No Place To Run, 83.

[253]Cook, No Place To Run, 110.

[254]Griffith, Battle Tactics of the Western Front, 43.

Because most of the available memoirs and diaries are from infantrymen not the artillery, they do not mention the use of gas shells by the artillery.[255] Even during an attack, the average soldier was more interested in the effectiveness of the artillery than its methods. Moreover, the infantry may have been too busy to notice the gas, since they were busy trying to survive. While the same thing could be said of gas cloud and projector attacks, it must be noted that these weapons were often deployed either in the front-line trenches or much closer to them than the artillery. They were, therefore, much more likely to be noticed by the front-line soldiers. Even more likely to be noticed were enemy uses of gas directed against Canadian soldiers. Wheeler recalled:

> G-A-S, that terrifying three-letter word, feared and hated by every front line soldier in the Great War, was being pounded out in Morse code... the urgent alarm was coming through the headpiece of my D Mark III telephone.[256]

While mentions of Canadian uses of gas were rare, the same can not be said for German uses of gas. Almost every diary covering more than a few days at the front contained some mention of coming under gas attack. As the war progressed the battlefield became increasingly toxic. Cook states that the Canadian Corps War Diary indicated that gas had been used against Canadian units on an almost daily basis "during the last three weeks of April and all of May" of 1917.[257]

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[255]In fact the only mention of allied gas use in the single diary of an artilleryman consulted for this paper makes reference to gas shells fired by a French battery. Peter G. Rogers ed. Gunner Ferguson's Diary (Hantsport Nova Scotia: Lancelot Press, 1985), 49.

[256]Wheeler, The 50th Battalion in No Man's Land, 1.

[257]Cook, No Place To Run, 111.

The nature of the gas war was not static. Not only did the delivery systems change, but so did the agents that were being delivered. Increasingly deadly gases were used as the war went on. In general the types of gases used can be divided into lethal and irritant varieties. The former category includes such gases as chlorine, phosgene and eventually mustard gas. The second category of gases includes the various types of lachrymatory (tear gas), and other non-lethal irritant gases.[258] Mustard gas is somewhat difficult to classify due to its characteristics, but will be considered a lethal gas because prolonged exposure caused death. Mustard gas also had many irritant properties and was especially dangerous due to its persistent nature.

Soldiers did not necessarily know what type of gas was used against them, especially since their respirators protected them from everything but the highest concentrations of enemy gas.[259] Mustard gas would burn the soldier but it would normally not kill him unless a large quantity had been inhaled.

Mustard gas introduced an entirely new style of chemical warfare and was hard to detect. "The faint smell of mustard given off by the Yellow Cross shells, like phosgene, was usually lost amid the overpowering smells of decay, garbage, and body odour surrounding the trenches."[260] Unlike phosgene and the other forms of lethal gas, however, mustard gas did not dissipate in a matter of hours, nor was it negated by weather or high

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[258]These categories are somewhat simplistic and arbitrary but will suffice for this paper. For a more complete list of gases see Haber.

[259]Since soldiers were trained to recognize gas in its various incarnations this is questionable. Cook, No Place To Run, 115-118.

[260]Cook, No Place To Run, 124.

winds. Mustard gas could remain active on the ground for days or even weeks under the right conditions. Also, mustard gas was even worse than other gases because the standard counter measures, that had been drilled into the soldiers by the Gas Services, were only partially effective. Even with a properly adjusted gas mask, soldiers could still be badly burned.[261]

Mustard gas represented a radical change in the course of the gas war; yet only few diaries or memoirs mention the change. Wheeler mentions the use of Yellow Cross (mustard gas) shells by the Germans at Passchendaele but does not deal with its qualities, or effects.[262] Kerr notes that despite rumours of the potency and qualities of the gas, it "proved to be little, if anything, worse than the ordinary variety."[263] He recalled that the chemical containers for the gas masks were changed, although the old ones seemed to have been reasonably effective. In what is most likely a reference to mustard gas use on 13 August 1917, Newton notes that during the night, the Germans had "put over a large number of his new gas shells." Mustard gas had only been used by the Germans since July and was most likely the kind of gas being used. Newton never directly identifies the gas being used. Charles Savage directly referred to Mustard gas in his memoirs: "There had been a good bit of shelling with mustard gas on this front and our hurried and frequent dives into shell holes eventually brought many of us severe burns."[264] This quotation

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[261]Cook, No Place To Run, 121.

[262] Wheeler, The 50th Battalion in No Man's Land, 165.

[263]Kerr, Shrieks and Crashes, 94.

[264]CLIP, Charles Savage, memoir.

shows some of the risk associated with mustard gas. A soldier could dive into a shell hole to seek cover from machine gun or artillery fire and expose himself to mustard gas hours or even days after the gas had been released. Savage also recalled how his mustard gas burns stayed with him "on and off for three or four years after the war."[265] It wasn't just the gas that was persistent, but also its effects.

Although few soldiers identified the specific type of gas being used against them, mentions of coming under gas attack can be found in almost every diary and memoir of a front-line soldier., especially in the latter part of the war. Even if details are lacking, the frequency and nature of these mentions is enough to show that these attacks affected their lives. On 13 January 1918 Albert West wrote in his diary: "A lovely day. We were gas shelled at night but no casualties."[266] Commenting on gas attacks almost seems to be like commenting on the weather. Simple one-line entries about gas attacks are common. Some soldiers even commented on the positive, if temporary, effects of a German gas attack. Thomas Gosford related that a German gas attack had killed off all the rats.[267] Of course, not every gas attack was the same. In March of that year West's unit was hit with a German gas projector attack: "It was the most infernal looking sight. Terrifying, as no one knew what to expect the company heavily losing, 16 dead and 80 sick." [268] Caught by

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[265]CLIP, Charles Savage, memoir.

[266]LAC, Albert C. West fonds, MG30 G32, p8.

[267]LAC, Autobiographical manuscript by Thomas William Gosford, MG 30 E475, p.13.

[268]LAC, Autobiographical manuscript by Thomas William Gosford, MG 30 E475, p 12.

surprise, the Canadians suffered heavily.[269] The next day West himself was feeling the effects of the gas. Arthur Foster also related how he "got a little of it, enough to render me almost speechless for days."[270] The day after his battery had been heavily shelled with gas Robert Brown reported that he and his companions had been "slightly affected by gas and all seemed to have bad colds - tight feeling in the head & chest, etc."[271] George Bell was not quite as lucky. He recorded: "I was badly dosed with gas, ...gas from shells which the enemy now uses almost entirely."[272] Shortly afterwards Bell was removed from the front for medical reasons. He did not return to active service.

With the number of gas attacks constantly increasing, it was up to the Gas Services to give the soldiers the tools to protect themselves. The soldier at the front needed two things to be able to protect himself against gas attacks. First he needed a means of physically protecting himself from the gas. This protection would normally consist of a gas mask. Gas-free dugouts were another means of escaping the gas.[273] Even if these were provided, they were useless if the soldiers did not know how and when to use them. Second, education was required. A soldier had to be able to identify a gas attack, and to know what steps to take to protect himself.

It was immediately obvious with the introduction of gas onto the battlefield that

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[269]For another example of a German gas projector attack see: CLIP, Charles Savage, memoir.

[270]LAC, Arthur James Foster fonds, MG30 E393.

[271]CLIP, Robert Brown, diary, May 8 1917.

[272]LAC, "Back to Blighty" George V. Bell, MG30 E113, File #2, p138.

[273]Gas-free is perhaps being a little generous, but that was the intention.

steps had to be taken to protect the soldiers from its effects. Understandably, the concern was as much for their physical safety as it was for the maintenance of morale.[274] As new gases were introduced, gas masks were adapted to counter them, although the first few models were rather primitive. This evolution culminated in the Small Box Respirator (S.B.R.) which was introduced late in 1916, though many units only received them in 1917.

Lachrymatory shells had been used in large quantities since the beginning of the war. Gas masks were uncomfortable to wear for any length of time, made physical activity exhausting, and severely limited the vision of the soldiers wearing them. At some point gas goggles, that only covered the eyes were intended to protect the soldiers from the effects of tear gas while not hampering them as much as a full gas mask would, had been issued to the troops.[275] Private Fraser wore goggles in December 1915 while under tear gas attack.[276] Private William B. Woods also mentions the gas goggles and their importance. "Soon after they were issued," he wrote "we were warned that on a kit inspection if it was found that we did not have them, charges would be laid."[277] The goggles, however, soon proved to be a liability. By mixing a lethal gas with an irritant gas the Germans caught many soldiers unprepared. As Woods himself noted, some soldiers

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[274]Cook, No Place To Run, 38.

[275]Cook, No Place To Run, 45.

[276]Roy, The Journal of Private Fraser, 68.

[277]LAC, William B. Woods fonds, MG31 G30, "A Private's Own Story of the First World War."

wore their gas goggles to combat the irritant effects and were then affected by the more lethal gases.[278] Due to this risk, the gas goggles were withdrawn from service and ordered to be returned on 10 June 1917.[279] Although it might have impaired their ability to fight, wearing a regular gas mask during all gas attacks helped reduce the chances of accidental casualties.

Many diaries mention the receipt of S.B.R.s. Frank Tilbury received his new respirator on 26 February 1917. The new masks were immediately tested in a real gas environment.[280] Robert Brown was issued his new mask on 5 April, and Herbert White noted in his diary that he had been issued an S.B.R on 4 May.[281] White also mentions that the soldiers were drilled on the use of the new masks and retained their old masks as well. Other mentions of gas masks are also sprinkled throughout the various accounts.

Gas masks were a necessary and important piece of equipment. Their appearances in passages that have nothing to do with gas point to the fact that they were always present. Wheeler mentions in passing that he has his "respirator at the ready" in a passage that describes him acting as a runner.[282] Gunner Ferguson gave a similar description as he was heading towards his gun position: "I loaded my bacon and bread into the proper place, put the old iron fedora on, threw my trusty, if somewhat leaky, gas mask over my shoulder and

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[278]LAC, William B. Woods fonds, MG31 G30.

[279]Cook, No Place To Run, 114. See also: MG31 G30 p13.

[280]CLIP, Frank Tilbury, diary, 26 February 1917.

[281]CLIP, Herbert White, diary, 4 May 1917.

[282]Wheeler, The 50th Battalion in No Man's Land, 9.

proceeded to hit the trail... ."[283] The gas mask had evidently become a piece of everyday equipment, like a soldier's rations and helmet. Of course, not every mention of gas masks was quite so conventional. Thomas Gosford's diary noted that there were even gas masks for the horses.[284] That these existed is not really surprising, though it must have been shocking to see them in use for the first time. Perhaps the best indicator of the importance of the gas mask to the front-line soldier comes from the diary of Albert West. In one entry he describes the events of a nighttime work party in No Man's Land: "One half hour or so before I finished I discovered I had left my gas mask in camp. I was never so frightened before... I did not feel safe again until I was beside my mask in the hut again."[285] In an increasingly toxic environment, the gas mask was a necessary tool for survival.

Aside from the gas mask, the only other method of direct protection from the effects of gas was what Cook calls the gas-free dugout that was created by hanging chemically treated blankets in the doorway of a dugout. In theory these dugouts provided a refuge from gas for casualties, and would give a place to escape concentrations of gas which were too great for a gas mask. As Wheeler indicated, they were often far from perfect. "We had two gas curtains across the entrance of our Station dugout, but they failed to provide complete safety, and we frequently put on our gas masks while operating the telegraph key."[286] As Ferguson relates, however, soldiers adapted. "Last night we got

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[283]Rogers, Gunner Ferguson's Diary, 135.

[284]LAC, Autobiographical manuscript by Thomas William Gosford, MG30 E475, p13.

[285]LAC, Albert C. West fonds, MG30 E32, p16.

[286]Wheeler, The 50th Battalion in No Man's Land, 108.

another bad shelling with gas, but as we had two gas blankets in the doorway and two more over the window, and then crawled into our bunks with our respirators on, we felt reasonably safe."[287] Of course as Ferguson and others discovered, attempting to sleep in a gas mask was not that easy. Gas curtains, or blankets, were only effective if they were actually available. Sometimes physical comfort seemed to be more important than safety. Cook recounts that in the colder months soldiers often scrounged the anti-gas blankets to keep warm.

Even with the proper equipment it was vital for the troops to receive the necessary training. Soldiers had to be able to quickly identify gas attacks, and to rapidly don and adjust their masks. Their education became the responsibility of what would eventually be known as the Canadian Gas Services. Early attempts to train soldiers for gas warfare were often chaotic or ineffective. By the opening months of 1916, the British had established formal schools to instruct officers in anti-gas measures, but had no formal method of passing this information on at the Divisional level or below.[288] The Canadian Corps was ordered to appoint divisional gas officers on 23 May 1916. These officers were to create divisional gas schools to spread gas training. Eventually each Brigade and battalion had its own gas officer and each Company had its own gas N.C.O.. The importance of continuous gas training was increasingly obvious as the war went on. According to Cook, the goal of the Canadian Gas Services was:

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[287]Rogers, Gunner Ferguson's Diary, 112.
It is clear that in this case the gas curtains were used on a building and not a dugout.

[288]Cook, No Place To Run, 47.

> to impart a realistic understanding of what would be confronted at the front, control a possible epidemic of gas casualties, and ease the fears of all soldiers regarding the expanding gas war by developing an active defence against it.[289]

Training and education were the keys. All new recruits had to go through gas training, and even for veteran soldiers, gas drills, courses and inspections were common place.

If there is one part of gas warfare that is clearly visible in the memoirs and diaries of those who served at the front, it is the training that began almost as soon as a soldier arrived in France. On his second day in France Albert West recorded: "To-day we marched to the training ground and again went thro' gas and had lectures and other work."[290] Arthur James Foster also remembered going through gas and other training on arrival at the Bullring in France.[291] Training and inspections continued.

Albert West mentions "[g]as inspection and repairs"[292] on 4 July 1918. On 14 September he was once again on a gas parade when his mask was inspected. Nine days later he left the line to go on a gas course.[293] Robert Brown's diary for 19 April 1918 records a "[m]uster parade to inspect box respirators."[294] On 10 June he was again on parade for gas mask repairs because of the importance of keeping the mask in working condition. George Edmund Thorpe was sent on gas courses twice in the final year of the

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[289]Cook, No Place To Run, 90.

[290]LAC, Albert C. West fonds, MG30 E32.

[291]LAC, Arthur James Foster fonds, MG30 E393.

[292]LAC, Arthur C. West fonds, MG30 E32, p26.

[293]LAC, Arthur C. West fonds, MG30 E32, 43-44.

[294]CLIP, Robert Brown, diary, 19 April 1918.

war. Thorpe went on a one week gas course in February, then reported to the Gas Area School Seaford for another week in August 1918. Thorpe's repeated trips to gas courses may have been linked to his officer training. Thorpe gained a commission in the Engineers.[295] Charles Savage also received extensive gas training. He was first sent to a gas school in 1915.[296] In 1916 he was sent to the divisional gas school as an instructor. Savage, who eventually became an officer, was probably selected for these assignments due to his background in chemistry. Ivan Maharg was put through tear gas to test his respirator on 4 July 1918. On 10 August he was again put through gas, and ten days later his entire company was sent to gas school for the day.[297] Gunner Ferguson also relates accounts of gas training and the testing of gas masks. Ferguson was less than impressed with the entire ordeal, and with the gas orderly who administered the test. "Breaking a gas bomb in a dugout which he has made airtight," he observed, "we don our respirators and sit in there like so many monkeys to find out if the helmets leak. Damn rot, I calls it."[298] Ferguson may have thought it a waste of time, but it was an effective way of testing the reliability of gas masks. Such gas tests were not without risk. Injuries due to accidental, or in some cases purposeful, gas inhalation were not uncommon. These injuries did tend to convince the witnesses to take the process seriously.[299]

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[295]LAC, George Edmund Thorpe fonds,MG30 E550, p12, "Diary of My Military Service."

[296]At the time full strength chlorine gas was used during training.

[297]CLIP, Ivan Maharg, diary, 4 July, 10, 20 August 1918..

[298]Rogers, Gunner Ferguson's Diary, 98.

[299]Cook, No Place To Run, 81.

Victor Wheeler recounted a gas mask test at the Gas school at Villers-au-Bois. He feared having his gas mask fail during the test, but realized that this sort of test was necessary.[300] These tests were not just meant to ensure that the gas masks were working, but also, in the case of newly arrived troops, to give the soldiers some experience with gas. After surviving a heavy gas attack against his unit (1 C.M.R.) on Hill 60, Thomas Gosford recalled that he had not been worried because "for a week before, we had been tested by marching us through a long tunnel filled with chlorine gas."[301] In this particular case the Gas Services had succeeded in instilling faith in the anti-gas training and equipment in Gosford. This faith or trust in the training and equipment was a key part of the Gas Services' mission. If soldiers believed that they could survive a gas attack they were more likely to endure it.

Gosford was not the only example of the success of the Gas Services. Private Fraser was caught in a gas attack at Vimy Ridge. His reactions would have made the Gas Services proud:

> I was on the point of climbing out of the trench when a shell with a dull pop burst on the parapet almost in my face. My breathing stopped at once. With mouth open I could neither breathe in nor out. Breathing was paralyzed. It was a peculiar sensation. In a flash I knew it was a gas shell and it completely fouled the air. In a fraction of a second, in fact my quickness astonished me, I had my respirator on and was breathing freely.[302]

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[300]Wheeler, The 50th Battalion in No Man's Land, 75.

[301]LAC, Autobiographical manuscript by Thomas William Gosford, MG30 E475, p12.

[302]Roy, The Journal of Private Fraser, 263.

The training had allowed Fraser to react virtually without thinking. While not everyone would react to gas that quickly, training did limit the effectiveness of gas attacks. Most gas casualties in the later part of the war were either caught by surprise or had made a mistake. By 1917, some units saw being gassed as nothing short of carelessness. Alfred Andrews was "called on the carpet" when a number of men under his command were affected by gas. There were no serious casualties.[303] With time and training gas use "was transformed from a terror weapon to one viewed with antipathy and caution based on learned experience."[304] In fact some soldiers came to view being under gas attack as preferable to being under an artillery attack. William Woods' reaction to coming under fire from trench mortars at Paschaendaele was, "this is it, they cannot miss us with such a concentration, then the first one burst with a pop instead of a bang and I relaxed, it was only gas."[305] Wilfred Kerr noted in his memoir that the Germans "had the bad taste to mix shells, sending over one high explosive to about six gas, so that one could not be quite free of danger from flying splinters."[306] In short, when properly trained and equipped, soldiers viewed gas bombardments as little more than a nuisance. While gas still had to be viewed with caution it was certainly not the terror inducing weapon that many had feared it would become in 1915.

Accounts of gas warfare in the primary sources are similar to accounts of artillery

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[303]CLIP, Alfred Andrews, diary/memoir, 17-18 August 1917.

[304]Cook, No Place To Run, 66.

[305]LAC, William B. Woods fonds, MG31 G30.

[306]Kerr, Shrieks and Crashes, 42.

and machine gun use. When it comes to offensive gas use they are similar in that if allied gas use is mentioned details are few. With the exception of the artillery no Canadian units would have played any role in the release of poison gas.[307] When it comes to German gas use the accounts differ from those in the previous two chapters. While we are given few details about the types of gas used by the Germans, we are often, but not always, told how the gas was delivered. Furthermore many sources mention the steps taken to protect the troops from gas. This reflects the amount of effort put into educating the soldiers at the front about the threat of poison gas, and the steps that needed to be taken to minimize that threat. It is also interesting to note that while numerous diaries and memoirs include accounts of the author being partially gassed only one soldier was affected enough that it ended his service at the front.[308] While the soldiers had to live in an increasingly toxic environment, the constant training was having the desired effect, and they were surviving.

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[307]Interestingly none of the artillery sources mention Canadian gas use either.

[308] It is not clear that gas was the reason George Bell was removed from the front. It certainly appears to have been a contributing factor.

Chapter 5
Conclusion

To a great extent the very nature of World War I was shaped by the weapons employed to fight it. The massive increases in firepower provided by modern artillery and machine guns created the conditions which led to trench warfare. By late 1914, both sides were at a loss over how to overcome the predicament that technology had created. Variations in tactics as well as new technologies were tried, most often with mixed results. The introduction of gas warfare was simply one more attempt find a way to break the deadlock. By the end of the Battle of the Somme in 1916, the basic lessons of trench warfare had been learned. What remained was to take what had been learned and apply it in such a way as to break the deadlock. From 1917 through to the end of the war a series of tactical changes, coupled with the growing exhaustion of the German armies, led to the eventual allied breakthrough and the final campaign generally referred to as the hundred days.

The point of this thesis, however, was not merely to show the accepted fact that technological and tactical changes occurred during World War, but rather to see how these changes were reflected in the diaries and memoirs of the soldiers who fought on the Western Front between 1916 and 1918 and what the soldiers chose to remember in their writings.

While technology continued to advance throughout the war, by 1916 machine guns, artillery and poison gas were present on the battlefield in some form. It was not simply the technology that would change but also how that technology would be

employed. Artillery became more accurate over the final years of the war, machine guns were employed in different ways and the types of gas used became deadlier and more persistent even as the delivery methods changed. How then where these changes reflected in the diaries and memoirs of the soldiers at the front?

When it comes to the offensive uses of the weapons, the answer is often the same for all three. Quite simply changes often passed unnoticed. Artillery shaped most aspects of a soldier's life at the front since it largely dictated whether an attack would succeed or not. Though the infantry was better prepared to fight without it towards the end of the war, artillery made things much easier. Despite this relationship, it seems unlikely that the infantry had an accurate view of how the artillery was being employed. Artillery is a constant backdrop in most of the sources used for this paper, but tactical changes mainly show up in major battles or other spectacular events. Thus, the nature or ferocity of a particular barrage is more likely to have been recorded than the preliminary bombardment which sometimes lasted for weeks. Subtle changes were unlikely to be noted unless the author was directly affected by them. While Gunner Ferguson's diary notes an increase in counter-battery shoots prior to the battle of Vimy Ridge for example, he never reflects on it. If he noticed the change at the time he chose not to comment on it.

Soldiers did note how machine guns were used. On the offensive, the Vickers guns added another layer of fire to the barrage but few, outside members of a gun crew, noted it. The removal of the Vickers guns from the direct control of the infantry battalions limited the infantry's exposure to them. The Lewis guns, on the other hand, is much more visible because these weapons remained in the hands of the infantry units, and became more

important as the war progressed. The Lewis provided a portable means of increasing a unit's firepower and gave the infantry a way of covering its own advances. If the advance succeeded the Lewis gun also increased the assaulting troops' ability to fight off the almost inevitable German counter-attack. The Lewis gun was also an important tool in defending established Canadian positions. Close contact and familiarity with the Lewis gun increased the likelihood of it being mentioned in the writings of Canadian soldiers.

Mentions of offensive gas use are very rare. From the beginning of the war, gas was a specialist weapon and the only Canadians with any direct experience with gas use were those who served the artillery. The infantry had little contact with gas aside from possibly carrying cylinders up to the front for the Special Brigade. Moreover, the Canadian Corps ceased to combine gas and infantry attacks after the failed raid in 1917 and that limited the Canadian soldier's exposure to large scale gas attacks and their ability to comment on such operations. Reports of allied gas use are often short and vague.

A soldier was most likely to write about things that directly affected his life. It should be no surprise then that German uses of artillery, machine guns and gas come across in a totally different light in the sources. Accounts of coming under attack from any of the three weapons are common. Enemy artillery was a constant threat in the battle zone and the soldiers at the front were more concerned about minimizing its effects than the methods employed by their own artillery. German machine gun fire was also a continuous threat. Unlike the threat from artillery fire, machine gun fire could be effectively neutralised by staying in the trenches. Unfortunately for the soldiers, this was not always an option. Any task that put them outside the shelter of the trenches even for a moment

left them at risk. This constant risk explains the relatively frequent mentions of German machine gun fire.

Like machine guns and artillery, German gas attacks were a constant danger at the front. By 1916 gas was no longer a surprise weapon. Everyone was aware that gas could be used against them at anytime. So the troops had training and equipment to allow them to operate in the new realities of the chemical battlefield. Aside from the numerous mentions of enemy gas attacks there are also accounts of gas inspections and drills. Several soldiers were also sent on gas courses. If a soldier wanted to survive in the frontlines, he had to be aware of the risks and to be able to adapt.

What is most striking about accounts of German artillery, machine gun and gas use in the primary sources is their almost static quality. One could easily switch an account from 1916 and 1918 and not notice the difference. In some respects this is hardly surprising. Soldiers were most likely too busy trying to stay alive to notice any difference from one attack to the next. For him it was probably enough to know that he was being shot at. The same approach would also apply to a gas attack. Since the same counter measures were generally effective against the various forms of gas employed by the Germans, soldiers did not need to know what kind of gas was being used. Survival was the prime concern. Being forced to continually keep gas masks at the ready, and to wear them for prolonged periods became common place for Canadians at the front. Gas was a common topic in diaries and memoirs.

Undoubtedly changes in tactics and available technology affected the lives of frontline soldiers in World War I. The point of this thesis, however, was to evaluate if

and how these changes were reflected in the diaries and memoirs of those soldiers. The results have to some extent been surprising. While certain changes are visible in the source material they are not as evident as one might have expected. On the whole there is no concrete sense of change or progression over time. The changes that are evident usually present themselves in accounts of major battles or in extraordinary events. Outside of these events, life at the front, as described by the soldiers' own words, seemingly remained unchanged between 1916 and 1918.

What is seen in the diaries and memoirs of the soldiers is a focus on the things and events that directly impacted their comfort and survival. Being shelled, shot at or gassed left a greater impression on a soldier than what was happening to the enemy across no-man's land. In the case of major attacks, however, soldiers were more likely to notice what was going on around them until the moment when they were committed to battle. At that point, the focus again shifts to events directly influencing the soldier or events in which he took part. While this limited viewpoint appears in descriptions of artillery, machine guns and gas, it does vary slightly among the three weapons. These variations can be understood if one looks at how closely the soldier would have come into contact with the weapons in question.

Another exception to the rule is trade specific. Soldiers serving in the Artillery obviously commented on the day-to-day activities of their batteries and recorded basic information of various shoots. Accounts could include the number of rounds fired, and in some cases the target of those rounds but rarely the results of these bombardments. The fact that these soldiers served around the guns day in and day out virtually insured that

they would comment on them in their diaries and memoirs. This also applies to machine gunners in the infantry. Fraser was the only soldier to spend any amount of time discussing the Vickers guns, probably because he was a machine gunner. The same can be said of Lewis guns, though because these were kept in the frontline they were a more common topic in accounts than the heavier Vickers. Even in these cases, however, accounts of enemy action are generally more vivid than day-to-day accounts of their own actions.

Can diaries and memoirs be used to measure the impact of technological and tactical change on the lives of frontline soldiers? The answer is more complicated than a simple yes or no. Diaries have the benefit of having been written shortly after the events that they record; this same quality, however, imposes limitations of its own. Most entries are short and lack any great detail. This is to be expected since few soldiers would have had the spare time to write long entries every day, nor would they have had the space to store a large diary. Some published diaries have longer entries, but one has to question if all the information was in the original diary entry or if it was added as the diary was being prepared for publication. If details were added after the fact, the amount of time that elapsed between the original entry and the editing could affect its reliability. Diaries provide a limited snapshot of the day-to-day life of the soldier. We are given selected details about a given time period or event. The brevity of many entries means we are often left without the details or context that might allow understanding of what the soldier meant. We may be given what appears to be an emerging pattern of events over a certain time frame but unless the author specifically says so, we are unable to tell if he saw them

as such or whether he was just recording them as they happened. At times there are indications of tactical changes without much indication that the soldiers really noticed them. Technological changes were generally more common, but were not universal. There are mentions of the arrival of new gas masks, or extra Lewis guns for a unit, but other changes, such as the introduction of mustard gas are generally missing but it is not clear why. Nevertheless, diaries allow us to get a better understanding of certain events, and to get an idea of what was worth recording for frontline soldiers. They often do not explicitly give us a sense of change, but certain changes can often be seen over the course of the diary.

Memoirs pose a different set of problems altogether since they are written after the facts, sometimes using a diary as source material, sometimes not. Generally they have more detail than a diary; however, more detail is not necessarily a good thing since it can be influenced by outside factors. Wheeler for example accidentally passed on false information because he misread one of the secondary sources he consulted. Aside from simple errors, memoirs also have a tendency to try to place events in their context. In this way they can give the impression that the author knew more at the time of the events than he would have. This unfortunately also often occurs in published diaries. The impressions of the battlefield given in memoirs can also suffer simply due to the temporal distance between the actual events being portrayed and the time of the writing. Diaries provide a picture of the day to day concerns of the soldiers. Memoirs attempt to provide the same glimpse of the day-to-day, but also try to fit the day-to-day into the greater narrative of the soldier's war experience. In some cases, this imposition of a narrative produces an

artificial order to the events.

Diaries and memoirs can be used to measure the impact of tactical and technological change on the soldiers, but not in the way expected. The sources do not provide a clear sense of tactical advancement in the use of technology in the last years of the war. Brief glimpses of changes in how artillery, machine guns and gas were employed give the impression that the artillery became more effective at paving the way for the infantry during attacks as the war went on. This impression is often due to the outcome of the battle as much as any comments about the effectiveness of the artillery. The diaries and memoirs do show how the openings of major battles changed, but after the opening barrage, accounts of battle remain very similar. Soldiers had a very small scale and often confused view of combat, with little idea of what is going on outside of his view. Though not overly helpful to any attempt to judge the impact of changing tactics, it is not surprising. Once the battle began the soldiers were far too focussed on survival to worry about how certain weapons were used.

What we do see in large quantities in the sources is the threat posed by German artillery, machine guns and gas. There are more mentions of German uses of these technologies than allied uses because this had a more direct impact on the lives of the Canadian soldiers. Ironically, in some ways the diaries and memoirs would almost be of more use in measuring the impact of changes in German technology and tactics on Canadian soldiers.

While the primary sources indicate that changes in tactics and technology had an impact on the lives of Canadian soldiers, they do not provide any definitive answers about

the size of the impact. While the diaries and memoirs may be of only limited use when trying to guage the impact that tactics and technology had on the lives of the soldiers at the front, the do tell us a great deal about the soldiers' lives at the front. Diaries and memoirs do not tell us everything that the soldiers saw or felt. They merely provide a reflection of daily life in the trenches. This reflection only shows us, in the case of a diary, what the author chose to write down at the time or, in the case of a memoir, what left a large enough impact to stand out at some later date.

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