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# Destruction, Reconstruction, and Remembrance: Exploring 'Memory' and 'Environment' through Pennsylvania World War I Memorials in France

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# **DESTRUCTION, RECONSTRUCTION, AND REMEMBRANCE:**

## **EXPLORING 'MEMORY' AND 'ENVIRONMENT' THROUGH PENNSYLVANIA WORLD WAR I MEMORIALS IN FRANCE**

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A thesis submitted for the degree of the Bachelor of Arts

May 2018

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*“Although the world is full of suffering, the world is also  
full of overcoming it.” - Helen Keller*

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## **ABSTRACT**

After examining the substantial efforts at land reclamation and environmental mitigation accompanying the State of Pennsylvania's construction of memorials after World War I in France, I discovered a strong relationship between post-war memorialization and environmental mitigation in the areas in which the environmental consequences of WWI continue to affect humans and wildlife. My research illuminates how cultural impulses to build memorials that acknowledged the vast losses, acts of valor, and victories heavily influenced mitigation of France's ecologically damaged Western Front. Many of France's former battlefields, particularly in the devastated area known as the Red Zone, weren't accessible to visitors before memorial-related mitigation efforts began in the 1920s. Even today, the Red Zone in France and Belgium, defined by millions of unfilled craters and unexploded ordnance, remains in place due to the cost and dangers involved with clean-up.

Yet, when mitigation does occur in these devastated areas, it is still done with the intention to create memorial structures or spaces. Despite this, large expanses of agricultural land were never re-ploughed, many villages were never rebuilt, the prohibition against living in the Red Zone is still in effect, and WWI's environmental consequences still persist in harmful ways, particularly affecting agriculture and tourism, the Western Front's most lucrative industries. I approach environmental mitigation of warzones holistically in a way that treats people, land, and places of cultural significance as interconnected and context-dependent, a perspective that is under-studied in the existing scholarship on memorials and mitigation.

My research has allowed me to analyze the crucial problem of war's lasting effects on the environment through a novel perspective rooted in historical and cultural ecology. Concentrating on the construction of memorials as the focal points of returning damaged land to productive use has enabled me to conceptualize war's environmental legacy through spaces of memorialization and the repair work done there.

# Introduction

## War, Environment, and Memory

Hugh Clout, in *After the Ruins: Restoring the Countryside of Northern France after the Great War*, writes that between August 1914 and November 1918, France's northernmost districts "experienced death and destruction on a scale unparalleled in human history."<sup>1</sup> Within these districts, many of France's world acclaimed croplands became battered and poisoned and marks of civilization were reduced to ruins. By examining the archival record of agricultural change in the nineteenth century, Clout found that the most productive *départements* were some of the most savagely devastated as a result of the First World War.<sup>2</sup> This devastation still manifests itself in France's northern landscapes, muted in some places, but fully present in others.

France's war-devastated region included some of the best, or most nutrient rich, agricultural land and most important manufacturing districts in the country.<sup>3</sup> Although this land covered only one-fourth of France's territory, it contributed one-fifth of national tax revenues prior to the war's onset.<sup>4</sup> Thus, the war's physical devastation also wounded France economically.

The stagnant nature of the trench warfare that categorized a great portion of World War I's war-fighting left deep and involved wounds to the landscape. In some places along the front, as weaponry modernized during the war, even the pervasive trench systems were eventually erased by the continuous shellfire, and shell holes became one of the few places where men could take

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<sup>1</sup> Hugh Clout. *After the Ruins: Restoring the Countryside of Northern France After the Great War*. Exeter: University of Exeter Press, 1996, xi.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid, 2-3; These regions of northern France were known for their quality wheat, sugar beet, and grape outputs, among other crops.

<sup>4</sup> Ibid, 3.

shelter instead.<sup>5</sup>



Figures 1.1 and 1.2: Vauquois, France, near Verdun, in November (left) and May (right) of 2017.<sup>6</sup>

Indeed, new mechanisms of modern warfare utilized during the First World War created enduring consequences for battlefields and their surrounding areas. Chemical warfare (e.g. mustard gas, diphosgene, and phosgene) and the continuous use of artillery shells led to several environmental changes. While chemical warfare caused immense immediate damage, other chemicals dispersed, but mustard gas remained. The impact of heavy artillery, which wrought the most horrific destruction, regardless of a battle's pace or nature, can still be seen and observed in the present in the form of poisoned harvests and decorated forest floors.<sup>7</sup>

The level of devastation produced by the Great War was unprecedented. Thus, the challenge of restoration in a postwar setting was also of unprecedented magnitude.<sup>8</sup> In 1919, American town planner, George B. Ford remarked on the postwar scene, declaring “so stupendous is the

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<sup>5</sup> Christina Holstein in Stuart Thornton. “Red Zone: France’s Zone Rouge is a lingering reminder of World War I.” Accessed August 10, 2017. <http://www.nationalgeographic.org/news/red-zone/>.

<sup>6</sup> Taken by the author on November 6, 2017 (left) and May 27, 2017 (right); In this area of Vauquois, the land is preserved and maintained by a private entity to serve as a reminder of one of the most gruesome battles fought.

<sup>7</sup> Clout 1996, 20.

<sup>8</sup> Ibid, 19.

destruction in the devastated regions of France that no one can begin to realize what it means.”<sup>9</sup>

After four years of fighting, the landscape that remained was likened to the surface of the moon. Clout writes, “Weeds flourished among shell holes, trenches, barbed wire and concrete bunkers, carpeting the countryside with quite a different vegetation from the cereals and lush fodder crops that it had supported for so long. Across some stretches, every tree had been felled by gunfire or had been cut down intentionally. No bird song was heard; no birds remained. Whole villages had been destroyed in the fighting or had been mined as the Germans withdrew.”<sup>10</sup> On landscapes other than where fighting occurred, ecological devastation still took place thanks to the “damage caused by the enforced presence of troops and by the effects of scorched earth policies.”<sup>11</sup> The direct and indirect devastation that resulted from the First World War required large-scale reconstruction and environmental mitigation.<sup>12</sup>

Although some reconstruction and mitigation occurred almost as the war itself began, much more needed to be done in the aftermath of the Great War in order to reconstitute the French, Belgian, and German landscapes and communities along the Western Front. After the Armistice of 1918, crucial efforts were made to record the extent and intensity of land damage. However, just before the armistice was signed, “a government circular (October 31, 1918) required the engineers of the Génie Rural to classify in a standardized way all the land in each *commune* of the warzone, according to whether they considered: it could be returned to cultivation or other forms of normal use after simple clearance of debris; it would require considerable restoration

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<sup>9</sup> G.B. Ford. *Out of the Ruins*. New York: Century, 1919. In Hugh Clout. *After the Ruins: Restoring the Countryside of Northern France After the Great War*. Exeter: University of Exeter Press, 1996, 19.

<sup>10</sup> Clout 1996, 20.

<sup>11</sup> Ibid, 22.

<sup>12</sup> In this thesis, mitigation is defined as the return to useable land (although not always its pre-war use); the alleviation of the ecological impacts of warfare. As Edmund Russell and Richard Tucker point out on page 7 of their edited work, *Natural Enemy, Natural Ally: Toward an Environmental History of War*, there is a distinction between “first nature,” organisms and geology, and “second nature,” the built environment.

work; or it was so devastated that the likely costs of restoration would outstrip its intrinsic value.”<sup>13</sup> Three months after this task, instruction for special maps to be drawn up to represent these three appraisals were issued by the topographical office of the *Reconstitution foncière*,<sup>14</sup> with direction to use blue, yellow, and red tint to make these categorical distinctions.<sup>15</sup> Instruction also called for additional, more detailed maps to be drawn up of the area denoted with red tint. This area was inevitably termed the Red Zone, where destruction was most intense.<sup>16</sup> Places that made up the Red Zone were the areas in which the fighting was most intense or prolonged, where the landscape’s surface was severely wounded and the possibility of agricultural restoration was far from certain.<sup>17</sup> As a result of the millions of shells that had battered the trenches of the Red Zone, the ground was pulverized along with many the area’s buildings. Dangers still linger as a result of the heavy shelling, for it is estimated that one-fifth of the projectiles did not explode, including more stealthy grenades.<sup>18</sup> Where the projectiles had exploded in areas with thinner top soil, trenches, shell holes, and craters brought the underlying rock to the surface.<sup>19</sup> Based on these facts, land restoration in this devastated area of the Western Front would be costly in every regard.

Mitigation also took place in the less devastated blue and yellow zones. The 1,694,500 ha blue zone, which typically “embraced that was a substantial distance from areas where the battle front had been stabilized for a considerable length of time,” required only simple clearance,

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<sup>13</sup> Ibid, 24.

<sup>14</sup> The *Service de la Reconstitution Foncière* (Service for the Reconstitution of Landed Property) was established in France to promote and execute land consolidation.

<sup>15</sup> Ibid.

<sup>16</sup> Ibid, 24.

<sup>17</sup> Ibid, 25.

<sup>18</sup> M. Bechmann. “*Sur les moyens de venir en aide aux agriculteurs des regions libérées.*” *Séances et Travaux de l’Académie d’Agriculture de France*, 1917. In Hugh Clout. *After the Ruins: Restoring the Countryside of Northern France After the Great War*. Exeter: University of Exeter Press, 1996, 28.

<sup>19</sup> Clout 1996, 28.

agricultural restoration, and rebuilding.<sup>20</sup> The blue zone was made up by the southern and western parts of the war zone which had been overrun rapidly during the German advance of summer 1914, in addition to extensive districts which had been behind the German front line throughout the war.<sup>21</sup>

The yellow zone, which consisted of 1,495,000 ha and was “demarcated roughly by a line traced some 15 km from the furthest points reached by the enemy between the start of trench warfare” in September 1914 and the Armistice in November 1918, was where an intermediate level of destruction and disruption occurred.<sup>22</sup> Thus, the efforts within this zone were much more sustained than those within the blue zone and much less daunting than the efforts that took place in the Red Zone. In the yellow zone, shells and other remaining paraphernalia of war were identified, removed, and disposed of and shell holes and trenches were filled.<sup>23</sup> Despite the relatively positive prospects for the reconstitution of the landscape, it would still be several years and intensive labor before agricultural recovery was complete in this zone.<sup>24</sup> Such efforts were particularly involved in the war zone’s western and central portions.<sup>25</sup>

Other than the environmental devastation that marks century-old battle zones, military cemeteries and memorial structures also mark many if not all of these spaces. Among those who widely advocated for land restoration within the Red Zone, it was argued that the Red Zone should be made safe and subsequently afforested to “form a national memorial, or alternatively

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<sup>20</sup> Clout 1996, 24; Hugh D. Clout. “The Revival of Rural Lorraine after the Great War.” *Geografiska Annaler. Series B, Human Geography*, Vol. 75, No. 2, pp. 73-91 Published by: Taylor & Francis, Ltd. on behalf of the Swedish Society for Anthropology and Geography. 1993. Accessed March 25, 2018. <http://www.jstor.org/stable/490701>, 73.

<sup>21</sup> Clout 1996, 25; Clout 1993, 73.

<sup>22</sup> E. Michel. *Les dommages de guerre de la France et leur réparation*. Berger-Levrault: Paris, 1932, 89. In Clout Hugh Clout. *After the Ruins: Restoring the Countryside of Northern France After the Great War*. Exeter: University of Exeter Press, 1996, 25.

<sup>23</sup> Clout 1996, 25.

<sup>24</sup> Ibid.

<sup>25</sup> Ibid.



be provided with a *voie sacrée* that would be lined with monuments and cemeteries.”<sup>26</sup> As a response to public sentiment, the French government adopted a policy that allowed the government to direct land reclamation efforts for eventual access as a memorial.

Following World War I’s armistice, many countries erected memorials commemorating their soldiers who fought along the Western Front. Although the U.S. did not become actively involved in World War I until April 1917, it was not exempt from this post-war commemorative process. In 1923, the U.S. Government appointed a commission “for the execution of a program comprising monuments on the battlefields and chapels in the military cemeteries.”<sup>27</sup> This commission, the American Battle Monuments Commission, was founded and chaired by General John J. Pershing and included a consulting architect, Paul P. Cret.<sup>28</sup> However, this

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<sup>26</sup> L. Vaillat. ‘*La voie sacrée.*’ *LA*, 1919. In Hugh Clout. *After the Ruins: Restoring the Countryside of Northern France After the Great War*. Exeter: University of Exeter Press, 1996, 28.

<sup>27</sup> Monuments of Pennsylvania in France. National Archives and Records Administration. Record Group 117.

<sup>28</sup> In Paul Phillippe Cret papers, Kislak Center for Special Collections, Rare Books and Manuscripts, University of Pennsylvania, 4-7 and “Philadelphia Architects and Buildings.” American Institute of Architects. *Journal of the American Institute of Architects*. Washington, DC: v. 10, n. 05, p. 8, 9, 10, 11, 12, May 1938. [www.philadelphiabuildings.org](http://www.philadelphiabuildings.org): Paul Phillippe Cret was born in Lyon, France, on October 23, 1876. In 1893, he entered the École nationale des Beaux-Arts de Lyon, where he studied architecture and won the Prix de Paris in 1897; the award provided a stipend from his home city for his subsequent study at the École des Beaux-Arts, Paris. In 1903, he was offered the position of Assistant Professor of Design in the School of Architecture of the University of Pennsylvania. At U. Penn., Cret “taught design in the style of the French atelier and also lecture courses in the history of art and the philosophy of architecture.” From the moment he began teaching at UPenn, Cret “maintained a private practice in tandem with his teaching, and that practice never stopped, even during his service in World War I.” Prior to opening a formal office, Cret practiced his skills from his home and employed some of his students, most notably John F. Harbeson, his mentee. Later he formed a partnership with Harbeson and three other former students, William J. H. Hough, William H. Livingston, and Roy F. Larson. Although he delegated some aspects of projects to his partners, Cret remained in full control of all of the work his firm, Zantzinger, Borie & Medary, carried out to the end of his notably involved career. In 1905, Cret married Marguerite Lahalle, sister of his long-time friend and fellow student Pierre Lahalle, of Lahalle and Levard, the architectural firm Cret used for the construction of the Pennsylvania memorials in France. (It should also be noted that Cret also knew Georges Levard, the firm’s other owner, through military training before the both of them headed to school.) Paul and his wife were visiting her father’s home in Beauvois, France, in the summer of 1914, when World War I broke out. Marguerite aided the war effort as a volunteer hospital worker. As a reservist, Cret reported for duty and was assigned as a private soldier to the Chasseurs alpins, the elite mountain infantry in the French Army. Following the United States’ entry in the war, “Cret, now a lieutenant, was assigned as interpreter first to the American First Division and then, after that division entered Germany, to the 92nd Division.” For his wartime service to France, “he was awarded the Croix de guerre, and in 1925 he was made a member of the Légion d’honneur.” After the war, Cret translated his war experience into serving as Consulting Architect for the American Battle Monuments Commission (1923 to 1945), designing memorials, cemeteries, and chapels commemorating the war dead for the State of Pennsylvania and the United States. It was in this capacity that Cret had the ability to “affect the image of the United States [that] was projected

commemorative process was not limited to efforts on a federal level. Like the British Dominions who commemorated their troops, some American states installed monuments in places along the battlefield where their divisions “particularly distinguished themselves” during the First World War.<sup>29</sup> Indeed, through my research on the cultural and political motivations for and the activities related to the building and maintenance of Pennsylvania’s overseas memorials, I have uncovered a connection between land restoration/environmental mitigation and memorialization which motivates this thesis.

Although unique in some regards, Pennsylvania’s experience exposes a trend in the magnitude of and desire to commemorate following the war. As mentioned, the State of Pennsylvania, which contributed the most troops of any of the American states to the war effort, was among the states that constructed overseas World War I monuments. Many Pennsylvanians fought within three American divisions, the 28<sup>th</sup>, 79<sup>th</sup>, and 80<sup>th</sup>. The 28<sup>th</sup> division, which was headquartered in Pennsylvania, was even known as the Keystone Division given its proportion of soldiers from Pennsylvania. Each of these three divisions has been commemorated by memorials installed within France’s Red Zone by the State of Pennsylvania at the sites on or in proximity to where their most notable warfighting efforts took place.<sup>30</sup>

This paper concentrates on three war-memorials constructed and still maintained by the State of Pennsylvania, located in northern France’s Red Zone. The largest and most expensive of the memorials installed, known as the Pennsylvania Memorial, is located fifteen miles west of Verdun in the town of Varennes-en-Argonne within the Department of the Meuse. This grand

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abroad.” He would continue working in this capacity until his death, at which point Harbeson assumed his role. Cret also served as juror for the Canadian Battlefields Memorials Competition.

<sup>29</sup> Ibid.

<sup>30</sup> The 79<sup>th</sup> Division is not distinctly noted on any of these memorial structures, however. It is commemorated by proxy since the memorial in Varennes-en-Argonne, France honors all Pennsylvania troops.

memorial that compares to federal memorials in size and scale is “the principle memorial to Pennsylvania’s soldiers.”<sup>31</sup> Along with the town of Varennes, Nantillois, a town located in France’s Department of the Meuse, was also located on the path of the Meuse-Argonne Offensive of September 26<sup>th</sup> to November 11<sup>th</sup>, 1918. The Pennsylvania Memorial Fountain in Nantillois is smaller and commemorates the 80<sup>th</sup> Division. The 28<sup>th</sup> Division is commemorated by the Pennsylvania Memorial Bridge, which was built to replace a bridge destroyed in World War I, in Fismes, a town which lies within the Aisne-Marne region and is within the Department of the Marne.



Figure 1.3: The Pennsylvania Memorial at Varennes-en-Argonne.<sup>32</sup>

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<sup>31</sup> Ibid.

<sup>32</sup> Taken by the author on November 6, 2017.

Each of these battlefield memorials, or memorials built on former battlegrounds, were designed by Paul P. Cret and Thomas H. Atherton, with the collaboration of Paris' Lahalle and Levard architectural firm,<sup>33</sup> diligently to guarantee they had their desired effect: "to recall the memory of the combatants of 1918."<sup>34</sup> In a letter from Cret to General Price, Cret writes, "...I believe that monuments erected to endure for generations ought to be designed with the greatest care. Many memorials erected, for instance, after the Civil War are now defeating their purpose, because nobody gets any inspiration from them, while some of them are literally objects of mirth for the passerby."<sup>35</sup>

General Pershing held a similar belief, which motivated him to found the ABMC. Pershing had lived through the commemorative crisis that occurred with the Gettysburg battlefield, where numerous military units wanted to commemorate their fallen comrades through installing memorials, but years later these memorials fell into ruin through poor maintenance and no longer paid appropriate tribute to those commemorated.<sup>36</sup> Thus, Pershing was determined to oversee future military-related commemoration.

In total, the monument in Varennes, including the corresponding memorial park, cost \$157,500, or \$2,298,523.68 relative to inflation up to May 9, 2018; the bridge in Fismes cost \$32,200, or \$469,920.40 relative to inflation up to May 9, 2018; and the monument in Nantillois cost \$10,548, or \$153,935.41 relative to inflation up to May 9, 2018.<sup>37</sup> In addition to funding the

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<sup>33</sup> See: Footnote 28, page 6.

<sup>34</sup> Ibid.

<sup>35</sup> Ibid.

<sup>36</sup> Transcript from phone interview with Tom Cavanass, Planning and Policy Specialist of the American Battle Monuments Commission, on April 28, 2017.

<sup>37</sup> Pennsylvania WWI Memorials. National Archives and Records Administration. Record Group 117; Samuel H. Williamson, "Seven Ways to Compute the Relative Value of a U.S. Dollar Amount, 1774 to present." MeasuringWorth, 2018. <https://www.measuringworth.com/calculators/uscompare/relativevalue.php>; Given the fact that these structures were projects, the standard interest rate for commodities isn't as accurate for these calculations, so I have provided an estimated range for project investment costs with added inflation up to 2017 for each

initial construction of these memorial structures and their subsequent repairs following the Second World War, the State of Pennsylvania still allocates a portion of taxpayer money to the ABMC for the maintenance of these memorials and their respective landscapes.<sup>38</sup> Pennsylvania also contractually pays a small fee, less than 1,000 euros a month, to the town hall of Varennes for use of the memorial site.<sup>39</sup> Since at least three years ago, the State of Pennsylvania has paid of taxpayer money annually \$50,000 to the ABMC for upkeep and maintenance via hired contractors in France.<sup>40</sup> As a result, the State of Pennsylvania has annually had money on hand for memorial maintenance and upkeep.<sup>41</sup> This stable funding came as a result of public outcry (Pennsylvanians, international visitors, citizens living in the three French municipalities, and members of the ABMC) for improved upkeep of these memorials after they became forgotten in the wake of World War II.<sup>42</sup>

At least in the context of World War I, memorialization has played the key role in the mitigation of war devastated landscapes. This is especially true regarding the Red Zone, for this area was initially, or before the memorialization policy was implemented, determined by the French government to be too dangerous for normal public access. The reason some of the areas of Verdun were mitigated was because of the push for soldiers who served to go back and visit these sites safely. Such was the case with Vauquois, one of the towns where the Battle of Verdun was fought. At Vauquois, the land is preserved and maintained by a private entity to serve as a

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memorials' value/cost as of 1924: Varennes (\$1,811,250 to \$34,777,173.80) Fismes (\$372,000.00 to \$7,110,000.00); Nantillois (\$121,302 to \$2,329,077.01).

<sup>38</sup> Transcript from phone interview with Tom Cavanass, Planning and Policy Specialist of the American Battle Monuments Commission, on April 28, 2017.

<sup>39</sup> Ibid.

<sup>40</sup> Governor Tom Wolf. "Governor's Executive Budget 2018-2019." Pennsylvania Governor's Office. Accessed February 10, 2017. <http://www.budget.pa.gov/PublicationsAndReports/CommonwealthBudget/Documents/2018-19%20Proposed%20Budget/2018-19%20Governor%27s%20Executive%20Budget%20-%20Web.pdf>, E31-6.

<sup>41</sup> Cavanass.

<sup>42</sup> Annual Report of the American Battle Monuments Commission to the President of the United States: Fiscal Year 1925. Government Printing Office, Washington. 1926. National Archives and Records Administration. RG 117, 67.

reminder of one of the most gruesome battles fought. Through an initial artillery clean-up phase, the land was converted to function as a memorial site. In the case of the Pennsylvania memorials, the sites were also mitigated through the process of constructing these commemorative sites.

France's policy to allow the government to direct land reclamation efforts within the Red Zone for eventual access as a memorial is only one example of how memorialization has encouraged mitigation of war-torn lands. This trend of using memorialization as a proxy for standard environmental cleanup has proved effective beyond just the framework of the First World War, into other instances of environmentally devastating instances of modern warfare, such as the Peace Memorial Park developed in Hiroshima following the atomic bombing in 1945. There is an integral connection between the healing of people and land in postwar contexts that motivates this paper.

### ***Memory and Environment: The Integral Connection***

I argue that there is a crucial connection between memory and environment. My research has illuminated some of the immediate and persistent environmental and political obstacles that confront the State of Pennsylvania while memorializing its citizens who served in the First World War. Thus, the aim of my honors thesis is to address how "war memory" of the First World War, especially as it connects to Pennsylvania, not only has cultural but also environmental implications. My thesis reflects the steps I have taken to research in greater depth the relationship between battlefields and mitigation of the effects of war on the environment and the human relationships required to bring about this mitigation. I will use World War I, a war defined by new strategies, machinery, weaponry, attitudes, and the commemorative impulses that followed throughout the world in an attempt to answer pertinent questions such as, "How do we

understand the Great War's environmental legacy for Europe through spaces of memorialization and the 'repair work' and 'clean up' performed at these sites?"

While abroad during Fall Semester 2016 and again recently in May 2017, as part of my Dalal research, I visited St. Hubert's Pavilion in a forest near Château-le-Vienne in northeastern France, where Dwite Schaffner (Bucknell University, Class of 1915) earned his Medal of Honor. Almost a century later, St. Hubert's Pavilion is still defined by its toxic soil and by the extensive network of trenches littered with unexploded ordnance. However, even more alarming of an observation was the farmland located adjacent to this war-polluted site. From my prior research, I was aware of the fact that this land now utilized for agricultural purposes was once indistinguishable from St. Hubert's, engrained with deep, pervasive trenches and littered with artillery shells and grenades. It became apparent to me that this agricultural land was an example of a battlefield that has been reverted back to its antebellum function after the war, a common trend carried out in France. Armed with this knowledge and insight, I began to question the safety of this practice, especially due to the fact that many people are still killed or injured all over Europe from stepping on unexploded devices left over from World War I and because of the potential hazardous environmental implications and their effects on humans or the wild animals that gradually returned to the abandoned land. An instance where this concern became a reality was during the fall of 2015, when French authorities ordered the potato crop of the Department of the Meuse, an area outside the most war-damaged area, destroyed because it contained World War I-era toxic elements, such as arsenic and lead.<sup>43</sup> Thus, my thesis will explore the broad question of whether or not it was a sound practice to revert land that served as battlefields back

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<sup>43</sup> Léa Boschiero. "Terres Polluées Par 14-18 : La Récolte 2015 Détruite Dans Le Nord Meusien." Exclusif | Terres Polluées Par 14-18 : La Récolte 2015 Détruite Dans Le Nord Meusien. 2015. Accessed April 02, 2018. <https://www.estrepublicain.fr/actualite/2015/09/17/terres-polluees-par-14-18-la-recolte-2015-detruite-dans-le-nord-meusien>.



to their original use and the decision-making behind it. I will also address situations where land was too devastated to be returned to its pre-war function and was thus converted to new uses, such as memorial spaces. My hope is to illuminate how war's environmental consequences have severe ramifications for the immediate community and the extended population when these consequences are not dealt with appropriately. I also hope to convey that cultural impulses to commemorate have the power to drive environmental mitigation in the form of installing memorials.



Figure 1.4: St. Hubert's Pavilion, France. Artillery shell in the bottom left corner amidst the trenches.<sup>44</sup>

### *Historiography*

This thesis primarily pulls from four different areas of scholarship: memory and remembrance, geography, military history, and environmental history.

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<sup>44</sup> Taken by the author on May 27, 2018.



In each of these areas of study, the discussion of what happens to the landscape after battle is often missing, especially in regard to the lasting ecological consequences. Further, while scholarship on memory and remembrance often touches on a site or landscape's role in memory, there is very limited scholarship that links the contributions of memory or memorialization to natural landscapes. While each area of compliments my interdisciplinary topic, it is where these topics overlap in practice but are missing from contemporary literature on the environmental consequences of war that motivates this thesis. With this thesis, I hope to make a significant contribution to the study of war's environmental consequences through incorporating arguments on memorialization and memory, stressing the importance of culture within the context of conflict-related environmental devastation and repair.

Overlooked in the traditional studies of war and environment are “the long-term effects of the military operations upon the landscape.”<sup>45</sup> Edmund Russell and Richard Tucker write, “Environmental historians have studied many ways in which people have envisioned nature: as a collection of resources, a threat, a holy place, a source of beauty and artistic inspiration, a refuge, a playground, a location of rites of passage, an object of scientific discovery and a source of employment. Rarely, however, have we studied nature as a solider.”<sup>46</sup> Tate Keller agrees with this notion, asserting, “the natural world often remains a voiceless casualty of war in current scholarship.”<sup>47</sup> Keller notes that often times, history texts “typically regard the environment as the backdrop for battle or as collateral damage, if they consider the natural world at all. Such is the paradox of the environment in times of war: nature is both omnipresent and invisible.”<sup>48</sup> It is

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<sup>45</sup> Joseph P. Hupy. “The Long-term Effects of Explosive Munitions on the WWI Battlefield Surface of Verdun, France.” *Scottish Geographical Journal*, 122:3, 2006, 167-184.

<sup>46</sup> Richard P. Tucker and Edmund Russell. *Natural Enemy, Natural Ally: Toward an Environmental History of Warfare*. Corvallis: Oregon State University Press, 2004, 1.

<sup>47</sup> Tait Keller. “Destruction of the Ecosystem.” *International Encyclopedia of the First World War*, 2014.

<sup>48</sup> Ibid.

in this assertion that a great truth comes forward, “only by taking the environment into account can we fully understand the trauma of the Great War and how this conflict shaped the most basic levels of human existence for years afterwards.”<sup>49</sup>

The earliest scholarly works on war and environment include mid-twentieth century interpretations of war’s environmental impacts, and usually lack a scientific basis of analysis. However, the field has more recently evolved through the works of geographers such as Dr. Joseph Hupy, who focuses on the physical impact of World War I on the Verdun landscape and what that means for ecological diversity. Yet, there are still many gaps in literature on the relationship between war and environment, especially in relation to memory and memorialization.

Regarding scholarship on memory and remembrance, Pierre Nora’s scholarship on memory, particularly his volumes entitled, *Lieux de mémoire*, a project that fuses comprehensive study of French culture with the study of collective memory, has provided scholars a foundation to continue and broaden the study of memory and remembrance. Indeed, Nora’s introduction of the concept of the “lieu de mémoire” or “site of memory” has significantly shaped international understandings of nations and their pasts as well as those of national memory more broadly, particularly in Europe.<sup>50</sup> Within his conception of a site of memory includes the view that communities create sites of memory when the memory itself begins to fade. In this way, individuals are constantly chasing their memories. However, I would argue that in the case of World War One, there was a desire to remember before the war had even ended. The overwhelming losses manifested in a guilty, deep desire to commemorate those who sacrificed

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<sup>49</sup> Ibid.

<sup>50</sup> Michael Rothberg. “Introduction: Between Memory and Memory: From *Lieux de mémoire* to *Noeuds de mémoire*.” Yale French Studies, No. 118/119, *Noeuds de mémoire: Multidirectional Memory in Postwar French and Francophone Culture* (2010), pp. 3-12. Yale University Press. <http://www.jstor.org/stable/41337077>, 3.

their lives for their nation(s).

However, one area of Nora's argument where I am in agreement is in his assessment of sites of memory, where he asserts that they functioning as a source of "residual continuity."<sup>51</sup>

Although I would argue that sites of memory are more dynamic than Nora's point of view on the matter, it is rather important to conceptualize the ability of a site to illicit emotion or reinforce values. Especially when these sites are liminal in nature, where you can emotionally suffer for the fallen of the First World War among a former battlefield turned horse farm, for example. To feel something while within the landscape creates an involuntary connection to that space.

In addition, Mike Heffernan, among other geographers, have argued that the way in which we engage with a space is what determines their meanings. In the context of both memorials and battlefields, there is a reason we go back to these spaces (or, visit them in the first place). And, in regard to the national approach to commemoration that I will expand on in Chapter 1, geographer Stephen Legg argues that "nationalist memory describes a geography of belonging, an identity forged in a specified landscape, inseparable from it."<sup>52</sup> If individuals derive their sense of sense from within these landscapes ravaged by war, it is crucial to analyze the implications surrounding the conscious and subconscious reconfiguration of these landscapes after the war's end.

As Joseph Hupy points out, and as I have already indicated, there is minimal scholarship aimed at addressing "what happens to the agricultural and forest landscape after it has been bombed, mined and shelled over the course of several years of warfare."<sup>53</sup> It is important to

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<sup>51</sup> Pierre Nora. "Between Memory and History: *Les Lieux de Mémoire*." Representations, No. 26, Special Issue: *Memory and Counter-Memory*. University of California Press. Spring, 1989. pp. 7-24.  
<http://www.jstor.org/stable/2928520>, 8.

<sup>52</sup> Stephen Legg. "Memory and Nostalgia." Cultural Geographies. VOL. 11(NUMB 1), 2004, 99-107.  
<http://journals.sagepub.com/toc/cgj/11/1>, 101.

<sup>53</sup> Hupy.

examine how the physical environment has influenced past military operations, but the converse is also of interest, that is, how and where military operations have had an effect upon the physical environment. While military historians have analyzed nature in regard to tactical or strategic implications when waging or planning to wage war, they often omit what comes after war is waged.

In addition, both environmental and military historians have yet to explicitly consider war's hazardous ecological implications as "a central, distinctive element of human's historically evolving relation to the natural world."<sup>54</sup> This remains true despite mankind's increasing awareness that modern warfare has significantly contributed to the environmental stress and harm placed on our contemporary world.<sup>55</sup> Most notably, as scholarship on these topics grow, the impact of wartime ideas and tools on nature has maintained a low profile.<sup>56</sup> It is also worth mention that while cultural historians have exposed many ways in which war has shaped domestic social relations, their studies rarely include relations with nature.<sup>57</sup>

Leo Marx has contributed extremely influential works, such as *The Machine in the Garden: Technology and the Pastoral Ideal in America*, which address the notion of a uniquely romantic pastoralism that formed through the embrace of nature within the American frontier.

In most versions [of the myth of America as a new beginning], the regenerative power is located in the natural terrain: access to undefiled, bountiful, sublime Nature is what accounts for the virtue and special good fortune of Americans. It enables them to design a community in the image of a garden, an ideal fusion of nature with art. The landscape thus becomes the symbolic repository of value of all kinds—economic, political, aesthetic, religious.<sup>58</sup>

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<sup>54</sup> Tucker and Russell, 1.

<sup>55</sup> Ibid.

<sup>56</sup> Ibid.

<sup>57</sup> Ibid.

<sup>58</sup> Leo Marx. *The Machine in the Garden: Technology and the Pastoral Ideal in America*. New York: Oxford University Press, 2000, 228.

While Marx makes many sound arguments in regard to America's nostalgic attitudes about nature as well as the infiltration of technology into that pure and peaceful landscape, 1) I do not believe that American pastoralism influenced the American Battle Monument Commission's decision to recommend working in memorial parks and green spaces into the designs of overseas memorials, and 2) while I understand that natural symbolism can be manipulated for political purposes, I believe that any allusions to nature in the overseas Pennsylvania memorials were genuine and representative more so of classical ideals regarding nature. Perhaps on an unconscious level the ABMC was influenced by thoughts of nature as a source of regeneration amidst the unimaginable emotional and physical trauma, but I concur with the point of view that I argue in subsequent chapters, which is that park spaces were recommended by the ABMC given their potential function within a community to hold commemorative events, and so on. Yet, in this way, one could see how the 'German view' that it is necessary to commemorate the war dead while surrounded by nature.<sup>59</sup> In this way, nature itself becomes liminal. As George L. Mosse writes, for the Germans, "Such a celebration of the heroic must take place in association with the surrounding landscape: nature must always participate in reminding the living that those who have died for the fatherland still live."<sup>60</sup> I would argue that, similar to German views of nature—although removed from any sentiments regarding the cultural rootedness within a nation—, perhaps in death, we find hope and peace within nature because nature is the ultimate representation of life. Indeed, we are ourselves nature's beings, regardless of how much insulate ourselves with technology and material goods. As nature's beings, we plant our loved ones in the ground so that life may be reborn. We surround ourselves with trees because in the midst of death, we need to value and truly appreciate life. Death represents absence; thus, we fill that void

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<sup>59</sup> Mosse, 112.

<sup>60</sup> Ibid.

with the only source of life we know: nature itself. And, within these notions, we reinforce our identities as humans. But also, or instead, perhaps, it is deep within nature that we regain the peace we lost among the death and destruction we came to know by way of mechanized war.

In the context of historical environmental thought in the United States, Timothy Walker makes a powerful assertion:

Where she [Nature] denied us rivers, Mechanism has supplied them. Where she left our planet uncomfortably rough, Mechanism has applied the roller. Where her mountains have been found in the way, Mechanism has boldly levelled or cut through them. Even the ocean, by which she thought to have parted her quarrelsome children, Mechanism has encouraged them to step across. As if her earth were not good enough for wheels, Mechanism travels it upon iron pathways.<sup>61</sup>

While the words of Timothy Walker are intended convey the notion that nature is not absolute, and that it is man and his inventiveness in allowing him to overcome nature that is great.

However, I view his words as representing a relationship of confrontation, where, in all of the earth's bounty and wonder, we constantly seek out more. But, is there more?

Of additional significance, Walker presents an example of man's destruction of nature and our desire to control it, when we are in fact a part of nature. Thus, and especially in the context of modernized war, it is from the conflict that we as humans instigate that the inherent harmony within nature is disrupted and displaced.

## ***Methodology***

My research methodology takes a holistic approach, blending my studies in history, biology, and political science. In addition to using archival resources from federal, state, and university archives in the United States to inform this topic and my approach, I have also conducted fieldwork in France, Belgium, the United Kingdom, and Japan, which has included collecting

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<sup>61</sup> Marx, 182-183.

soil and water samples for analysis at the Pennsylvania State water analysis laboratories. While the test results revealed exactly the opposite of what I expected, they suggested that, in some places within France, post-war clean-up has succeeded in the most affected places, but has not always succeeded in places given full attention. Further discussion of my findings will take place in subsequent chapters.

My research is grounded in archival documents, particularly those within Record Group 117, from the National Archives and Records Administration of the United States (NARA) in College Park, Maryland. Other archives that I have utilized include the Paul Cret Archives within the University of Pennsylvania's University Archives and Records Center. The socio-cultural historical perspective I have acquired builds strongly from archival documents detailing the construction process, including Franco-American correspondence and the efforts at land reclamation and environmental mitigation specific to each memorial, and a contemporary literature in memorialization and postwar environmental mitigation.

I have conducted fieldwork in France on two separate occasions (November 2016 and May 2017). My initial trip allowed me to gain insight on the memorials, such as upkeep, aesthetic, and visitor frequency and interactions, but also establish a larger conceptualization of the memorial spaces compared to other sacred battlefields that have or have not been converted into memorial spaces or to their antebellum function (e.g. agricultural land). Along with the additional fieldwork I conducted at the Royal Artillery Memorial at Hyde Park Corner in London, I also conducted a comparative field study in Hiroshima, Japan in January 2018. Each of these trips have allowed me to gain a conceptualization of the memorial spaces, while helping me to better understand their role in mitigating the land and spiritually healing mourning communities.

## ***Chapter Overview***

In Chapter 1, I discuss the difference in the national and cultural meaning behind the First World War between Europe and the United States. This will be discussed in relation to their common yet divergent post-war experiences. World War I was a conflict that divided Europe, at a large cost (in body count and fiscally). On the other hand, while the United States experienced similar losses, the U.S. gained a spot on the world stage. So, it is important to discuss this difference in order to fully understand the implications for environmental mitigation and memory. This chapter serves as pertinent background information for the reader's understanding of the relationship between war and environment going forward. Significant sources in which this chapter is grounded includes Steven Trout's *On the Battlefield of Memory: The First World War and American Remembrance, 1919-1941*, John R. Gillis' edited work, *Commemorations: The Politics of National Identity*, and Lisa M. Budreau's *Bodies of War: World War I and the Politics of Commemoration in America, 1919-1933*.

In Chapter 2, I provide the reader with a background on the battles fought within the landscapes of interest as well as a description of the three French towns where the relevant Pennsylvania memorials are located (Fismes, Nantillois, and Varennes-en-Argonne) and their current and historical ecological diversity and production of economic resources, both natural and domesticated. This chapter is grounded in materials such as environmental census data provided by the French Government as well as literature that discusses the relevant military campaigns and how these military actions affected the landscape. Secondary sources such as *American Armies and Battlefields in Europe* and *America and WWI: A Traveler's Guide* will help me achieve this. My goal for including scholarship of this nature is to help the reader develop a general understanding of the economic necessity to turn to agriculture for some



communities. This point will be reinforced in greater depth in Chapter 4 (while asserting that some communities and individuals are forced into dangerous or hazardous practices because of their limited financial means). Further, in Chapter 2, a reader will also assume a comprehensive understanding of the way in which war was waged during these battles, and the types of weapons utilized during each of the respective campaigns.

Chapter 3 discusses the construction efforts regarding the PA Memorial in Varennes-en-Argonne, the PA Memorial Fountain in Nantillois, and the PA Memorial Bridge in Fismes. I provide a detailed description, heavily drawing from the archival records in Record Group 117 of military records at the National Archives and Records Administration, of each process taken to construct each of these memorials. Chapter 3 provides readers with an in-depth analysis of the attempts at land reclamation and environmental mitigation (including a discussion of the environmental effects that had to be overcome during construction) as well as the construction efforts, specific to each memorial. I also offer discussion of the Franco-American cooperation that occurred throughout each of these processes, discussing the attitudes around each particular project. This chapter also briefly discusses current efforts at maintaining the memorials and the resources allocated by the State of Pennsylvania to carry out this maintenance, and concludes with an analysis of how this archival information has afforded me new insight about the landscapes.

In Chapter 4, I construct an argument about the inherent dangers regarding the standard practice of converting land to its antebellum function in a post-war setting. I provide the reader examples of landscapes where this practice has been implemented and compare it to landscapes that have been mitigated but now serve as sites of memory. To accomplish this, I rely on news reports of instances where agriculture production has been hindered by war's environmental

consequences. I will also rely on scholarly articles by geographers such as Joseph Hupy, Daniel Hube, and Tate Keller, that discuss statistical data surrounding war's persistent environmental consequences. In this chapter, I argue that in some cases, landscapes have not been adequately mitigated to where they continue to create hazards for wildlife, even in adjacent areas (due to run-off, etc.). A central part of this discussion involves an analysis of World War I's persisting environmental consequences and their harmful implications.

My conclusion expands on my overall argument which asserts that certain landscapes have not been adequately mitigated to where they should be reverted to their pre-war function. It is here that I claim that mitigation efforts can be costly, but this shouldn't prevent them; and instead, mitigation efforts should correspond with their intended land use. I also assert in my conclusion that when there is no intended land use, there should be a procedural response aimed at mitigating the landscape for any use (by restoring species diversity, water quality, and soil composition). Thus, this portion of my work focuses on the necessity of addressing these problems in a culturally appropriate manner, considering the role memorialization can have and has historically had with environmental mitigation in postwar settings, while still considering the political and social dynamics at play. To accomplish this, I offer potential alternatives to achieve environmental mitigation adequately and appropriately (while also addressing what it means to do so) using instances like the Pennsylvania Memorial in Fismes as one example of positive international cooperation to assume and restore a community's livelihood and spirit in a safe and effective manner. On balance, I conclude that my holistic research serves as an archetype for future understanding and application to heal war-torn lands and peoples.

## Conclusion

Despite the costs associated with postwar environmental mitigation, commemorative impulses have often overpowered the French government's hesitations since the armistice, and many locations within the Red Zone have been mitigated because of these memorial installations. It is also argued that civilian meaning and attachments to landscapes that persist after militarization offer another barrier to full-scale militarization in the future. The city of Hiroshima exceeded this notion and allocated an entire park to serve as a memorial space as well as a place that advocates for world peace. As seen in France and other countries, the process of creating war-related memorial structures and spaces characterizes an effective ad hoc mechanism for postwar clean-up.

Chris Pearson, in *Mobilizing Nature: The Environmental History of War and Militarization in Modern France*, writes “the militarized environment of the Western Front was among the most extreme that has ever existed.”<sup>62</sup> Pearson goes as far to argue that in regard to wartime environmental annihilation, the Western Front has been perhaps only matched by the atomic bombings of Hiroshima and Nagasaki during the Second World War and the Agent Orange-led defoliation of jungle during the Vietnam War.<sup>63</sup> The technological might of the ‘war machine’ obliterated human and nonhuman life along the Western Front.<sup>64</sup> But, it is through the process of death, particularly by way of war, and thus dying for reasons larger than oneself, that these warzones turn into sacred spaces, inherently spiritual and conflicting.

The construction of memorials and memorial spaces has served a dual purpose for communities ravaged by war: to heal the broken spirits of those affected by war and to heal the

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<sup>62</sup> Chris Pearson. *Mobilizing Nature: The Environmental History of War and Militarization in Modern France*. Manchester University Press, 2012, 1.

<sup>63</sup> Ibid, 92.

<sup>64</sup> Ibid.

land that has been degraded by war. Even beyond the cleanup related to constructing, memorialization has also served a function in both physical and economic post-war recovery. However, my research highlights that some former battlefields have not been adequately mitigated for the spaces to be reverted back to their pre-war functions. Mitigation efforts can be costly, but the process of mitigating through memorialization can help to justify those costs to the respective communities. Through the loss of lives, especially in fighting for vague notions bigger than ourselves, the respective space transforms into that which is sacred.

From the Western Front to Hiroshima to Vietnam, and now perhaps even Syria, memorialization has played a vital role in postwar environmental mitigation. I believe this process has potential for effective future applications as well.

## Chapter 2

### The Environmental Cost of Victory

Geographer Joni Seager asserts, “Militaries are the world’s biggest vandals, whether at war or in peace.”<sup>1</sup> She continues by declaring, “as the technological might and global reach of militaries increases, so does their destructive capacity.” This increasing destructive capacity can be seen over the four years in which the First World War was fought, but as the first instance of mechanized war, there is not currently a clear threshold for war-related destruction in sight.<sup>2</sup>

In this chapter, I discuss the nature of war-fighting during the First World War, with special emphasis on two campaigns: The Battle of the Meuse (a campaign within the Meuse-Argonne Offensive, which was fought from September 26, 1918 until November 11, 1918 [the Armistice]) and the Battle of Fismes and Fismette, which took place from August 3, 1918 to September 1, 1918. My narrative of World War I within this chapter thus focuses on the towns in which the three overseas Pennsylvania memorials are located—Varennes-en-Argonne, Fismes, and Nantillois—and the battles, or campaigns, where, respectively, Pennsylvania soldiers of the 28<sup>th</sup>, 79<sup>th</sup>, and 80<sup>th</sup> divisions fought within or in the immediate vicinity these towns. Further, I discuss the economic implications of these battles on the French communes of Varennes-en-Argonne, Fismes, and Nantillois, particularly in relation to the material losses as a result of the environmental degradation that ensued, both initial and persistent. The significance of these

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<sup>1</sup> Forward by Joni Seager in William Thomas. *Scorched Earth: The Military's Assault on the Environment*. Philadelphia, PA: New Society Publ., 1995, xi.

<sup>2</sup> Ibid.

losses is better understood when made aware of the fact that between 1905 and 1913, “agriculture constituted 40 percent of the national product” in France.<sup>3</sup>

### ***An Overview of How War Was Waged***

At its onset, World War I on the Western Front appeared as if it was going to be fought in the same manner as previous wars—mobile and short.<sup>4</sup> But as troops hit deadlock in mid-November, movement began to be measured in yards, not miles, and troops on each side dug trenches as an attempt to safely hold their positions.<sup>5</sup>

As the first instance of modern, mechanized warfare, World War I changed the nature of warfare, making the act of war far more destructive than ever before. As the war waged on, new technologies were introduced into warfighting. When the United States entered the First World War in 1917, the technological might of warfare had reached its height. The use of chemical weapons was common by that point, and other weapons such as plane-bombers and tanks made their appearance on the front.

The main types of chemical weapons utilized by either side in the Battle of the Meuse and the Battle of Fismes and Fismette were tear gas mixtures, blue cross (diphenyl chlorarsine or diphenyl cynarsine), green cross (diphosgene or a combination of phenyl carbylamines chloride), phosgene, and yellow cross (dichlorethyl sulphide, more popularly known as mustard gas or yperite).

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<sup>3</sup> Roger Price. *The Economic Modernisation of France*. New York: Wiley, 1975, 225.

<sup>4</sup> Mosse, George L. *Fallen Soldiers: Reshaping the Memory of the World Wars*. New York: Oxford University Press, 2011, 3.

<sup>5</sup> Price, 225.

During the Meuse-Argonne Offensive, about 129,000 tons of gas were used, approximately 68,000 tons by the Germans, 36,000 tons by the French, and 25,000 tons by the United States.<sup>6</sup> The United States' initial raid of the offensive on September 6, 1918 used more explosives in three hours that had been used in the entire United States Civil War.<sup>7</sup>

In the case of both the Battle of the Meuse and the Battle of Fismes and Fismette, the arsenal of deadly weapons and obstacles also included airplane bombs, hand grenades, barbed wire, mortar and artillery shells, machine guns, and rifle bullets (often made of shrapnel). However, the Battle of Fismes and Fismette is partly best-known for the heavy use of flame-throwers.<sup>8</sup>

During the First World War, the previously unrefined concept of indirectly firing at an unseen enemy using trigonometric equations became the norm. In this type of indirect artillery tactic, hitting a target on the lee side of a ridge proved much more difficult than hitting the crest or fore slope. (Armies were easy targets when on a ridge crest because this was what the gunners used to sight their artillery pieces.) Thus, the crests and facing hillslopes on high ground (especially those facing the enemy) were most vulnerable to artillery fire and bore the brunt of most artillery barrages. Therefore, the location of armies in relation to topographic position influenced the degree of disturbance across the battlefield.

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<sup>6</sup> Matt Deegan. "The Weapons of the Meuse-Argonne Offensive." American Battle Monuments Commission. Accessed March 1, 2018. <https://www.abmc.gov/learning-resources/lesson-plans/weapons-meuse-argonne-offensive>, 78.

<sup>7</sup> Ibid, 90.

<sup>8</sup> I was not able to determine if flame throwers were used in the Meuse-Argonne against the three respective Pennsylvania-related divisions; however, I was able to determine that the Germans used flame-throwers against the 77<sup>th</sup> Division in this campaign. The 77<sup>th</sup> Division contained a number of Bucknell alumni.



Figure 3.1: A battered tank in Varennes. First hit by a shell then burned.<sup>9</sup>

Over the course of the First World War, millions of bomb and shell craters invaded former crop fields and woodlands. Since the battles that ensued, northern France remains littered with artillery shells, some filled with chemicals, and other munitions.

### ***The Battle of Fismes and Fismette***

The bloody Battle of Fismes and Fismette occurred in the small French commune of Fismes between August 3, 1918 and September 1, 1918. This battle is unique in the war's history due to the extreme violence and street fighting that occurred, compared to the majority of World War I battles which took place on farmland, in addition to the presence of storm trooper attacks and flame throwers.<sup>10</sup> The culmination of these factors ruined Fismes, with ninety percent of the

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<sup>9</sup> Pennsylvania in the First World War/World War I, 408.

<sup>10</sup> "Battle of Fismes and Fismette." Revolv. Accessed March 1, 2018.  
<https://www.revolv.com/main/index.php?s=Battle of Fismes and Fismette>.



commune destroyed, and created a battle that was regarded as one of the most vicious in all of World War I.<sup>11</sup> Over the course of the battle's duration, Fismes would be won and lost a total of five times by the Allies.<sup>12</sup>

After the failure in the Second Battle of the Marne, Germany's last major attack of the war, German troops retreated to Fismes, developing a new front along the Vesle River. On August 3, 1918, American troops attacked this new front in hopes to break through. Over the first two days of the battle, the 32<sup>nd</sup> American Division lost around 2,000 men through the attempt to cross the Vesle and reach Fismes.<sup>13</sup> Following this slaughter, the 32<sup>nd</sup> Division was relieved by the 28<sup>th</sup> Infantry Division, also known as the Keystone Division given its high composition of Pennsylvanians.

On August 26, 1918, the 28<sup>th</sup> Division captured Fismette, creating a bulge in the German line.<sup>14</sup>

In the early morning hours of August 27, 1918, 230 Pennsylvanians of the 28th Division trudged across the Vesle River into their defensive positions in the rubble- strewn village of Fismette, France. Less than an hour after taking up their fighting positions, these men would encounter the terror, confusion and savagery of the German principle of "Schwerpunkt," or focus of energy. A full battalion of elite Stormtroopers armed with rifles, grenades and flamethrowers rushed the weak American line.<sup>15</sup>

The German gas mission for August 7th and 8th included infantry as well as artillery targets that German observers had located. The 4th Guard reported that early on the morning of the 8th it had shelled the bottom of the Ardre Valley with 655 rounds of yellow cross and put yellow cross rafales<sup>16</sup> along the Ardre Valley, in Villesavoye, and in

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<sup>11</sup> Ibid.

<sup>12</sup> Ibid; and "World War 1." Tour De Travoy. April 13, 2017. Accessed March 1, 2018. <https://tourdetravoy.wordpress.com/history/world-war-1/>.

<sup>13</sup> "Battle of Fismes and Fismette."

<sup>14</sup> "Schwerpunkt at Fismette, August 27, 1918." Army. Accessed March 1, 2018. [https://www.army.mil/article/44329/schwerpunkt\\_at\\_fismette\\_august\\_27\\_1918](https://www.army.mil/article/44329/schwerpunkt_at_fismette_august_27_1918).

<sup>15</sup> "Tragedy at Fismette, France, 1918."

<sup>16</sup> A rafale ("squall") fire was a sudden burst of simultaneous rapid artillery fire from each of the guns of a battery.

the woods southwest of that village.<sup>17</sup> Between 3:00am and 5:00am, five field batteries of the 216th Division carried out a yellow cross contamination shoot on the woods and roads south of Villetta and from 5:00am to 5:30am put yellow cross on the woods east of Fismes and along the northern edge of Magneux. On the night of August 8th, three batteries of the 216th again contaminated the woods east of Fismes with 200 rounds of yellow cross, and the following morning, repeated the gassing of Magneux and the nearby woods. Standing orders read: "The section of Fismes east of the Fismes-St. Gilles-Blancy road and south of the railroad will continue to be held under slight harassing fire.....If the weather is favorable, contaminate with yellow cross."<sup>18</sup>

Of this contamination fire, on August 7<sup>th</sup> and 8<sup>th</sup> the 28<sup>th</sup> Division reported only that Fismes had been shelled with gas and high-explosives.<sup>19</sup> However, the following day, the division said that almost 1,000 77-mm and 150-mm gas shells had fallen along its front. Regarding this attack, the enemy artillery was systematic and clearly had accurate knowledge of all battery and troop positions.<sup>20</sup>

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<sup>17</sup> The End of the Aisne-Marne Campaign. <http://www.dtic.mil/dtic/tr/fulltext/u2/a955204.pdf>, 5 and 6.

<sup>18</sup> 216<sup>th</sup> Division order on August 9<sup>th</sup>. <http://www.dtic.mil/dtic/tr/fulltext/u2/a955204.pdf>, 6.

<sup>19</sup> Ibid.

<sup>20</sup> Ibid.

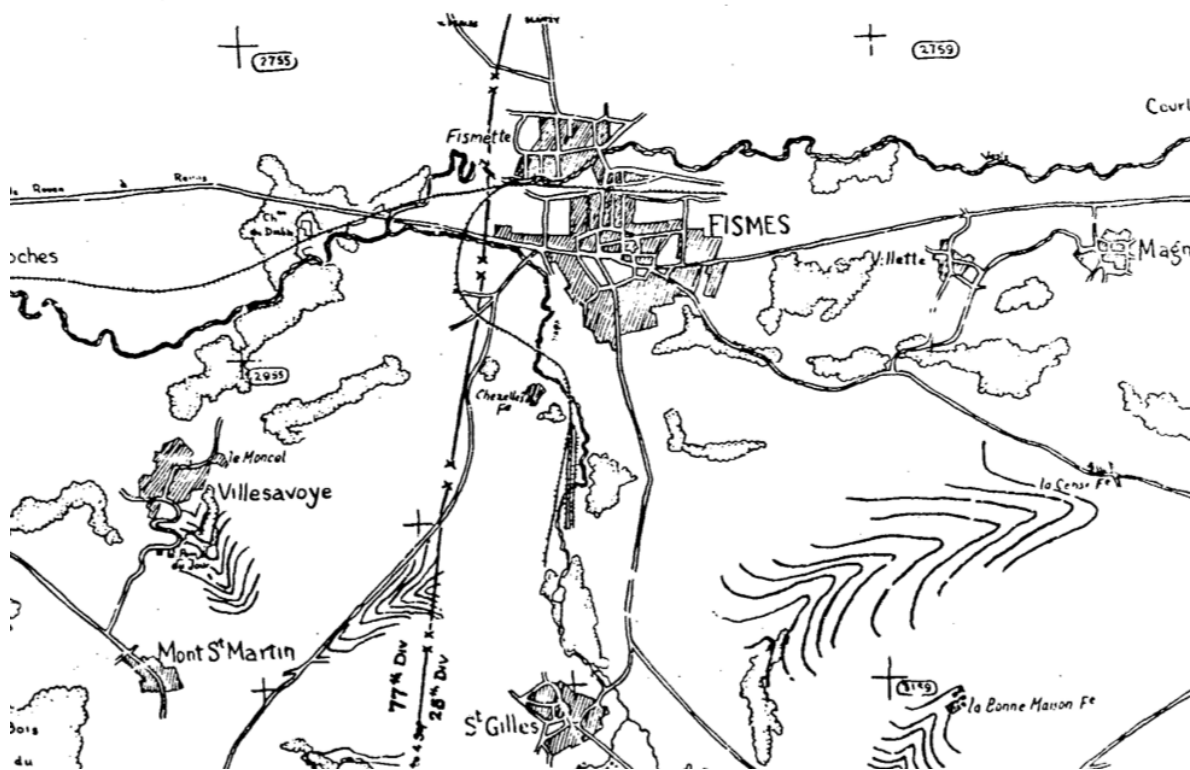


Figure 3.2: German map of the Fismes sector.<sup>21</sup>

According to 28<sup>th</sup> Division's Journal of Operations, the daily raids and patrols were costly, "owing to the enemy machine guns and the existence of large quantities of mustard gas in the grass."<sup>22</sup> Over the course of the month, combatants engaged in a back-and-forth long the Vesle's edge.<sup>23</sup> Rexmond C. Cochrane, writes that "by day artillery and machine guns kept the III Corps sector ablaze, and by night the woods, ravines, and hollows were systematically contaminated with yellow cross gas."<sup>24</sup> The enemy maintained the advantage throughout the month, with secure positions and superior artillery compared to the III Corps who had "little or no gas to return."<sup>25</sup> In addition to the artillery fire and gas experienced by the 28<sup>th</sup> Division, two major gas

<sup>21</sup> Ibid, 7.

<sup>22</sup> Ibid, 11-12.

<sup>23</sup> Ibid, 12.

<sup>24</sup> Ibid.

<sup>25</sup> Ibid.

shoots, KANARIENVOGEL and PARADEISVOGEL, occurred on or near the Vesle.<sup>26</sup> The 77<sup>th</sup> Division was hit hard by the two attacks, with the first, KANARIENVOGEL aimed at the division and the second aimed at its sector.<sup>27</sup> These attacks began two days after the 77<sup>th</sup> Division reached the river front.<sup>28</sup>

KANARIENVOGEL was to occur on August 15<sup>th</sup>. This large-scale attack consisted of a three-minute shelling of blue cross followed by a two-hour shelling of yellow cross.<sup>29</sup> Regarding the first attack, 1<sup>st</sup> Lt. H. D. Snyder asserted that “some 500 diphenylchloroarsine and phosgene shells ,followed by more than 2,000 mustard gas shells, fell in and around Mont Notre Dame, Villesavoye, Mont St. Martin, and in the Bois Cochelet.”<sup>30</sup> At least five batteries of 4<sup>th</sup> Guard Division were involved, three of them firing 400 rounds of yellow cross into two target areas. Additionally, six batteries of the 216<sup>th</sup> Division targeted the woods about St. Gilles and the valley to the southwest.<sup>31</sup> Further, just two batteries of the 17<sup>th</sup> Division were active in the initial attack, with three active in the repeat shoot the next morning. In addition to the 17<sup>th</sup> Division’s participation, Germany’s 29<sup>th</sup> Division also engaged in the repeat shoot, firing 887 blue cross (diphenylchlorarsine) and 2,300 yellow cross shells.<sup>32</sup> Although there has not been a report found that includes the number of yellow cross shells allotted or fired by the corps in the two shoots, the 29<sup>th</sup> Division’s report suggests that approximately 7,000 rounds of mustard gas may have been fired into the III Corps sector each night by the division of Corps Schoeler and Corps Wichura.<sup>33</sup> 1<sup>st</sup> Lt. H. D. Snyder recalled that this second attack left the 77<sup>th</sup> Division “completely

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<sup>26</sup> 13.

<sup>27</sup> Ibid.

<sup>28</sup> Ibid.

<sup>29</sup> 13.

<sup>30</sup> 15-6.

<sup>31</sup> 14.

<sup>32</sup> 14.

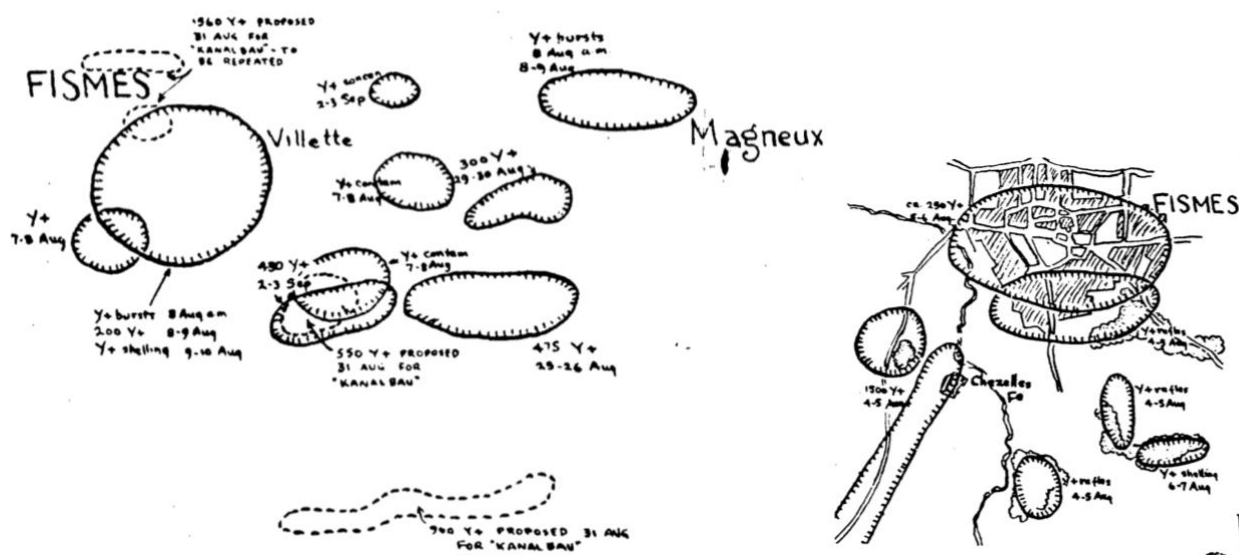
<sup>33</sup> 15.

drenched” with more than 3,000 yellow cross shells, “fired in three barrages of mixed gas and [high-explosives].<sup>34</sup>

Contrasting with the 77<sup>th</sup> Division’s intense experience, the 28<sup>th</sup> Division only reported about 100 shells in the area between St. Gilles and Courville, half of them gas.<sup>35</sup> The 28<sup>th</sup> Division’s reports recall 300 gas shells the following morning, on August 16<sup>th</sup>.<sup>36</sup>

Throughout the Battle of Fismes and Fismette, “high explosives, shrapnel and gas shells of all calibers were...poured into the valley... [and the troops] were forced to stand fast and endure the slaughter without an opportunity to fight back.”<sup>37</sup>

The Germans’ significant use of chemical gas at the Vesle were largely instrumental in producing the stalemate. Germany used gas to immobilize the 77<sup>th</sup> and 28<sup>th</sup> Divisions through the month of August, and the equally effective gas tactics German troops employed during their retreat from the Vesle to the Aisne in early September. It is estimated that German gas exacted well over 6,000 gas casualties among American divisions alone during that month at the Vesle.<sup>38</sup>



Figures 3.3: Gas map overlays for Fismes, excluding KANARIENVOGEL and PARADEISVOGEL.<sup>39</sup>

<sup>34</sup> 16.

<sup>35</sup> 19-20.

<sup>36</sup> 20.

<sup>37</sup> From *The 28<sup>th</sup> Division in the World War* in <http://www.dtic.mil/dtic/tr/fulltext/u2/a955204.pdf>, 21.

<sup>38</sup> Ibid.

<sup>39</sup> The End of the Aisne-Marne Campaign. <http://www.dtic.mil/dtic/tr/fulltext/u2/a955204.pdf>, cover; Division Report of the 32<sup>nd</sup> Division, cover. <http://www.dtic.mil/dtic/tr/fulltext/u2/a955207.pdf>.

The 6.467 square mile commune of Fismes is located within the France's Marne department in the Grand l'Est region, about 25 kilometers west from Reims. During the war, the nickname bestowed to Fismes by American doughboys was "Flames," given the explosive nature of warfare waged during the Battle of Fismes and Fismette.<sup>40</sup>



Figure 3.4: Ruins of the Town Hall of Fismes in 1918.<sup>41</sup>

In the 1800s, France underwent the industrial revolution. The economic history of the nineteenth century and the advancements of Fismes and the broader region included sugar beet, rare and expensive porcelain (specifically from Fismes), the railway, hat making, the foundry, tanneries, and mills. The local economy was dominated by the presence of a sugar factory until

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<sup>40</sup> Edward G. Lengel. *Thunder and Flames: Americans in the Crucible of Combat, 1917-1918*. University Press of Kansas, 2015. <http://www.jstor.org/stable/j.ctt1qft32v>.

<sup>41</sup> "World War 1."

the factory ceased operations in 1978. Additionally, light metalworking has also been present for “a long time” in Fismes. However, the twentieth century for Fismes and the region proved to be difficult given the undeniable impact of the Great War. German troops invaded Fismes, then remained on the Chemin des Dames before completely destroying Fismes in 1918.



Figure 3.5: Fismes' train station before the First World War, next to a large sugar refinery.<sup>42</sup>

After the First World War, Fismes attempted to gradually reconstruct itself, however, these efforts were hindered given the town's position as a railway town through which trains passed with deportees sent to Germany during World War II. A total of fourteen *Fismois* or *Fismoises* (inhabitants of Fismes), including Fismes' mayor, Dr. Genillon, were seized for acts of resistance and sent to die in Nazi concentration camps.<sup>43</sup> Despite the struggles to regain a foothold since World War I, Fismes was successfully integrated into the production zone for Champagne in 2008, after making “fismes,” or the coloring matter that gives Champagne a light rose tint, since at least the nineteenth century.<sup>44</sup>

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<sup>42</sup> Ville de Fismes. <http://www.fismes.fr>; Archives of Fismes. <http://bit.ly/Fismesarchives>.

<sup>43</sup> Ibid.

<sup>44</sup> Scientific American: Supplement, Volume 43. January 9, 1897, 17541.

Another factor that hindered Fismes' ability to thrive economically after World War I was its extremely slow population growth compared to other communes. This slow growth can be seen in Graph 1.

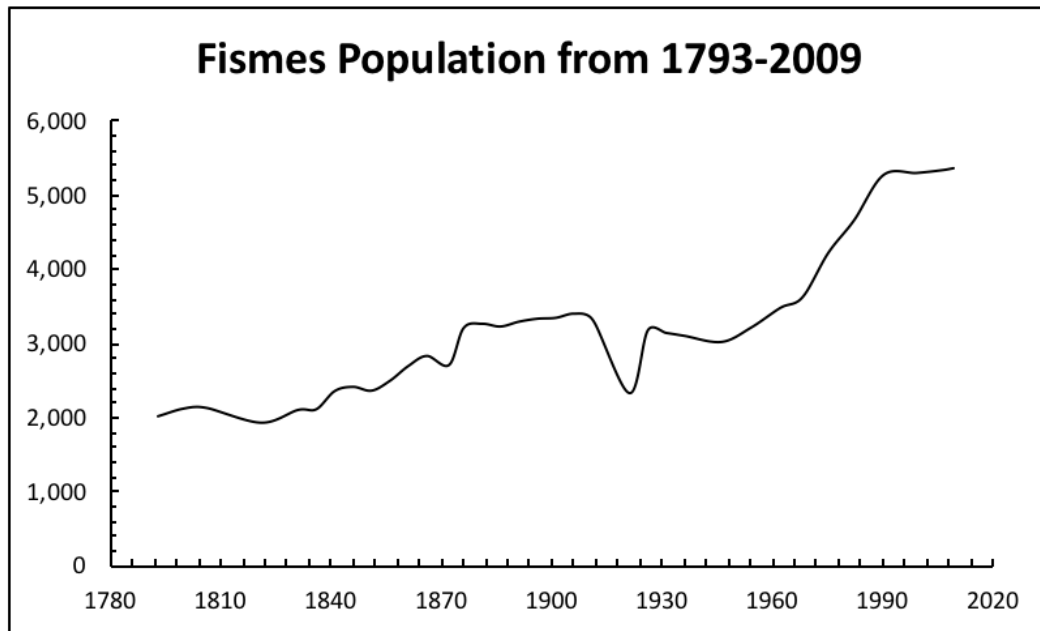


Figure 3.6: Population in Fismes from 1793 to 2009. The population drops by almost 1,000 from 1911 to 1921.<sup>45</sup>

<sup>45</sup> "Fismes." Revolv. Accessed February 02, 2018. <https://www.revolv.com/main/index.php?s=Fismes>; Fismes - Notice Communale. Accessed February 1, 2018. [http://cassini.ehess.fr/cassini/fr/html/fiche.php?select\\_resultat=13886](http://cassini.ehess.fr/cassini/fr/html/fiche.php?select_resultat=13886); Clout 1996.



### *The Meuse-Argonne Offensive: Varennes-en-Argonne and Nantillois*

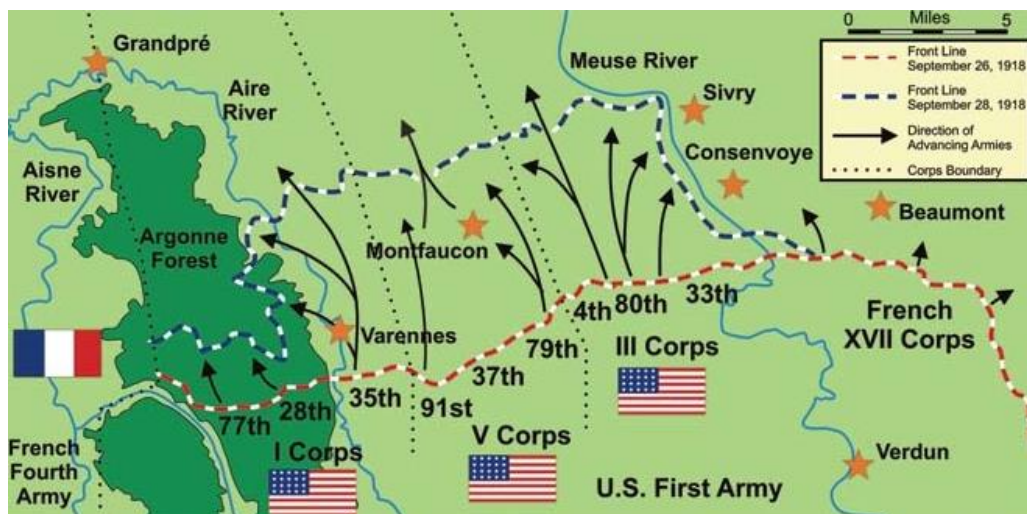


Figure 3.7: Stars indicate the use of chemical agents during the Meuse-Argonne.<sup>46</sup>

The United States' largest military operation and victory of the First World War, engaging over one million American soldiers, was a forty-seven-day offensive in the Meuse-Argonne region of northeastern France.<sup>47</sup> The Meuse-Argonne Offensive, fought from September 26, 1918 to November 11, 1918, was a part of the final Allied offensive of the war, known as the Hundred Days Offensive, and ultimately helped to bring the war to an end by cutting the main artery in the German supply system.<sup>48</sup> This offensive was also the deadliest campaign in American history, with approximately 26,277 U.S. soldiers killed in action.<sup>49</sup>

<sup>46</sup> Corey J. Hilmas, Jeffery K. Smart, and Benjamin A. Hill. "History of Chemical Warfare." Chapter 2: History of Chemical Warfare. Accessed April 2, 2018. [http://ke.army.mil/bordeninstitute/published\\_volumes/chemwarfare/CHAP2\\_Pg\\_09-76.pdf](http://ke.army.mil/bordeninstitute/published_volumes/chemwarfare/CHAP2_Pg_09-76.pdf).

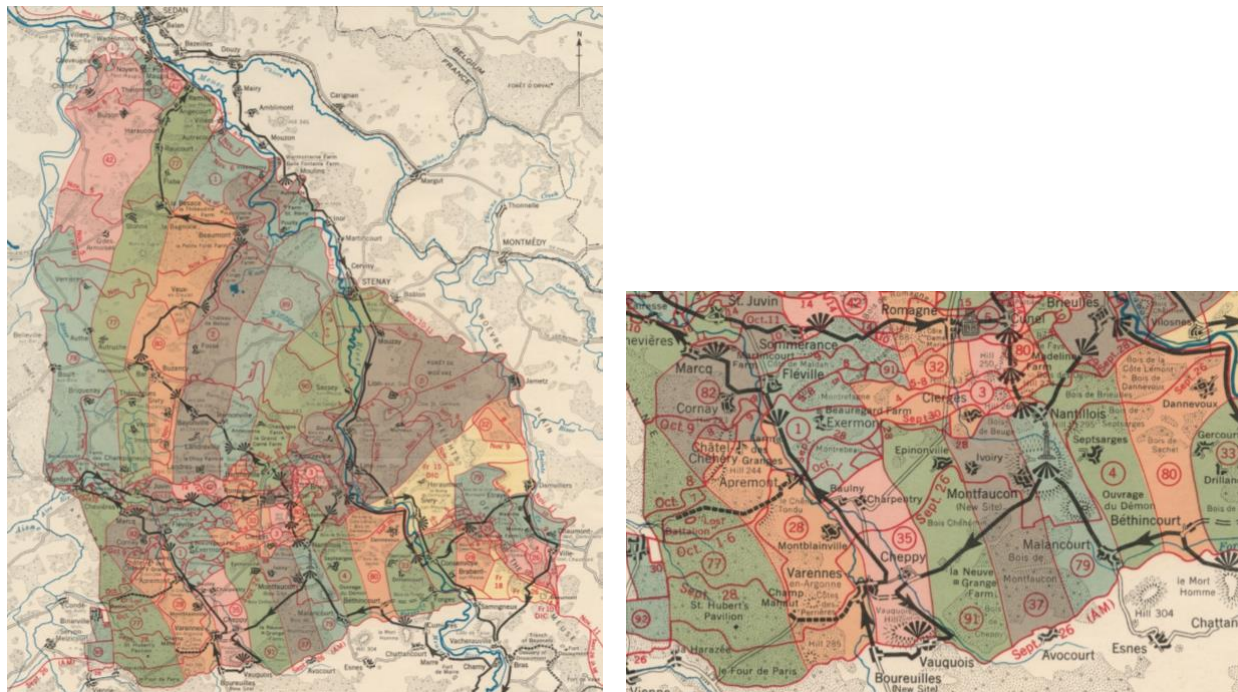
<sup>47</sup> Matt Deegan. "The Weapons of the Meuse-Argonne Offensive." American Battle Monuments Commission. Accessed March 1, 2018. <https://www.abmc.gov/learning-resources/lesson-plans/weapons-meuse-argonne-offensive>; More Americans were killed in this offensive than in any battles of the Civil War or World War II.

<sup>48</sup> "The Meuse-Argonne Offensive." National Archives and Records Administration. Accessed April 03, 2018. <https://www.archives.gov/research/military/ww1/meuse-argonne.html>; Secretary of War. Annual Report for 1919. United States Department of War. 1919, 2.

<sup>49</sup> Ibid.

General Pershing summarized the results of the Meuse-Argonne campaign in his final report:

Between September 26 and November 11, 22 American and 4 French divisions, on the front extending from southeast of Verdun to the Argonne Forest, had engaged and decisively beaten 47 different German divisions, representing 25 percent of the enemy's entire divisional strength on the western front... [...] ...The First Army suffered a loss of about 117,000 in killed and wounded. It captured 26,000 prisoners, 847 cannons, 3,000 machine guns, and large quantities of material.<sup>50</sup>



Figures 3.8 and 3.9: American Battle Operations in the Meuse-Argonne region. Right: Entire campaign. Left: Cropped to show the actions of the 28<sup>th</sup>, 79<sup>th</sup>, and 80<sup>th</sup> divisions in Varennes, Nantillois, and Montfaucon.<sup>51</sup>

<sup>50</sup>“The Big Show.”

<sup>51</sup> American Battle Monuments Commission. *American Armies and Battlefields in Europe: A History, Guide, and Reference book*. Washington: Headquarters, U.S. Marine Corps., 1938.

During the offensive, the 28<sup>th</sup> and 77<sup>th</sup> divisions of the AEF had particularly difficult times advancing. In the Aire Valley, the 28<sup>th</sup> Division suffered flanking fire from the forest, as all troops in the area would for the next few weeks. The 79<sup>th</sup> Division tried to storm Montfaucon, where the Germans held commanding heights. The German artillery devastated the advancing Americans.<sup>52</sup>

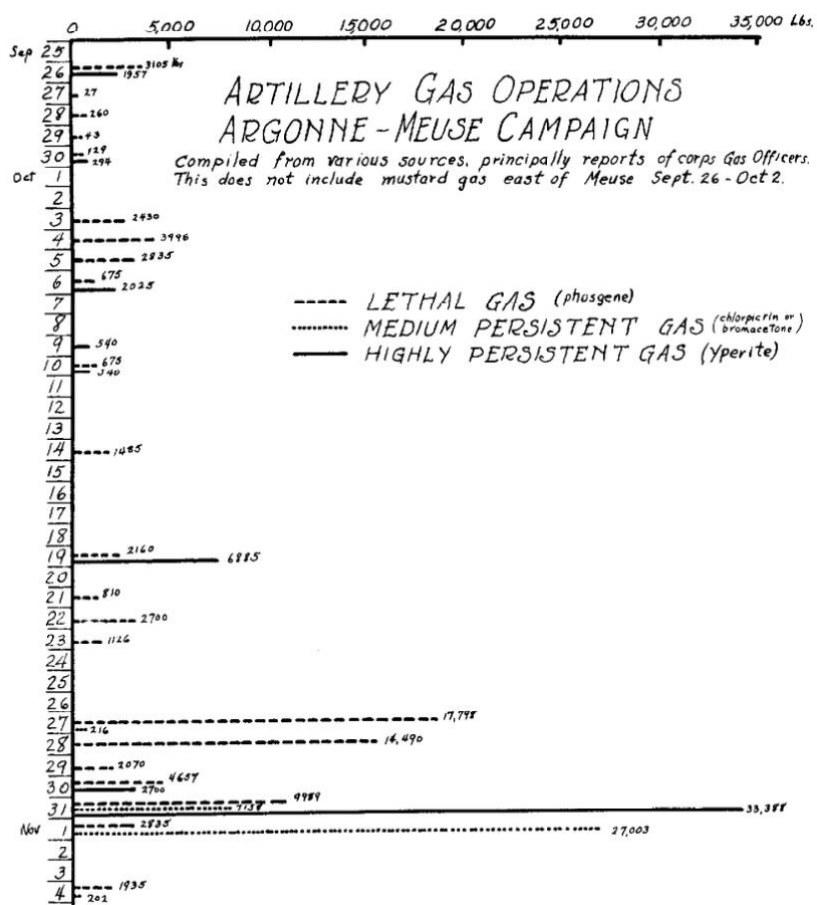


Figure 3.10: Artillery gas operations during the Meuse-Argonne Offensive. Excludes data of mustard gas use east of the Meuse between September 26 and October 2, 1918.<sup>53</sup>

<sup>52</sup> Andrew Knighton. "The Largest American Military Operation of the First World War - The Meuse-Argonne Offensive." War History Online. June 14, 2017. Accessed February 12, 2018. <https://www.warhistoryonline.com/world-war-i/american-attack-argonne-b.html>.

<sup>53</sup> Rexmond C. Cochrane. *The Use of Gas in the Meuse-Argonne Campaign, September-November 1918*. Army Chemical Center, Md.: U.S. Army Chemical Corps Historical Office, 1958, 88.

No army artillery expenditure reports have been found for the yperite program proposed to take place east of the Meuse during the offensive. However, Colonel Schulz, the respective Army Gas Officer, later estimated a “probable amount of 25 to 30 tons” of gas had been used in “yperiting” east of the Meuse from September 26th to October 2<sup>nd</sup> of 1918.<sup>54</sup> An additional 60-70,000 rounds of yperite were fired east of the Meuse within just the first few days of the Meuse-Argonne Offensive.<sup>55</sup> Additionally, on September 26<sup>th</sup>, the combination of gas, prosperous, high-explosive (HE) fire, and the demonstration raids made by the XVII Corps, the 1<sup>st</sup> Austro-Hungarian Division of Maas Ost reported a total of about 500 men killed, wounded, gassed, or missing.<sup>56</sup> As a result of their tenacious gassing, the United States 1<sup>st</sup> Army “successfully neutralized the enemy guns that might have hampered the initial advance on the right flank.”<sup>57</sup>

Figure 3.11: Zone bombed with gas shell type No. 20 (yperite) from September 26-October 2, 1918.<sup>58</sup>

After delay on September 29<sup>th</sup> caused by hostile machine gun and artillery fire, “the time had arrived for a vigorous use of poisonous gas” according to Brigade General Amos A. Friss, Chief of the Chemical Warfare Service, A.E.F.<sup>59</sup> As a result, almost 2,000 phosgene shells for the Livens projectors and 2,100 phosgene and chloropicrin shells for the Stokes mortars were available for liberal use by the First Gas Regiment.<sup>60</sup> Brig. Gen. Friss recommended that this supply be used along “the entire front whenever possible.”<sup>61</sup> Only use of mustard gas by the artillery required special approval from corps headquarters.<sup>62</sup>

According to Rexmond C. Cochrane, “although the Army order for the attack called for continued neutralization with yperite east of the Meuse, on the afternoon of 3 October, III Corps was notified that no yperite was to be fired across the river until further orders.”<sup>63</sup>



Figure 3.12: U.S. Marines during the Meuse-Argonne Offensive.<sup>64</sup>

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<sup>59</sup> Ibid, 27.

<sup>60</sup> Ibid.

<sup>61</sup> Ibid.

<sup>62</sup> Ibid.

<sup>63</sup> Ibid, 29-30.

<sup>64</sup> Knighton.

After the attack launched by the 1<sup>st</sup> Army on October 4<sup>th</sup>, German batteries in the Bois de Chatillon and “on the heights beyond,” were still unable to be silenced and the A.E.F. troops were still unable to “get above the machine guns ringing the German defense positions in and around Brioules, at the bend of the Meuse.”<sup>65</sup> So, on October 6<sup>th</sup>, the bombing and gassing of Brioules commenced.<sup>66</sup> However, even after twenty planes set fire to the town and the 80<sup>th</sup> Division artillery barraged Brioules with 1,000 phosgene shells and 1,500 yperite shells (the following morning), German forces were only temporarily silenced, and quickly restored their defenses around Brioules and on the northwestern ridge.<sup>67</sup>

In addition to the events at the beginning of the offensive, daily reports of the Verdun Grouping reveal that a total of 48,725 yperite shells were fired east of the Meuse during the period of October 14<sup>th</sup> to November 1<sup>st</sup>.<sup>68</sup> It is important to note that data from two days is missing and there was no firing during three days within this period.<sup>69</sup>

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<sup>65</sup> Cochrane, 31.

<sup>66</sup> Ibid.

<sup>67</sup> Ibid, 31.

<sup>68</sup> Ibid, 40.

<sup>69</sup> Ibid.



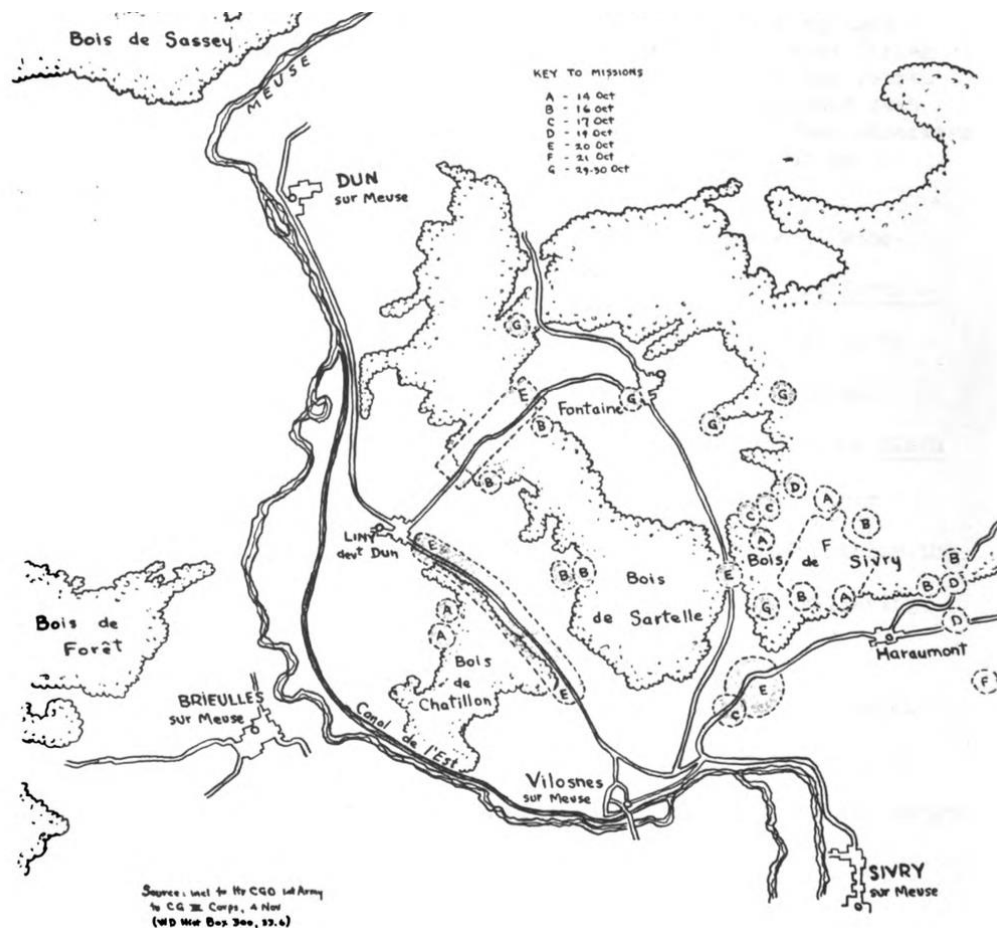


Figure 3.13: Zone bombed with yperite east of the Meuse from October 14 to 30, 1918.<sup>70</sup>

These statistics of chemical weapon usage east of the Meuse have been included because of the wind-carry inherent to the use of chemicals, meaning that although these weapons were deployed in one area, they could pose immediate and lasting ecological and public health hazards in the adjacent areas. Within the Department of the Meuse, however, according to Army artillery records, between 3,000 and 6,500 rounds of mustard gas were fired daily across the Meuse the week of November 2, 1918.<sup>71</sup>

<sup>70</sup> Ibid, 41.

<sup>71</sup> Ibid, 40.

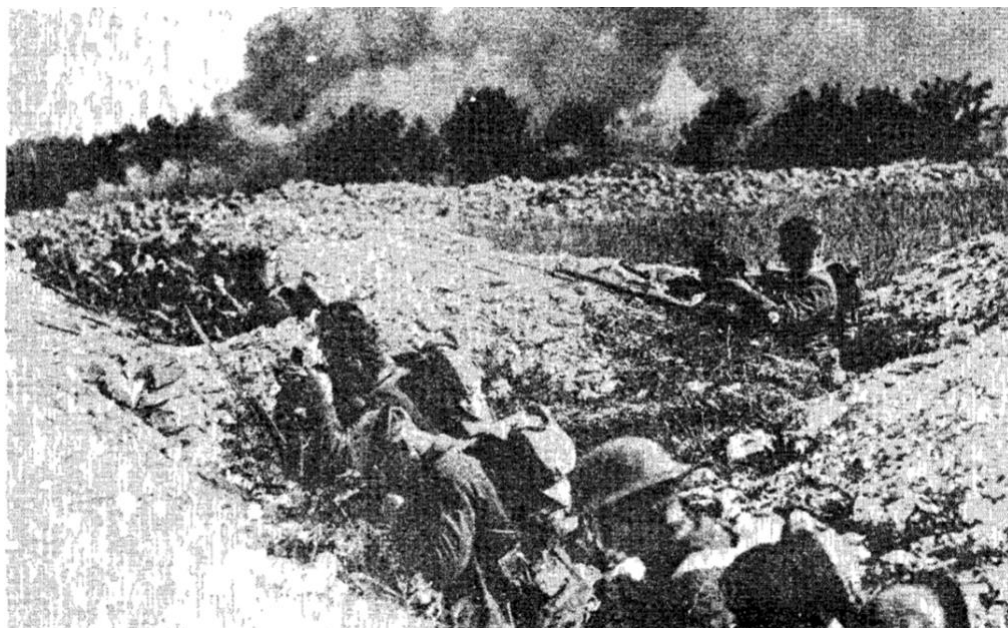


Figure 3.14: Infantrymen of the 28<sup>th</sup> Division masking during a gas attack on August 23, 1918.<sup>72</sup>

During this military operation, the A.E.F. fought through the rough, hilly terrain in which the German Army had spent four years fortifying.<sup>73</sup> Within the territory of the Meuse-Argonne Offensive lies the towns of Varennes-en-Argonne and Nantillois. These two towns, like many other towns along the Western Front, were completely devastated, and after the war they were deemed a part of the *zone rouge* by French governmental surveyors.

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<sup>72</sup> Charles E. Heller. *Chemical Warfare in World War I: The American Experience, 1917-1918*. Leavenworth Papers, no. 10. September 1984. <http://www.armyupress.army.mil/Portals/7/combat-studies-institute/csi-books/leavenworth-papers-10-chemical-warfare-in-world-war-i-the-american-experience-1917-1918.pdf>, 77.

<sup>73</sup> "The Big Show." The Meuse-Argonne Offensive: General Pershing's Report. Accessed March 1, 2018. <http://www.worldwar1.com/dbc/bigshow.htm>.





Figure 3.15: American artillery in action near Varennes.<sup>74</sup>

Varennes-en-Argonne, a hotly contested village during the war, was liberated by Pennsylvania's Keystone Division, the 28<sup>th</sup> Division, in September 1918, following the town's almost four-year occupation by German troops.<sup>75</sup> The town seal now includes a War Cross, to reward and recognize the hardships and sufferings faced during the Great War.<sup>76</sup> However, according to Varennes' tourism webpage, "The forest of Argonne, the natural border between the great plain of the Parisian basin and Lorraine, between the kingdom of Charles the Bald and the empire of Lothaire, has always been a place conducive to fighting."<sup>77</sup>

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<sup>74</sup> American Artillery Fire in Varennes-en-Argonne in the Meuse-Argonne. <https://goo.gl/images/4Jgibb>.

<sup>75</sup> [http://tac-bsa.org/wp-content/uploads/2017/12/meuse\\_argonne\\_hist\\_trail.pdf](http://tac-bsa.org/wp-content/uploads/2017/12/meuse_argonne_hist_trail.pdf).

<sup>76</sup> "Historique De La Commune."

<sup>77</sup> Ibid.



Figure 3.16: The French commune of Varennes-en-Argonne.<sup>78</sup>

The Pennsylvania Memorial is located on top of a hill overlooking the town of Varennes-en-Argonne, or Varennes, that was captured by the 28<sup>th</sup> Division of the United States Army on September 26, 1918 during the Battle of the Meuse. Varennes is a commune located in the Meuse department in northern France's Grand l'Est region. Varennes lies on the Aire River to the northeast of Verdun and Sainte-Menehould. This commune is 4.56 square miles large and, as aforementioned, is located within the *zone rouge*. Varennes, a town that's existence dates back to 1000, was almost completely destroyed during the First World War and was therefore reconstructed following the armistice.

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<sup>78</sup> Taken by the author on May 27, 2017.



Figures 3.17 and 3.18: The 28<sup>th</sup> Division in Varennes, September 26-27, 1918.  
The buildings suffered heavy shelling.<sup>79</sup>

As a commune with pre-war agricultural foundations, it is important to discuss the material damage to its agricultural and rural landscapes. The implications of such damage will be expanded upon in Chapter 4.

		Area	%
Total forest		481.96 ha	100
Disrupted soil/terrain, lost reserves, and destroyed state forest		6	2
Soil or terrain searches or excavations		79	16.4
		165.52	34.2
Damages from bombings or explosions	75% reserves lost	141.65	29.2
	50% reserves lost	25.72	5.3
	25% reserves lost	65.11	13.5
Undamaged sections		0	0
Iron wire network		88000 m <sup>2</sup>	186 m <sup>2</sup> /ha
Trenches and tunnels		16317 m <sup>2</sup>	34 m <sup>3</sup> /ha
		Surface or volume	Per hectare

Table 1.1: Statistics of agricultural recovery in Varennes-en-Argonne.<sup>80</sup>

<sup>79</sup> “September 26, 1918, Varennes-en-Argonne.” Some WW1 Photographs... September 24, 2014. Accessed March 1, 2018. <https://ww1photographs.wordpress.com/2014/09/26/september-26-1918-varennes-en-argonne/>; “Schwerpunkt at Fismette, August 27, 1918.” Army. Accessed March 1, 2018. [https://www.army.mil/article/44329/schwerpunkt\\_at\\_fismette\\_august\\_27\\_1918](https://www.army.mil/article/44329/schwerpunkt_at_fismette_august_27_1918).

<sup>80</sup> Jean-Paul Amat. “Guerre et milieu naturels: les forêts meurtries de l’Est de la France, 70 ans après Verdun.” *L’Espace Géographique*, 16, 1987, 229-230; Data from the information bulletin of the forest of Varennes-en-Argonne (obtained from the Center de gestion ONF, Verdun), with an area of 482 ha; A general survey of the state of forests devastated by the war was drawn up in 1920 by the Water and Forestry Administration. These information bulletins analyze, among other things, the nature and extent of destruction for each parcel.

The commune of Nantillois (2.96 square miles) was also almost entirely demolished as a result of the First World War. This commune within the Meuse department is situated between Montfaucon and Romagne-sous-Montfaucon. The Germans occupied Nantillois for slightly over four years until the town was liberated by U.S. troops on September 28, 1918.

Nantillois' population has been rather inconsistent over the years. The population as of 2016 is 65. However, this number is less than the population of the 1926 census (149), when the majority of people within the commune of Nantillois were professionals in farming, agriculture, or cultivation.<sup>81</sup>



Figures 3.19 and 3.20: Nantillois, France in ruin.<sup>82</sup>

### ***Economic Implications of Environmental Degradation in the Meuse and the Marne***

French government estimates declare that on the eve of the war, Marne consisted of 282,584 ha total, 254,626 ha of this sum being arable and another 11,007 ha consisting of permanent grassland. The Meuse department, which was made of 261,510 ha at the time, had 179,000 ha of

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<sup>81</sup> Mayor J. Pesamy. "Liste Nominative Des Habitants De La Commune de Nantillois." March 20, 1926. Accessed March 12, 2018. <http://archives.meuse.fr/ark:/52669/a011418739458gdsmdg/50961dbaf6>; "Nantillois." Wikipedia. July 11, 2017. Accessed May 06, 2018. <https://en.wikipedia.org/wiki/Nantillois>.

<sup>82</sup> Taken March 25, 19. National Archives and Records Administration. Record Group RG 117; "Multimedia." American Battle Monuments Commission. Accessed March 1, 2018. <https://www.abmc.gov/multimedia/images/wwi-education-program-ruins-nantillois>.

arable land and 41,000 ha of permanent grassland.<sup>83</sup> According to the Ministère de l'Agriculture's 1911-1914 reports, on the eve of the war, the ten *départements* within the warzone contained twelve percent of France's total landmass and fifteen percent of France's arable land.<sup>84</sup> Further, these ten war-torn *départements* included twenty-two percent of the nation's improved grasslands (*herbages*).<sup>85</sup> In the context of the French economy, agricultural productivity was high in these *départements*, with the ten *départements* consisting of fifteen percent of the nation's wheat-growing surface, but yielding no less than twenty-seven percent of France's total output (calculated average for 1910-1913).<sup>86</sup> These pre-war figures gave the ten *départements* a regional average yield of 22.37 qx/ha, a value almost double the national mean of 12.81 qx/ha.<sup>87</sup> Even the *département* with the lowest average yield still superseded the national mean on the eve of the war (Meuse, 13.32 qx/ha).<sup>88</sup>

	<b>Total</b>	<b>&lt;1 ha (%)</b>	<b>1-10 ha (%)</b>	<b>10-40 ha (%)</b>	<b>&gt;40 ha (%)</b>
<b>Marne</b>	62,766	41.3	38.1	15.7	4.7
<b>Meuse</b>	59,016	39.6	45.0	13.4	1.9
<b>Total (all 10 départements)</b>	669,351	45.0	40.8	11.5	2.6

Table 1.2: Farm structures in 1892, by whole *département* (Ministère de l'Agriculture (1897)).<sup>89</sup>

<sup>83</sup> Clout 1996, 12.

<sup>84</sup> Ibid, 14.

<sup>85</sup> Ibid.

<sup>86</sup> Ibid, 14-15.

<sup>87</sup> Ibid, 15; The combined yields of Aisne, Nord, Oise, Pas-de-Calais, and Somme totaled one-fifth of France's home supply of wheat.

<sup>88</sup> Ibid; The unit often used to quantify, or measure, grain yields is a metric quintal per hectare, where one quintal equals one hundred kilograms.

<sup>89</sup> Ibid, 14.



As a comparison, to show the importance of agriculture to the livelihoods of those living within each commune, I have included updated figures (from 2012) below. It is important to keep in mind, however, that despite the communes' economic dependence on agriculture, there have not been adequate studies to test the safety of the reversion of former battlefields in the area to agricultural land.

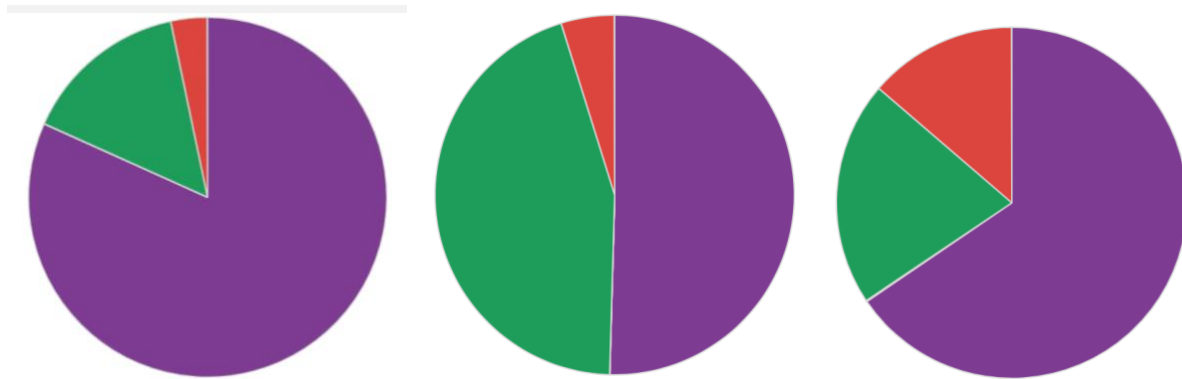


Figure 3.21: Land use in Nantillois (left), Varennes (center), and Fismes (right) as of 2012: human occupation (red), agriculture (purple), and forest (green).<sup>90</sup>

2012 Data	Nantillois		Varennes		Fismes		National Average
	Area	Percentage	Area	Percentage	Area	Percentage	
Human occupation	25 ha	3.3%	57 ha	4.8%	229 ha	13.7%	7.0%
Agriculture	629 ha	81.7%	595 ha	50.4%	1093 ha	65.5%	64.6%
Forest	115 ha	15.0%	527 ha	44.7%	346 ha	20.7%	23.2%
Natural Space	0 ha	0.0%	0 ha	0.0%	1 ha	0.2%	4.3%
Wet Area	0 ha	0.0%	0 ha	0.0%	0 ha	0.0%	0.2%
Water	0 ha	0.0%	0 ha	0.0%	0 ha	0.0%	0.6%

Table 1.3: Human occupation in Nantillois, Varennes, and Fismes as of 2012.<sup>91</sup>

<sup>90</sup> "Pollution à Nantillois (55270): les chiffres." L'Internaute. Accessed April 20, 2018. <http://www.linternaute.com/actualite/pollution/nantillois/ville-55375>. From Linternaute.com d'après Corine Land Cover; "Pollution à Fismes (51170): les chiffres." L'Internaute. Accessed April 20, 2018. <http://www.linternaute.com/actualite/pollution/fismes/ville-51250>. From Linternaute.com d'après Corine Land Cover; "Pollution à Varennes-en-Argonne (55270): les chiffres." L'Internaute. Accessed April 20, 2018. <http://www.linternaute.com/actualite/pollution/varennes-en-argonne/ville-55527>. From Linternaute.com d'après Corine Land Cover; As of 2012 statistics, in Montfaucon, 53.8% of land is used for agriculture and 42.6% is forest.

<sup>91</sup> "Pollution à Nantillois (55270): les chiffres."

## *Changing Ecology*

In regard to the state of wildlife populations, half of the total cover of oak, beech, and hornbeam throughout the Meuse was deemed to be damaged as a result of the war.<sup>92</sup> Over half of the communal woodland in that department had been devastated and two-fifths of both state and private woodland had suffered material damage.<sup>93</sup>

When it finally came to the process of clearing the land, trenches and barbed wire proved to be hindrances to rapid land reconstruction. Farmers in the Nord, for example, complained that the STPU had not filled shell holes and trenches properly, and left barbed wire and metal stakes in the soil, thereby making ploughing difficult and hazardous.<sup>94</sup> Other commenters claimed that the STPU has recorded some shell holes as being filled but in fact had done nothing to make them safe.<sup>95</sup>

Tate Keller, author of “Destruction of the Ecosystem,” claims that “the natural world often remains a voiceless casualty of war in current scholarship.”<sup>96</sup> Keller notes that often times, history texts “typically regard the environment as the backdrop for battle or as collateral damage, if they consider the natural world at all. Such is the paradox of the environment in times of war: nature is both omnipresent and invisible.”<sup>97</sup> It is in this assertion that a great truth comes forward, “only by taking the environment into account can we fully understand the trauma of the Great War and how this conflict shaped the most basic levels of human existence for years afterwards.”<sup>98</sup>

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<sup>92</sup> Clout, 37.

<sup>93</sup> Ibid, 27.

<sup>94</sup> Ibid, 93.

<sup>95</sup> Ibid.

<sup>96</sup> Tate Keller. “Destruction of the Ecosystem.” *International Encyclopedia of the First World War*, 2014.

<sup>97</sup> Ibid.

<sup>98</sup> Ibid.

In parts of the Western Front, the earth was so damaged and poisoned by the toxic gas, the mine warfare on an unprecedented scale, and the rotten corpses that even today it will not bear life. In these areas, the ground is simply grey and there is little hope that any vegetation will grow there again. In other areas, new species have grown on the landscape.

Soil contamination is a form of collateral damage of World War I. The environmental persistence of some military-origin contaminants is demonstrated by the heavy metal contamination in soils and leachates. Scientists have recommended that even the surrounding land should not be used for agricultural purposes because of the high concentration of contaminants at these abandoned disposal sites. The battles of the Great War turned stable soil ecosystems into loose, unconsolidated sediment, thus altering the surface hydrology, water table characteristics, and soil development rates.<sup>99</sup>

Keller argues that “combat on the Western Front altered the makeup of forests and the composition of soil.”<sup>100</sup> He claims that prior to 1914, “the majority of forests along the Western Front were deciduous, comprising European Beech, European Hornbeam, European Oak, and English Oak.”<sup>101</sup> During the French government’s reforestation program, “Austrian Pine and Scotch Pine (*Pinus sylvestris*) seedlings, fast-growing coniferous species that tolerated nutrient-poor soil” were planted in the “obliterated sections.”<sup>102</sup> After this initial effort, foresters reintroduced European Beech (*Fagus sylvatica*) as a way to combat thinning and clearing of pine.<sup>103</sup> Keller notes that “today some areas remain covered with conifers, although the majority of the battlefield is covered with a beech-dominated, deciduous forest.”<sup>104</sup>

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<sup>99</sup> Hupy.

<sup>100</sup> Keller.

<sup>101</sup> Ibid.

<sup>102</sup> Ibid.

<sup>103</sup> Ibid.

<sup>104</sup> Ibid.



France's immediate post-war cleanup program involved the disposal of UXO and ammunition stockpiles. Meanwhile shells made out of lead, copper and brass, fuses made out of copper and zinc together with ammunition containing arsenic were burned in open pits, resulting in soil concentrations of these substances above normal background levels. Perchlorates and chlorate, along with small levels of nitroaromatic explosives are also still present in leachates in the topsoil.

Some of the Western Front remains suspended in the year 1918.<sup>105</sup> The use of modern, industrial weaponry during the Great War generated landscapes that would be forever changed. As I will discuss further in Chapter 4, modern warfare creates as well as destroys.<sup>106</sup> Landscape is transformed, and this transformation can be seen all along the Western Front. Whether visible to the naked eye or hidden beneath the soil's surface, the persisting environmental consequences of the First World War, insidious in essence, have much greater, more severe implications.

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<sup>105</sup> Jonathan Olley, *Orion Magazine*. Accessed April 28, 2017. [https://orionmagazine.org/category/feature/the-world-as-we-know-it/?post\\_type=article](https://orionmagazine.org/category/feature/the-world-as-we-know-it/?post_type=article).

<sup>106</sup> Ibid.

## **Chapter 2:**

### **The Environmental Cost of Victory**

Geographer Joni Seager asserts, “Militaries are the world’s biggest vandals, whether at war or in peace.”<sup>1</sup> She continues by declaring, “as the technological might and global reach of militaries increases, so does their destructive capacity.” This increasing destructive capacity can be seen over the four years in which the First World War was fought, but as the first instance of mechanized war, there is not currently a clear threshold for war-related destruction in sight.<sup>2</sup>

In this chapter, I discuss the nature of war-fighting during the First World War, with special emphasis on two campaigns: The Battle of the Meuse (a campaign within the Meuse-Argonne Offensive, which was fought from September 26, 1918 until November 11, 1918 [the Armistice]) and the Battle of Fismes and Fismette, which took place from August 3, 1918 to September 1, 1918. My narrative of World War I within this chapter thus focuses on the towns in which the three overseas Pennsylvania memorials are located—Varennes-en-Argonne, Fismes, and Nantillois—and the battles, or campaigns, where, respectively, Pennsylvania soldiers of the 28<sup>th</sup>, 79<sup>th</sup>, and 80<sup>th</sup> divisions fought within or in the immediate vicinity these towns. Further, I discuss the economic implications of these battles on the French communes of Varennes-en-Argonne, Fismes, and Nantillois, particularly in relation to the material losses as a result of the environmental degradation that ensued, both initial and persistent. The significance of these

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<sup>1</sup> Forward by Joni Seager in William Thomas. *Scorched Earth: The Military's Assault on the Environment*. Philadelphia, PA: New Society Publ., 1995, xi.

<sup>2</sup> Ibid.

losses is better understood when made aware of the fact that between 1905 and 1913, “agriculture constituted 40 percent of the national product” in France.<sup>3</sup>

### ***An Overview of How War Was Waged***

At its onset, World War I on the Western Front appeared as if it was going to be fought in the same manner as previous wars—mobile and short.<sup>4</sup> But as troops hit deadlock in mid-November, movement began to be measured in yards, not miles, and troops on each side dug trenches as an attempt to safely hold their positions.<sup>5</sup>

As the first instance of modern, mechanized warfare, World War I changed the nature of warfare, making the act of war far more destructive than ever before. As the war waged on, new technologies were introduced into warfighting. When the United States entered the First World War in 1917, the technological might of warfare had reached its height. The use of chemical weapons was common by that point, and other weapons such as plane-bombers and tanks made their appearance on the front.

The main types of chemical weapons utilized by either side in the Battle of the Meuse and the Battle of Fismes and Fismette were tear gas mixtures, blue cross (diphenyl chlorarsine or diphenyl cynarsine), green cross (diphosgene or a combination of phenyl carbylamines chloride), phosgene, and yellow cross (dichlorethyl sulphide, more popularly known as mustard gas or yperite).

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<sup>3</sup> Roger Price. *The Economic Modernisation of France*. New York: Wiley, 1975, 225.

<sup>4</sup> Mosse, George L. *Fallen Soldiers: Reshaping the Memory of the World Wars*. New York: Oxford University Press, 2011, 3.

<sup>5</sup> Price, 225.

During the Meuse-Argonne Offensive, about 129,000 tons of gas were used, approximately 68,000 tons by the Germans, 36,000 tons by the French, and 25,000 tons by the United States.<sup>6</sup> The United States' initial raid of the offensive on September 6, 1918 used more explosives in three hours that had been used in the entire United States Civil War.<sup>7</sup>

In the case of both the Battle of the Meuse and the Battle of Fismes and Fismette, the arsenal of deadly weapons and obstacles also included airplane bombs, hand grenades, barbed wire, mortar and artillery shells, machine guns, and rifle bullets (often made of shrapnel). However, the Battle of Fismes and Fismette is partly best-known for the heavy use of flame-throwers.<sup>8</sup>

During the First World War, the previously unrefined concept of indirectly firing at an unseen enemy using trigonometric equations became the norm. In this type of indirect artillery tactic, hitting a target on the lee side of a ridge proved much more difficult than hitting the crest or fore slope. (Armies were easy targets when on a ridge crest because this was what the gunners used to sight their artillery pieces.) Thus, the crests and facing hillslopes on high ground (especially those facing the enemy) were most vulnerable to artillery fire and bore the brunt of most artillery barrages. Therefore, the location of armies in relation to topographic position influenced the degree of disturbance across the battlefield.

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<sup>6</sup> Matt Deegan. "The Weapons of the Meuse-Argonne Offensive." American Battle Monuments Commission. Accessed March 1, 2018. <https://www.abmc.gov/learning-resources/lesson-plans/weapons-meuse-argonne-offensive>, 78.

<sup>7</sup> Ibid, 90.

<sup>8</sup> I was not able to determine if flame throwers were used in the Meuse-Argonne against the three respective Pennsylvania-related divisions; however, I was able to determine that the Germans used flame-throwers against the 77<sup>th</sup> Division in this campaign. The 77<sup>th</sup> Division contained a number of Bucknell alumni.



Figure 3.1: A battered tank in Varennes. First hit by a shell then burned.<sup>9</sup>

Over the course of the First World War, millions of bomb and shell craters invaded former crop fields and woodlands. Since the battles that ensued, northern France remains littered with artillery shells, some filled with chemicals, and other munitions.

### ***The Battle of Fismes and Fismette***

The bloody Battle of Fismes and Fismette occurred in the small French commune of Fismes between August 3, 1918 and September 1, 1918. This battle is unique in the war's history due to the extreme violence and street fighting that occurred, compared to the majority of World War I battles which took place on farmland, in addition to the presence of storm trooper attacks and flame throwers.<sup>10</sup> The culmination of these factors ruined Fismes, with ninety percent of the

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<sup>9</sup> Pennsylvania in the First World War/World War I, 408.

<sup>10</sup> "Battle of Fismes and Fismette." Revolv. Accessed March 1, 2018.  
[https://www.revolv.com/main/index.php?s=Battle of Fismes and Fismette.](https://www.revolv.com/main/index.php?s=Battle of Fismes and Fismette)

commune destroyed, and created a battle that was regarded as one of the most vicious in all of World War I.<sup>11</sup> Over the course of the battle's duration, Fismes would be won and lost a total of five times by the Allies.<sup>12</sup>

After the failure in the Second Battle of the Marne, Germany's last major attack of the war, German troops retreated to Fismes, developing a new front along the Vesle River. On August 3, 1918, American troops attacked this new front in hopes to break through. Over the first two days of the battle, the 32<sup>nd</sup> American Division lost around 2,000 men through the attempt to cross the Vesle and reach Fismes.<sup>13</sup> Following this slaughter, the 32<sup>nd</sup> Division was relieved by the 28<sup>th</sup> Infantry Division, also known as the Keystone Division given its high composition of Pennsylvanians.

On August 26, 1918, the 28<sup>th</sup> Division captured Fismette, creating a bulge in the German line.<sup>14</sup>

In the early morning hours of August 27, 1918, 230 Pennsylvanians of the 28th Division trudged across the Vesle River into their defensive positions in the rubble- strewn village of Fismette, France. Less than an hour after taking up their fighting positions, these men would encounter the terror, confusion and savagery of the German principle of "Schwerpunkt," or focus of energy. A full battalion of elite Stormtroopers armed with rifles, grenades and flamethrowers rushed the weak American line.<sup>15</sup>

The German gas mission for August 7th and 8th included infantry as well as artillery targets that German observers had located. The 4th Guard reported that early on the morning of the 8th it had shelled the bottom of the Ardre Valley with 655 rounds of yellow cross and put yellow cross rafales<sup>16</sup> along the Ardre Valley, in Villesavoye, and in

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<sup>11</sup> Ibid.

<sup>12</sup> Ibid; and "World War 1." Tour De Travoy. April 13, 2017. Accessed March 1, 2018. <https://tourdetravoy.wordpress.com/history/world-war-1/>.

<sup>13</sup> "Battle of Fismes and Fismette."

<sup>14</sup> "Schwerpunkt at Fismette, August 27, 1918." Army. Accessed March 1, 2018. [https://www.army.mil/article/44329/schwerpunkt\\_at\\_fismette\\_august\\_27\\_1918](https://www.army.mil/article/44329/schwerpunkt_at_fismette_august_27_1918).

<sup>15</sup> "Tragedy at Fismette, France, 1918."

<sup>16</sup> A rafale ("squall") fire was a sudden burst of simultaneous rapid artillery fire from each of the guns of a battery.

the woods southwest of that village.<sup>17</sup> Between 3:00am and 5:00am, five field batteries of the 216th Division carried out a yellow cross contamination shoot on the woods and roads south of Villette and from 5:00am to 5:30am put yellow cross on the woods east of Fismes and along the northern edge of Magneux. On the night of August 8th, three batteries of the 216th again contaminated the woods east of Fismes with 200 rounds of yellow cross, and the following morning, repeated the gassing of Magneux and the nearby woods. Standing orders read: "The section of Fismes east of the Fismes-St. Gilles-Blanzky road and south of the railroad will continue to be held under slight harassing fire.....If the weather is favorable, contaminate with yellow cross."<sup>18</sup>

Of this contamination fire, on August 7<sup>th</sup> and 8<sup>th</sup> the 28<sup>th</sup> Division reported only that Fismes had been shelled with gas and high-explosives.<sup>19</sup> However, the following day, the division said that almost 1,000 77-mm and 150-mm gas shells had fallen along its front. Regarding this attack, the enemy artillery was systematic and clearly had accurate knowledge of all battery and troop positions.<sup>20</sup>

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<sup>17</sup> The End of the Aisne-Marne Campaign. <http://www.dtic.mil/dtic/tr/fulltext/u2/a955204.pdf>, 5 and 6.

<sup>18</sup> 216<sup>th</sup> Division order on August 9<sup>th</sup>. <http://www.dtic.mil/dtic/tr/fulltext/u2/a955204.pdf>, 6.

<sup>19</sup> Ibid.

<sup>20</sup> Ibid.





shoots, KANARIENVOGEL and PARADEISVOGEL, occurred on or near the Vesle.<sup>26</sup> The 77<sup>th</sup> Division was hit hard by the two attacks, with the first, KANARIENVOGEL aimed at the division and the second aimed at its sector.<sup>27</sup> These attacks began two days after the 77<sup>th</sup> Division reached the river front.<sup>28</sup>

KANARIENVOGEL was to occur on August 15<sup>th</sup>. This large-scale attack consisted of a three-minute shelling of blue cross followed by a two-hour shelling of yellow cross.<sup>29</sup> Regarding the first attack, 1<sup>st</sup> Lt. H. D. Snyder asserted that “some 500 diphenylchloroarsine and phosgene shells ,followed by more than 2,000 mustard gas shells, fell in and around Mont Notre Dame, Villesavoye, Mont St. Martin, and in the Bois Cochelet.”<sup>30</sup> At least five batteries of 4<sup>th</sup> Guard Division were involved, three of them firing 400 rounds of yellow cross into two target areas. Additionally, six batteries of the 216<sup>th</sup> Division targeted the woods about St. Gilles and the valley to the southwest.<sup>31</sup> Further, just two batteries of the 17<sup>th</sup> Division were active in the initial attack, with three active in the repeat shoot the next morning. In addition to the 17<sup>th</sup> Division’s participation, Germany’s 29<sup>th</sup> Division also engaged in the repeat shoot, firing 887 blue cross (diphenylchlorarsine) and 2,300 yellow cross shells.<sup>32</sup> Although there has not been a report found that includes the number of yellow cross shells allotted or fired by the corps in the two shoots, the 29<sup>th</sup> Division’s report suggests that approximately 7,000 rounds of mustard gas may have been fired into the III Corps sector each night by the division of Corps Schoeler and Corps Wichura.<sup>33</sup> 1<sup>st</sup> Lt. H. D. Snyder recalled that this second attack left the 77<sup>th</sup> Division “completely

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<sup>26</sup> 13.

<sup>27</sup> Ibid.

<sup>28</sup> Ibid.

<sup>29</sup> 13.

<sup>30</sup> 15-6.

<sup>31</sup> 14.

<sup>32</sup> 14.

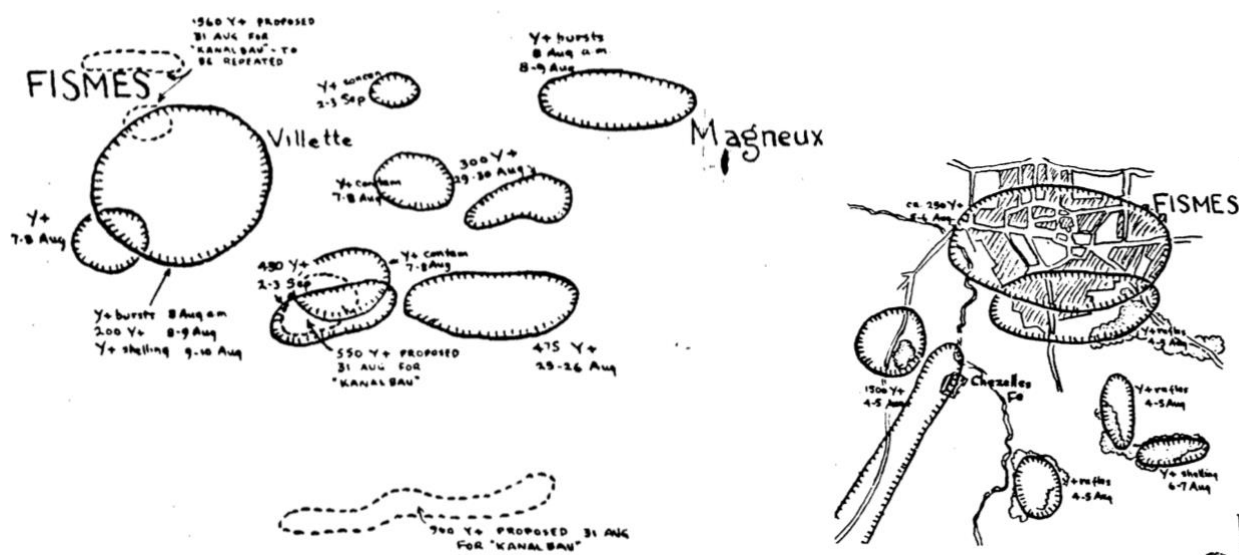
<sup>33</sup> 15.

drenched” with more than 3,000 yellow cross shells, “fired in three barrages of mixed gas and [high-explosives].<sup>34</sup>

Contrasting with the 77<sup>th</sup> Division’s intense experience, the 28<sup>th</sup> Division only reported about 100 shells in the area between St. Gilles and Courville, half of them gas.<sup>35</sup> The 28<sup>th</sup> Division’s reports recall 300 gas shells the following morning, on August 16<sup>th</sup>.<sup>36</sup>

Throughout the Battle of Fismes and Fismette, “high explosives, shrapnel and gas shells of all calibers were...poured into the valley... [and the troops] were forced to stand fast and endure the slaughter without an opportunity to fight back.”<sup>37</sup>

The Germans’ significant use of chemical gas at the Vesle were largely instrumental in producing the stalemate. Germany used gas to immobilize the 77<sup>th</sup> and 28<sup>th</sup> Divisions through the month of August, and the equally effective gas tactics German troops employed during their retreat from the Vesle to the Aisne in early September. It is estimated that German gas exacted well over 6,000 gas casualties among American divisions alone during that month at the Vesle.<sup>38</sup>



Figures 3.3: Gas map overlays for Fismes, excluding KANARIENVOGEL and PARADEISVOGEL.<sup>39</sup>

<sup>34</sup> 16.

<sup>35</sup> 19-20.

<sup>36</sup> 20.

<sup>37</sup> From *The 28<sup>th</sup> Division in the World War* in <http://www.dtic.mil/dtic/tr/fulltext/u2/a955204.pdf>, 21.

<sup>38</sup> Ibid.

<sup>39</sup> The End of the Aisne-Marne Campaign. <http://www.dtic.mil/dtic/tr/fulltext/u2/a955204.pdf>, cover; Division Report of the 32<sup>nd</sup> Division, cover. <http://www.dtic.mil/dtic/tr/fulltext/u2/a955207.pdf>.

The 6.467 square mile commune of Fismes is located within the France's Marne department in the Grand l'Est region, about 25 kilometers west from Reims. During the war, the nickname bestowed to Fismes by American doughboys was "Flames," given the explosive nature of warfare waged during the Battle of Fismes and Fismette.<sup>40</sup>



Figure 3.4: Ruins of the Town Hall of Fismes in 1918.<sup>41</sup>

In the 1800s, France underwent the industrial revolution. The economic history of the nineteenth century and the advancements of Fismes and the broader region included sugar beet, rare and expensive porcelain (specifically from Fismes), the railway, hat making, the foundry, tanneries, and mills. The local economy was dominated by the presence of a sugar factory until

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<sup>40</sup> Edward G. Lengel. *Thunder and Flames: Americans in the Crucible of Combat, 1917-1918*. University Press of Kansas, 2015. <http://www.jstor.org/stable/j.ctt1qft32v>.

<sup>41</sup> "World War 1."

the factory ceased operations in 1978. Additionally, light metalworking has also been present for “a long time” in Fismes. However, the twentieth century for Fismes and the region proved to be difficult given the undeniable impact of the Great War. German troops invaded Fismes, then remained on the Chemin des Dames before completely destroying Fismes in 1918.



Figure 3.5: Fismes' train station before the First World War, next to a large sugar refinery.<sup>42</sup>

After the First World War, Fismes attempted to gradually reconstruct itself, however, these efforts were hindered given the town's position as a railway town through which trains passed with deportees sent to Germany during World War II. A total of fourteen *Fismois* or *Fismoises* (inhabitants of Fismes), including Fismes' mayor, Dr. Genillon, were seized for acts of resistance and sent to die in Nazi concentration camps.<sup>43</sup> Despite the struggles to regain a foothold since World War I, Fismes was successfully integrated into the production zone for Champagne in 2008, after making “fismes,” or the coloring matter that gives Champagne a light rose tint, since at least the nineteenth century.<sup>44</sup>

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<sup>42</sup> Ville de Fismes. <http://www.fismes.fr>; Archives of Fismes. <http://bit.ly/Fismesarchives>.

<sup>43</sup> Ibid.

<sup>44</sup> Scientific American: Supplement, Volume 43. January 9, 1897, 17541.

Another factor that hindered Fismes' ability to thrive economically after World War I was its extremely slow population growth compared to other communes. This slow growth can be seen in Graph 1.

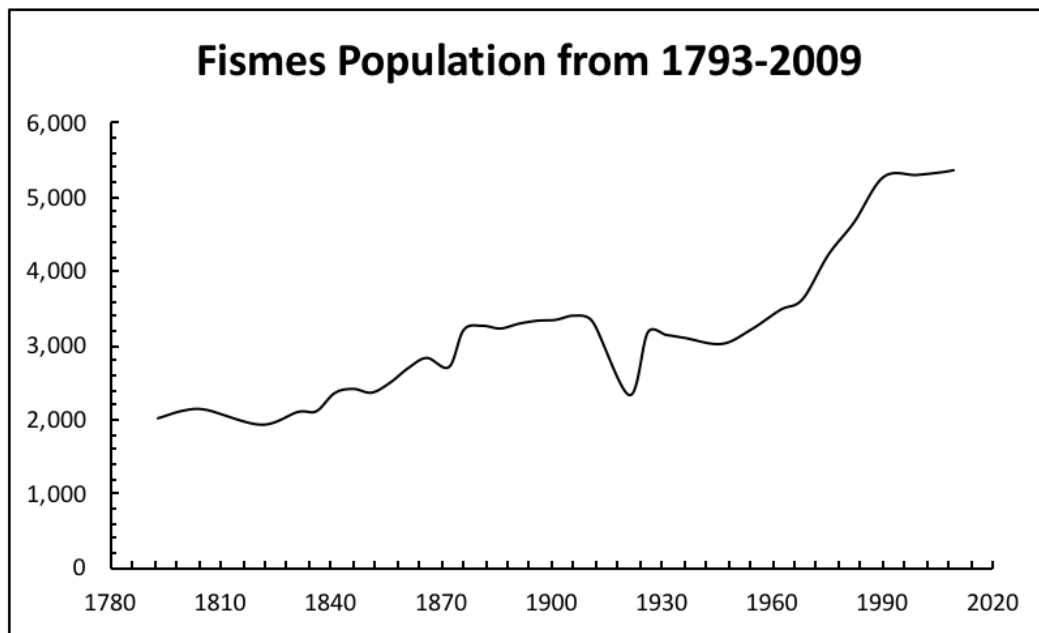


Figure 3.6: Population in Fismes from 1793 to 2009. The population drops by almost 1,000 from 1911 to 1921.<sup>45</sup>

<sup>45</sup> "Fismes." Revolv. Accessed February 02, 2018. <https://www.revolv.com/main/index.php?s=Fismes>; Fismes - Notice Communale. Accessed February 1, 2018. [http://cassini.ehess.fr/cassini/fr/html/fiche.php?select\\_resultat=13886](http://cassini.ehess.fr/cassini/fr/html/fiche.php?select_resultat=13886); Clout 1996.

### *The Meuse-Argonne Offensive: Varennes-en-Argonne and Nantillois*

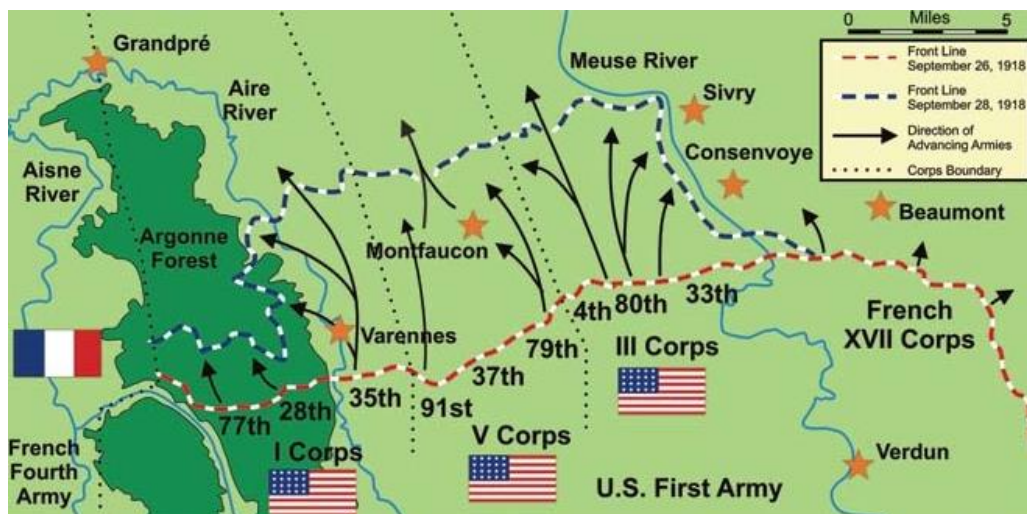


Figure 3.7: Stars indicate the use of chemical agents during the Meuse-Argonne.<sup>46</sup>

The United States' largest military operation and victory of the First World War, engaging over one million American soldiers, was a forty-seven-day offensive in the Meuse-Argonne region of northeastern France.<sup>47</sup> The Meuse-Argonne Offensive, fought from September 26, 1918 to November 11, 1918, was a part of the final Allied offensive of the war, known as the Hundred Days Offensive, and ultimately helped to bring the war to an end by cutting the main artery in the German supply system.<sup>48</sup> This offensive was also the deadliest campaign in American history, with approximately 26,277 U.S. soldiers killed in action.<sup>49</sup>

<sup>46</sup> Corey J. Hilmas, Jeffery K. Smart, and Benjamin A. Hill. "History of Chemical Warfare." Chapter 2: History of Chemical Warfare. Accessed April 2, 2018. [http://ke.army.mil/bordeninstitute/published\\_volumes/chemwarfare/CHAP2\\_Pg\\_09-76.pdf](http://ke.army.mil/bordeninstitute/published_volumes/chemwarfare/CHAP2_Pg_09-76.pdf).

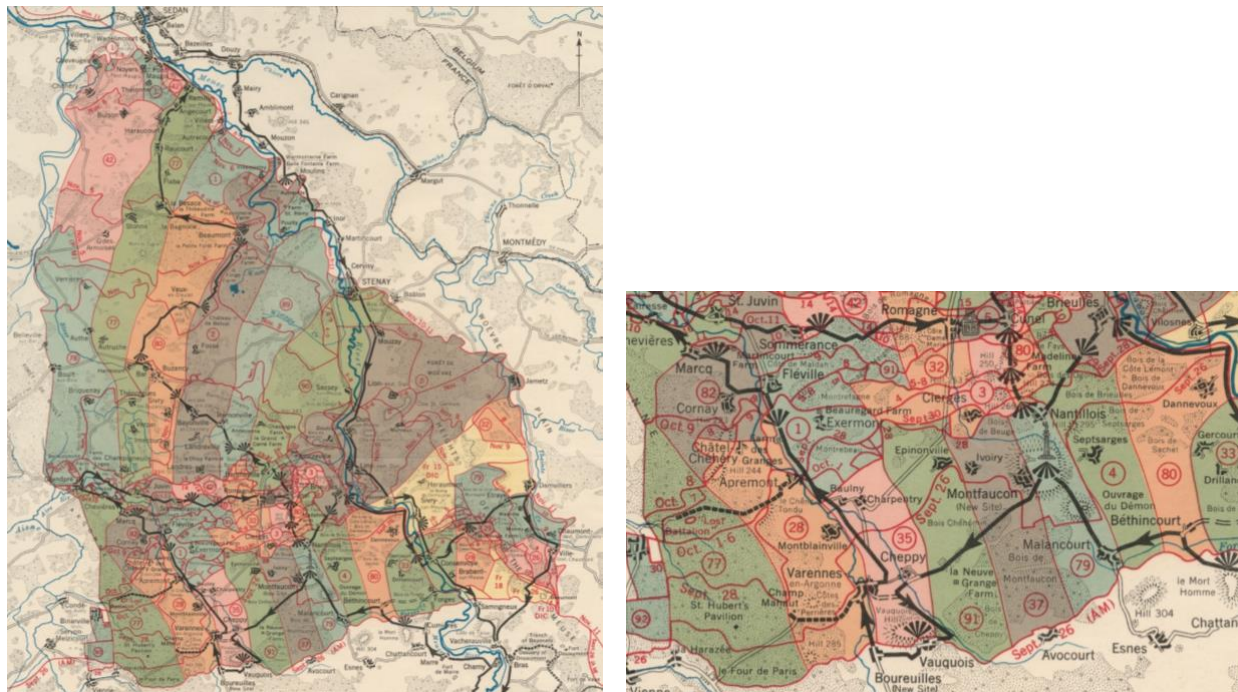
<sup>47</sup> Matt Deegan. "The Weapons of the Meuse-Argonne Offensive." American Battle Monuments Commission. Accessed March 1, 2018. <https://www.abmc.gov/learning-resources/lesson-plans/weapons-meuse-argonne-offensive>; More Americans were killed in this offensive than in any battles of the Civil War or World War II.

<sup>48</sup> "The Meuse-Argonne Offensive." National Archives and Records Administration. Accessed April 03, 2018. <https://www.archives.gov/research/military/ww1/meuse-argonne.html>; Secretary of War. Annual Report for 1919. United States Department of War. 1919, 2.

<sup>49</sup> Ibid.

General Pershing summarized the results of the Meuse-Argonne campaign in his final report:

Between September 26 and November 11, 22 American and 4 French divisions, on the front extending from southeast of Verdun to the Argonne Forest, had engaged and decisively beaten 47 different German divisions, representing 25 percent of the enemy's entire divisional strength on the western front... [...] ...The First Army suffered a loss of about 117,000 in killed and wounded. It captured 26,000 prisoners, 847 cannons, 3,000 machine guns, and large quantities of material.<sup>50</sup>



Figures 3.8 and 3.9: American Battle Operations in the Meuse-Argonne region. Right: Entire campaign. Left: Cropped to show the actions of the 28<sup>th</sup>, 79<sup>th</sup>, and 80<sup>th</sup> divisions in Varennes, Nantillois, and Montfaucon.<sup>51</sup>

<sup>50</sup>“The Big Show.”

<sup>51</sup> American Battle Monuments Commission. *American Armies and Battlefields in Europe: A History, Guide, and Reference book*. Washington: Headquarters, U.S. Marine Corps., 1938.



During the offensive, the 28<sup>th</sup> and 77<sup>th</sup> divisions of the AEF had particularly difficult times advancing. In the Aire Valley, the 28<sup>th</sup> Division suffered flanking fire from the forest, as all troops in the area would for the next few weeks. The 79<sup>th</sup> Division tried to storm Montfaucon, where the Germans held commanding heights. The German artillery devastated the advancing Americans.<sup>52</sup>

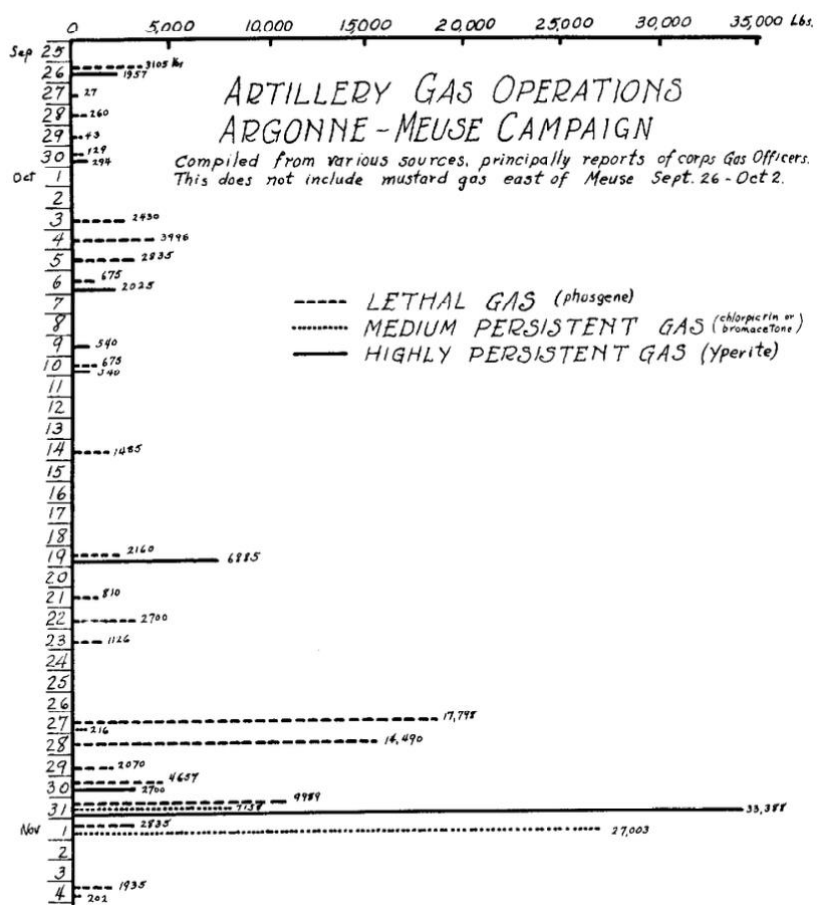


Figure 3.10: Artillery gas operations during the Meuse-Argonne Offensive. Excludes data of mustard gas use east of the Meuse between September 26 and October 2, 1918.<sup>53</sup>

<sup>52</sup> Andrew Knighton. "The Largest American Military Operation of the First World War - The Meuse-Argonne Offensive." War History Online. June 14, 2017. Accessed February 12, 2018. <https://www.warhistoryonline.com/world-war-i/american-attack-argonne-b.html>.

<sup>53</sup> Rexmond C. Cochrane. *The Use of Gas in the Meuse-Argonne Campaign, September-November 1918*. Army Chemical Center, Md.: U.S. Army Chemical Corps Historical Office, 1958, 88.



No army artillery expenditure reports have been found for the yperite program proposed to take place east of the Meuse during the offensive. However, Colonel Schulz, the respective Army Gas Officer, later estimated a “probable amount of 25 to 30 tons” of gas had been used in “yperiting” east of the Meuse from September 26th to October 2<sup>nd</sup> of 1918.<sup>54</sup> An additional 60-70,000 rounds of yperite were fired east of the Meuse within just the first few days of the Meuse-Argonne Offensive.<sup>55</sup> Additionally, on September 26<sup>th</sup>, the combination of gas, prosperous, high-explosive (HE) fire, and the demonstration raids made by the XVII Corps, the 1<sup>st</sup> Austro-Hungarian Division of Maas Ost reported a total of about 500 men killed, wounded, gassed, or missing.<sup>56</sup> As a result of their tenacious gassing, the United States 1<sup>st</sup> Army “successfully neutralized the enemy guns that might have hampered the initial advance on the right flank.”<sup>57</sup>

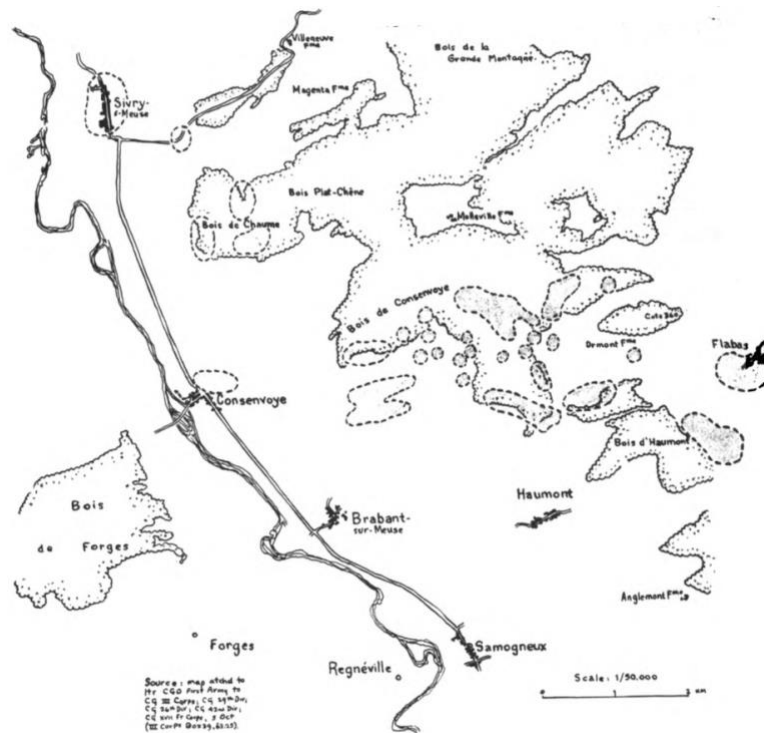


Figure 3.11: Zone bombed with gas shell type No. 20 (yperite) from September 26-October 2, 1918.<sup>58</sup>

<sup>54</sup> Ibid, 21-23.

<sup>55</sup> Ibid, 23.

<sup>56</sup> Ibid.

<sup>57</sup> Ibid, 26.

<sup>58</sup> Ibid, 22.

After delay on September 29<sup>th</sup> caused by hostile machine gun and artillery fire, “the time had arrived for a vigorous use of poisonous gas” according to Brigade General Amos A. Friss, Chief of the Chemical Warfare Service, A.E.F.<sup>59</sup> As a result, almost 2,000 phosgene shells for the Livens projectors and 2,100 phosgene and chloropicrin shells for the Stokes mortars were available for liberal use by the First Gas Regiment.<sup>60</sup> Brig. Gen. Friss recommended that this supply be used along “the entire front whenever possible.”<sup>61</sup> Only use of mustard gas by the artillery required special approval from corps headquarters.<sup>62</sup>

According to Rexmond C. Cochrane, “although the Army order for the attack called for continued neutralization with yperite east of the Meuse, on the afternoon of 3 October, III Corps was notified that no yperite was to be fired across the river until further orders.”<sup>63</sup>



Figure 3.12: U.S. Marines during the Meuse-Argonne Offensive.<sup>64</sup>

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<sup>59</sup> Ibid, 27.

<sup>60</sup> Ibid.

<sup>61</sup> Ibid.

<sup>62</sup> Ibid.

<sup>63</sup> Ibid, 29-30.

<sup>64</sup> Knighton.

After the attack launched by the 1<sup>st</sup> Army on October 4<sup>th</sup>, German batteries in the Bois de Chatillon and “on the heights beyond,” were still unable to be silenced and the A.E.F. troops were still unable to “get above the machine guns ringing the German defense positions in and around Brioules, at the bend of the Meuse.”<sup>65</sup> So, on October 6<sup>th</sup>, the bombing and gassing of Brioules commenced.<sup>66</sup> However, even after twenty planes set fire to the town and the 80<sup>th</sup> Division artillery barraged Brioules with 1,000 phosgene shells and 1,500 yperite shells (the following morning), German forces were only temporarily silenced, and quickly restored their defenses around Brioules and on the northwestern ridge.<sup>67</sup>

In addition to the events at the beginning of the offensive, daily reports of the Verdun Grouping reveal that a total of 48,725 yperite shells were fired east of the Meuse during the period of October 14th to November 1<sup>st</sup>.<sup>68</sup> It is important to note that data from two days is missing and there was no firing during three days within this period.<sup>69</sup>

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<sup>65</sup> Cochrane, 31.

<sup>66</sup> Ibid.

<sup>67</sup> Ibid, 31.

<sup>68</sup> Ibid, 40.

<sup>69</sup> Ibid.

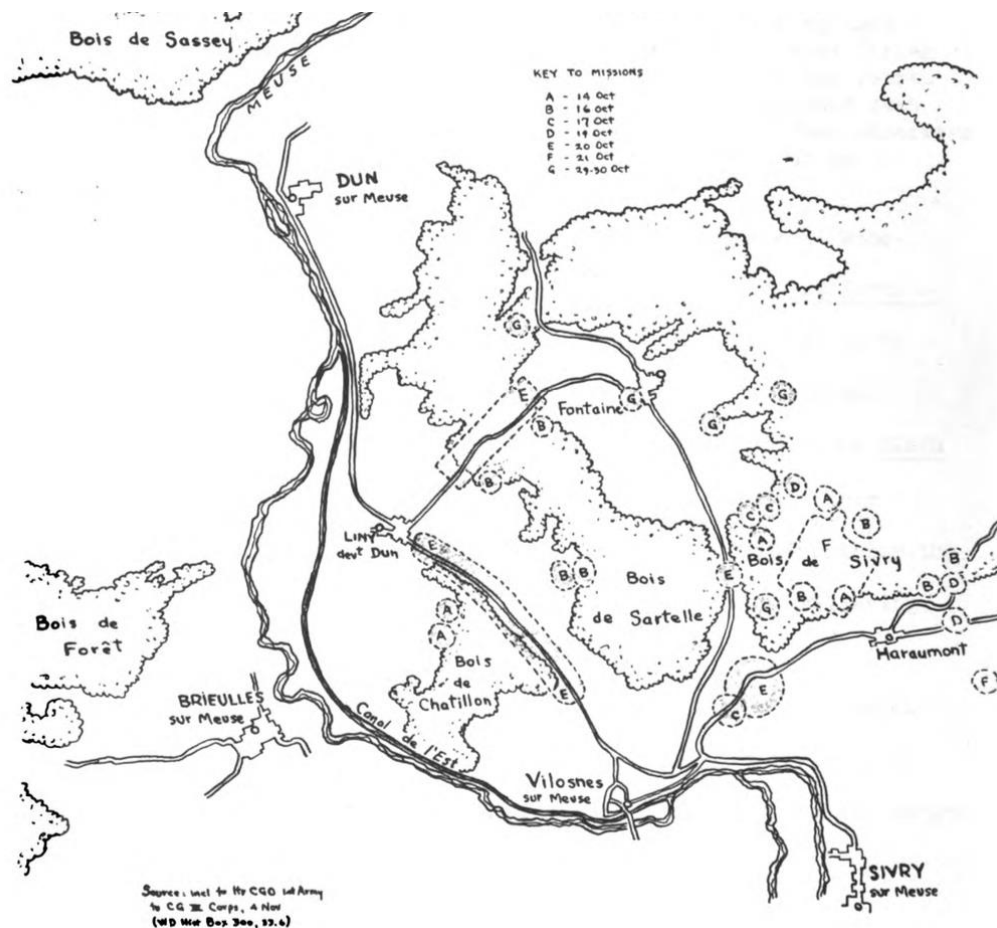


Figure 3.13: Zone bombed with yperite east of the Meuse from October 14 to 30, 1918.<sup>70</sup>

These statistics of chemical weapon usage east of the Meuse have been included because of the wind-carry inherent to the use of chemicals, meaning that although these weapons were deployed in one area, they could pose immediate and lasting ecological and public health hazards in the adjacent areas. Within the Department of the Meuse, however, according to Army artillery records, between 3,000 and 6,500 rounds of mustard gas were fired daily across the Meuse the week of November 2, 1918.<sup>71</sup>

<sup>70</sup> Ibid, 41.

<sup>71</sup> Ibid, 40.

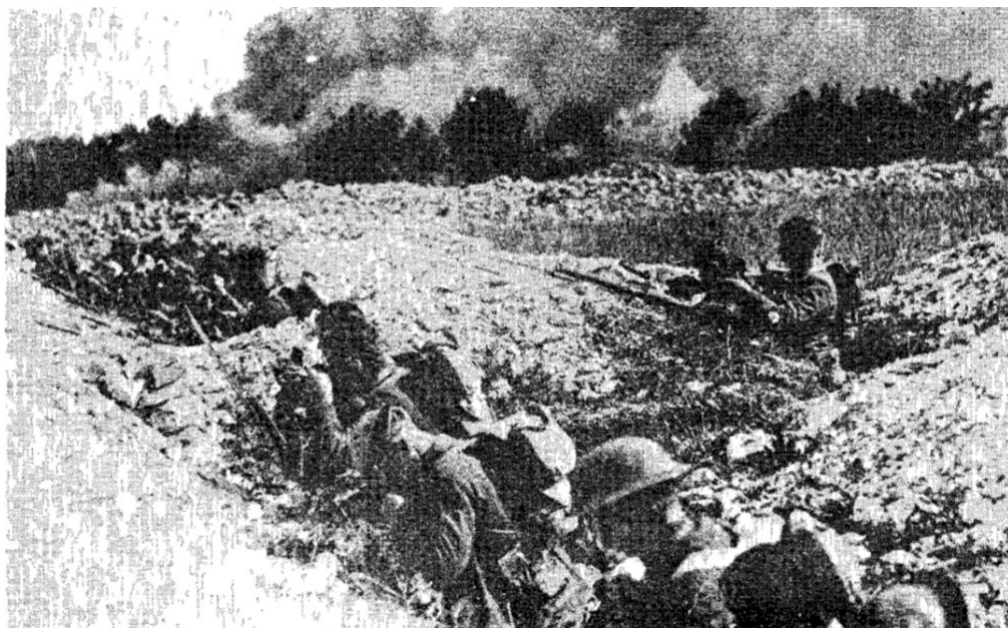


Figure 3.14: Infantrymen of the 28<sup>th</sup> Division masking during a gas attack on August 23, 1918.<sup>72</sup>

During this military operation, the A.E.F. fought through the rough, hilly terrain in which the German Army had spent four years fortifying.<sup>73</sup> Within the territory of the Meuse-Argonne Offensive lies the towns of Varennes-en-Argonne and Nantillois. These two towns, like many other towns along the Western Front, were completely devastated, and after the war they were deemed a part of the *zone rouge* by French governmental surveyors.

<sup>72</sup> Charles E. Heller. *Chemical Warfare in World War I: The American Experience, 1917-1918*. Leavenworth Papers, no. 10. September 1984. <http://www.armyupress.army.mil/Portals/7/combat-studies-institute/csi-books/leavenworth-papers-10-chemical-warfare-in-world-war-i-the-american-experience-1917-1918.pdf>, 77.

<sup>73</sup> "The Big Show." The Meuse-Argonne Offensive: General Pershing's Report. Accessed March 1, 2018. <http://www.worldwar1.com/dbc/bigshow.htm>.



Figure 3.15: American artillery in action near Varennes.<sup>74</sup>

Varennes-en-Argonne, a hotly contested village during the war, was liberated by Pennsylvania's Keystone Division, the 28<sup>th</sup> Division, in September 1918, following the town's almost four-year occupation by German troops.<sup>75</sup> The town seal now includes a War Cross, to reward and recognize the hardships and sufferings faced during the Great War.<sup>76</sup> However, according to Varennes' tourism webpage, "The forest of Argonne, the natural border between the great plain of the Parisian basin and Lorraine, between the kingdom of Charles the Bald and the empire of Lothaire, has always been a place conducive to fighting."<sup>77</sup>

<sup>74</sup> American Artillery Fire in Varennes-en-Argonne in the Meuse-Argonne. <https://goo.gl/images/4Jgibb>.

<sup>75</sup> [http://tac-bsa.org/wp-content/uploads/2017/12/meuse\\_argonne\\_hist\\_trail.pdf](http://tac-bsa.org/wp-content/uploads/2017/12/meuse_argonne_hist_trail.pdf).

<sup>76</sup> "Historique De La Commune."

<sup>77</sup> Ibid.



Figure 3.16: The French commune of Varennes-en-Argonne.<sup>78</sup>

The Pennsylvania Memorial is located on top of a hill overlooking the town of Varennes-en-Argonne, or Varennes, that was captured by the 28<sup>th</sup> Division of the United States Army on September 26, 1918 during the Battle of the Meuse. Varennes is a commune located in the Meuse department in northern France's Grand l'Est region. Varennes lies on the Aire River to the northeast of Verdun and Sainte-Menehould. This commune is 4.56 square miles large and, as aforementioned, is located within the *zone rouge*. Varennes, a town that's existence dates back to 1000, was almost completely destroyed during the First World War and was therefore reconstructed following the armistice.

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<sup>78</sup> Taken by the author on May 27, 2017.





Figures 3.17 and 3.18: The 28<sup>th</sup> Division in Varennes, September 26-27, 1918.  
The buildings suffered heavy shelling.<sup>79</sup>

As a commune with pre-war agricultural foundations, it is important to discuss the material damage to its agricultural and rural landscapes. The implications of such damage will be expanded upon in Chapter 4.

		Area	%
Total forest		481.96 ha	100
Disrupted soil/terrain, lost reserves, and destroyed state forest		6	2
Soil or terrain searches or excavations		79	16.4
		165.52	34.2
Damages from bombings or explosions	75% reserves lost	141.65	29.2
	50% reserves lost	25.72	5.3
	25% reserves lost	65.11	13.5
Undamaged sections		0	0
Iron wire network		88000 m <sup>2</sup>	186 m <sup>2</sup> /ha
Trenches and tunnels		16317 m <sup>2</sup>	34 m <sup>3</sup> /ha
		Surface or volume	Per hectare

Table 1.1: Statistics of agricultural recovery in Varennes-en-Argonne.<sup>80</sup>

<sup>79</sup> “September 26, 1918, Varennes-en-Argonne.” Some WW1 Photographs... September 24, 2014. Accessed March 1, 2018. <https://ww1photographs.wordpress.com/2014/09/26/september-26-1918-varennes-en-argonne/>; “Schwerpunkt at Fismette, August 27, 1918.” Army. Accessed March 1, 2018. [https://www.army.mil/article/44329/schwerpunkt\\_at\\_fismette\\_august\\_27\\_1918](https://www.army.mil/article/44329/schwerpunkt_at_fismette_august_27_1918).

<sup>80</sup> Jean-Paul Amat. “Guerre et milieu naturels: les forêts meurtries de l’Est de la France, 70 ans après Verdun.” *L’Espace Géographique*, 16, 1987, 229-230; Data from the information bulletin of the forest of Varennes-en-Argonne (obtained from the Center de gestion ONF, Verdun), with an area of 482 ha; A general survey of the state of forests devastated by the war was drawn up in 1920 by the Water and Forestry Administration. These information bulletins analyze, among other things, the nature and extent of destruction for each parcel.



The commune of Nantillois (2.96 square miles) was also almost entirely demolished as a result of the First World War. This commune within the Meuse department is situated between Montfaucon and Romagne-sous-Montfaucon. The Germans occupied Nantillois for slightly over four years until the town was liberated by U.S. troops on September 28, 1918.

Nantillois' population has been rather inconsistent over the years. The population as of 2016 is 65. However, this number is less than the population of the 1926 census (149), when the majority of people within the commune of Nantillois were professionals in farming, agriculture, or cultivation.<sup>81</sup>



Figures 3.19 and 3.20: Nantillois, France in ruin.<sup>82</sup>

### ***Economic Implications of Environmental Degradation in the Meuse and the Marne***

French government estimates declare that on the eve of the war, Marne consisted of 282,584 ha total, 254,626 ha of this sum being arable and another 11,007 ha consisting of permanent grassland. The Meuse department, which was made of 261,510 ha at the time, had 179,000 ha of

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<sup>81</sup> Mayor J. Pesamy. "Liste Nominative Des Habitants De La Commune de Nantillois." March 20, 1926. Accessed March 12, 2018. <http://archives.meuse.fr/ark:/52669/a011418739458gdsmdg/50961dbaf6>; "Nantillois." Wikipedia. July 11, 2017. Accessed May 06, 2018. <https://en.wikipedia.org/wiki/Nantillois>.

<sup>82</sup> Taken March 25, 19. National Archives and Records Administration. Record Group RG 117; "Multimedia." American Battle Monuments Commission. Accessed March 1, 2018. <https://www.abmc.gov/multimedia/images/wwi-education-program-ruins-nantillois>.

arable land and 41,000 ha of permanent grassland.<sup>83</sup> According to the Ministère de l'Agriculture's 1911-1914 reports, on the eve of the war, the ten *départements* within the warzone contained twelve percent of France's total landmass and fifteen percent of France's arable land.<sup>84</sup> Further, these ten war-torn *départements* included twenty-two percent of the nation's improved grasslands (*herbages*).<sup>85</sup> In the context of the French economy, agricultural productivity was high in these *départements*, with the ten *départements* consisting of fifteen percent of the nation's wheat-growing surface, but yielding no less than twenty-seven percent of France's total output (calculated average for 1910-1913).<sup>86</sup> These pre-war figures gave the ten *départements* a regional average yield of 22.37 qx/ha, a value almost double the national mean of 12.81 qx/ha.<sup>87</sup> Even the *département* with the lowest average yield still superseded the national mean on the eve of the war (Meuse, 13.32 qx/ha).<sup>88</sup>

	<b>Total</b>	<b>&lt;1 ha (%)</b>	<b>1-10 ha (%)</b>	<b>10-40 ha (%)</b>	<b>&gt;40 ha (%)</b>
<b>Marne</b>	62,766	41.3	38.1	15.7	4.7
<b>Meuse</b>	59,016	39.6	45.0	13.4	1.9
<b>Total (all 10 départements)</b>	669,351	45.0	40.8	11.5	2.6

Table 1.2: Farm structures in 1892, by whole *département* (Ministère de l'Agriculture (1897)).<sup>89</sup>

<sup>83</sup> Clout 1996, 12.

<sup>84</sup> Ibid, 14.

<sup>85</sup> Ibid.

<sup>86</sup> Ibid, 14-15.

<sup>87</sup> Ibid, 15; The combined yields of Aisne, Nord, Oise, Pas-de-Calais, and Somme totaled one-fifth of France's home supply of wheat.

<sup>88</sup> Ibid; The unit often used to quantify, or measure, grain yields is a metric quintal per hectare, where one quintal equals one hundred kilograms.

<sup>89</sup> Ibid, 14.

As a comparison, to show the importance of agriculture to the livelihoods of those living within each commune, I have included updated figures (from 2012) below. It is important to keep in mind, however, that despite the communes' economic dependence on agriculture, there have not been adequate studies to test the safety of the reversion of former battlefields in the area to agricultural land.

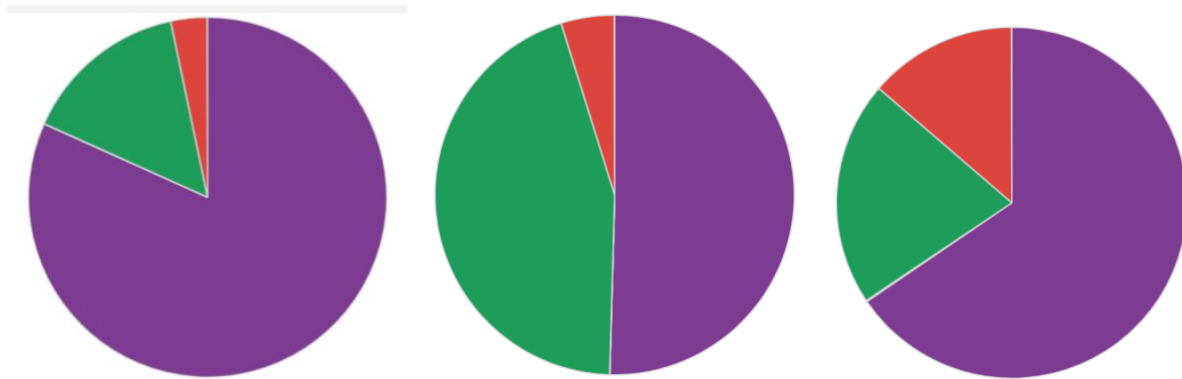


Figure 3.21: Land use in Nantillois (left), Varennes (center), and Fismes (right) as of 2012: human occupation (red), agriculture (purple), and forest (green).<sup>90</sup>

2012 Data	Nantillois		Varennes		Fismes		National Average
	Area	Percentage	Area	Percentage	Area	Percentage	
Human occupation	25 ha	3.3%	57 ha	4.8%	229 ha	13.7%	7.0%
Agriculture	629 ha	81.7%	595 ha	50.4%	1093 ha	65.5%	64.6%
Forest	115 ha	15.0%	527 ha	44.7%	346 ha	20.7%	23.2%
Natural Space	0 ha	0.0%	0 ha	0.0%	1 ha	0.2%	4.3%
Wet Area	0 ha	0.0%	0 ha	0.0%	0 ha	0.0%	0.2%
Water	0 ha	0.0%	0 ha	0.0%	0 ha	0.0%	0.6%

Table 1.3: Human occupation in Nantillois, Varennes, and Fismes as of 2012.<sup>91</sup>

<sup>90</sup> "Pollution à Nantillois (55270): les chiffres." L'Internaute. Accessed April 20, 2018. <http://www.linternaute.com/actualite/pollution/nantillois/ville-55375>. From Linternaute.com d'après Corine Land Cover; "Pollution à Fismes (51170): les chiffres." L'Internaute. Accessed April 20, 2018. <http://www.linternaute.com/actualite/pollution/fismes/ville-51250>. From Linternaute.com d'après Corine Land Cover; "Pollution à Varennes-en-Argonne (55270): les chiffres." L'Internaute. Accessed April 20, 2018. <http://www.linternaute.com/actualite/pollution/varennes-en-argonne/ville-55527>. From Linternaute.com d'après Corine Land Cover; As of 2012 statistics, in Montfaucon, 53.8% of land is used for agriculture and 42.6% is forest.

<sup>91</sup> "Pollution à Nantillois (55270): les chiffres."

## *Changing Ecology*

In regard to the state of wildlife populations, half of the total cover of oak, beech, and hornbeam throughout the Meuse was deemed to be damaged as a result of the war.<sup>92</sup> Over half of the communal woodland in that department had been devastated and two-fifths of both state and private woodland had suffered material damage.<sup>93</sup>

When it finally came to the process of clearing the land, trenches and barbed wire proved to be hindrances to rapid land reconstruction. Farmers in the Nord, for example, complained that the STPU had not filled shell holes and trenches properly, and left barbed wire and metal stakes in the soil, thereby making ploughing difficult and hazardous.<sup>94</sup> Other commenters claimed that the STPU has recorded some shell holes as being filled but in fact had done nothing to make them safe.<sup>95</sup>

Tate Keller, author of “Destruction of the Ecosystem,” claims that “the natural world often remains a voiceless casualty of war in current scholarship.”<sup>96</sup> Keller notes that often times, history texts “typically regard the environment as the backdrop for battle or as collateral damage, if they consider the natural world at all. Such is the paradox of the environment in times of war: nature is both omnipresent and invisible.”<sup>97</sup> It is in this assertion that a great truth comes forward, “only by taking the environment into account can we fully understand the trauma of the Great War and how this conflict shaped the most basic levels of human existence for years afterwards.”<sup>98</sup>

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<sup>92</sup> Clout, 37.

<sup>93</sup> Ibid, 27.

<sup>94</sup> Ibid, 93.

<sup>95</sup> Ibid.

<sup>96</sup> Tate Keller. “Destruction of the Ecosystem.” *International Encyclopedia of the First World War*, 2014.

<sup>97</sup> Ibid.

<sup>98</sup> Ibid.

In parts of the Western Front, the earth was so damaged and poisoned by the toxic gas, the mine warfare on an unprecedented scale, and the rotten corpses that even today it will not bear life. In these areas, the ground is simply grey and there is little hope that any vegetation will grow there again. In other areas, new species have grown on the landscape.

Soil contamination is a form of collateral damage of World War I. The environmental persistence of some military-origin contaminants is demonstrated by the heavy metal contamination in soils and leachates. Scientists have recommended that even the surrounding land should not be used for agricultural purposes because of the high concentration of contaminants at these abandoned disposal sites. The battles of the Great War turned stable soil ecosystems into loose, unconsolidated sediment, thus altering the surface hydrology, water table characteristics, and soil development rates.<sup>99</sup>

Keller argues that “combat on the Western Front altered the makeup of forests and the composition of soil.”<sup>100</sup> He claims that prior to 1914, “the majority of forests along the Western Front were deciduous, comprising European Beech, European Hornbeam, European Oak, and English Oak.”<sup>101</sup> During the French government’s reforestation program, “Austrian Pine and Scotch Pine (*Pinus sylvestris*) seedlings, fast-growing coniferous species that tolerated nutrient-poor soil” were planted in the “obliterated sections.”<sup>102</sup> After this initial effort, foresters reintroduced European Beech (*Fagus sylvatica*) as a way to combat thinning and clearing of pine.<sup>103</sup> Keller notes that “today some areas remain covered with conifers, although the majority of the battlefield is covered with a beech-dominated, deciduous forest.”<sup>104</sup>

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<sup>99</sup> Hupy.

<sup>100</sup> Keller.

<sup>101</sup> Ibid.

<sup>102</sup> Ibid.

<sup>103</sup> Ibid.

<sup>104</sup> Ibid.

France's immediate post-war cleanup program involved the disposal of UXO and ammunition stockpiles. Meanwhile shells made out of lead, copper and brass, fuses made out of copper and zinc together with ammunition containing arsenic were burned in open pits, resulting in soil concentrations of these substances above normal background levels. Perchlorates and chlorate, along with small levels of nitroaromatic explosives are also still present in leachates in the topsoil.

Some of the Western Front remains suspended in the year 1918.<sup>105</sup> The use of modern, industrial weaponry during the Great War generated landscapes that would be forever changed. As I will discuss further in Chapter 4, modern warfare creates as well as destroys.<sup>106</sup> Landscape is transformed, and this transformation can be seen all along the Western Front. Whether visible to the naked eye or hidden beneath the soil's surface, the persisting environmental consequences of the First World War, insidious in essence, have much greater, more severe implications.

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<sup>105</sup> Jonathan Olley, *Orion Magazine*. Accessed April 28, 2017. [https://orionmagazine.org/category/feature/the-world-as-we-know-it/?post\\_type=article](https://orionmagazine.org/category/feature/the-world-as-we-know-it/?post_type=article).

<sup>106</sup> Ibid.

## **Chapter 3**

### **Memorialization: An Ad Hoc Approach to Post-War Environmental Mitigation and Reconstruction**

In this chapter of my thesis, I discuss the three overseas Pennsylvania memorials, which serve as successful examples of memorialization as a culturally-appropriate proxy for standard environmental mitigation. This chapter is also focused on the way in which the Classical architectural style utilized within these memorials was intended by architects to perpetuate certain ideals that reinforce American nationhood, democratic ideals, and newly found global status. It is indeed the continuity of these spaces and their messages that create liminality.

Memorialization has been an effective way to heal both peoples and lands affected by the First World War. While some French towns and lands were being restored following the armistice, others were condemned by the French Government to remain un-reclaimed. In these areas where homes and livelihoods were forbidden to be restored, the land putrid with chemicals and metalloids from the war, memorialization played a significant role. These memorials, which were intended to be visited and utilized yearly for commemorative activities, at least in the case of those built by the Pennsylvania Monuments Commission (PMC) or those that received oversight from the American Battle Monuments Commission (ABMC), restored the safety of the land on which these structures reside.

The American Battle Monuments Commission made several considerations when determining where and how memorials overseas would be constructed in the war's aftermath, including those listed below:<sup>1</sup>

- i. Whatever form, memorial should provide effective setting for annual meeting or act of remembrance.
- ii. Regardless of the type, in the words of Paul P. Cret, memorial should be a "clear and arresting expression of the commemorative idea."
- iii. Civic projects under the guise of war memorials are not recommended, but if chosen, should be amply marked with tablet or other artistic accessory where annual memorial service may be conducted.
- iv. Memorials should be amply financed to ensure permanence.
- v. Sites should be distinctive and enhance memorial itself.
- vi. Avoid congestion when choosing a site.
- vii. Parks with a memorial on the plot are ideal.

The Act of Assembly, P.L. 1173, which was approved on May 27, 1921, authorized the Pennsylvania Monuments Commission, to be composed of five citizens who were former Pennsylvania servicemen, to investigate the battlefields of France and Belgium's Western Front, to cull points for the construction of memorials and markers of appropriate design in order to commemorate the achievements of Pennsylvania soldiers during the First World War, and to make a report to the General Assembly.<sup>2</sup> The appointed members of the Commission consisted of Major General William G. Price, Jr. (President), Colonel David J. Davis (Secretary), Samuel W. Fleming, Jr., Timothy O. Van Allen, and George H. Stewart, Jr. The report was rendered in February 1923.

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<sup>1</sup>Paul Phillippe Cret papers, Kislak Center for Special Collections, Rare Books and Manuscripts, University of Pennsylvania.

<sup>2</sup> Pennsylvania WWI Memorials. National Archives and Records Administration. Record Group 117.



In November 1924, plans for the erection of four memorials by the State of Pennsylvania in Europe were submitted for approval to the American Battle Monuments Commission.<sup>3</sup> These plans were presented to the Pennsylvania Monuments Commission, securing the approval of the State legislature to a project involving five memorials at the cost of \$300,000:<sup>4</sup>

- a. An altar and colonnades in the public square at Varennes-en-Argonne to be erected as a memorial to all troops of Pennsylvania who fought in World War I.
- b. A small memorial bridge between Fismes and Fismette to be erected as a memorial to the 28<sup>th</sup> Division.
- c. A public fountain in Nantillois to be erected as a memorial to the Pennsylvania troops of the 80<sup>th</sup> Division.
- d. A small memorial monument at Audenarde, Belgium, to be erected in memory of the Artillery Brigade of the 28<sup>th</sup> Division which fought in the vicinity with the 91<sup>st</sup> Division.<sup>5</sup>

The Commission was informed of plans to erect a fifth memorial in Montfaucon dedicated to the 79<sup>th</sup> Division.<sup>6</sup> However, these plans were stalled due to the ABMC's contemplation of installing a large, national memorial to American troops who fought in the Meuse-Argonne Offensive.<sup>7</sup> The PMC desired for its memorial in Montfaucon to "harmonize" with the AMBC's larger memorial, so further plans were stalled until those of the AMBC were complete.<sup>8</sup>

After "careful consideration," the commission approved the plans and was "greatly pleased with the beauty of the designs, as well as the fact that three out of the four [*sic*] memorials [were] useful in character."<sup>9</sup> Inscriptions were to be submitted and approved as they were determined.<sup>10</sup>

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<sup>3</sup> Annual Report of the American Battle Monuments Commission to the President of the United States: Fiscal Year 1925. Government Printing Office, Washington. 1926. National Archives and Records Administration. Record Group 117, 67.

<sup>4</sup> Ibid; The cost in 1924 amounts to \$4,378,140.35 relative to inflation up to 2018.

<sup>5</sup> The ABMC later decided that the memorial in Audenarde should be made a national memorial instead; The 91<sup>st</sup> Division of the A.E.F. was an African-American division.

<sup>6</sup> Annual Report of the ABMC: Fiscal Year 1925, 67.

<sup>7</sup> Ibid.

<sup>8</sup> Ibid.

<sup>9</sup> Ibid.

<sup>10</sup> Ibid.

In accordance with the law, the plans were then submitted to the National Commission of Fine Arts and were approved without change.<sup>11</sup> After approval, the governments of France and Belgium were notified that the respective memorials received official approval by the ABMC, and the plots of lands were purchased.<sup>12</sup> The memorial in Varennes, the memorial fountain in Nantillois, and the memorial bridge in Fismes were all erected in 1927 and dedicated in 1928.

Payments for the construction of these memorials were made for each of the following steps: completion of preliminary studies (divided proportionately among the different monuments), completion of working drawings and specifications, and erection and final completion.

Another fundamental step was a part of the building and planning of these overseas memorials. In his article, "Aerial Photography and Architecture," Paul P. Cret asserted that any survey or large plan of that time involved obtaining the accurate location of "a few prominent points," or polygonation.<sup>13</sup> Steps involved in the process of polygonation include the following: the measurement of height, the measurement of details, and the drawing of the map.<sup>14</sup> This was process required the use of aerial photography, which, at the time, "[gave] off a coefficient of error of only four inches for the actual location of points in plan and less than two feet for the actual heights above grade," to survey the plots of interest for memorialization.<sup>15</sup> This method,

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<sup>11</sup> Ibid; However, the Prefet de la Meuse, who praised the design and construction of the memorial in Varennes, was a bit condemning of such significant monies being spent on an ornamental structure instead of being used to alleviate the war-related sufferings of individuals in the region.

<sup>12</sup> Ibid, 58; As the result of correspondence carried out through the Department of State and the efforts of the commission while in Europe, the Governments of France and Belgium have officially agreed to withhold approval of the erection of American war memorials in their countries unless these monuments have first been approved by the ABMC.

<sup>13</sup> Paul P. Cret. "Aerial Photography and Architecture." *The Journal of the American Institute of Architects*. In Paul Phillippe Cret papers, Kislak Center for Special Collections, Rare Books and Manuscripts, University of Pennsylvania. Box 14. Folder 583. 1921, 9.

<sup>14</sup> Ibid.

<sup>15</sup> Ibid, 12.

which was also used at the time to keep up to date with city plans, was considered by Cret as being far more accurate than city surveys.<sup>16</sup>

Like the World War I memorial Paul P. Cret designed at Château-Thierry, Cret and Thomas H. Atherton decided to emphasize the memorial sites in Varennes, Fismes, and Nantillois through creating a simple, symmetrical design for the memorial structure. This simplicity paired with Cret's modernist-inspired interpretation of classicism, which is referred to as New Classicism, or stripped classicism, where the architectural style ignores the five orders adhered to in Pope's classicism but preserves the classical sense of composition and symmetry, is apparent in his design of the memorial spaces. The same can be said of the memorial park that Pennsylvania later adopted that adjoins the memorial in Varennes: trees run along the edge of the park in pairs, paralleling, or mirroring, the memorial's columns; stone benches sit along the inner stone walls of the park, under the trees.

Cret asserted that classicism represented a "symbolic affirmation of Americas traditional democratic ethos," and through it he and his client found an "artistic idiom for representing a sense of continuity with the past."<sup>17</sup> These Pennsylvania memorials utilize classicism to represent and convey timelessness, to never forget the deeds of those who lost their lives in battle. However, Cret's use of classicism also alludes to government and nationhood, helping to create one cohesive national and global identity instead of disjointed identities within the commemorative process.

According to Cret, America's classical civic architecture abroad would "bridge the end of Beaux-Arts historicism and the rise of modernism." Therefore, his classically-influenced designs closely paralleled the nation's struggle to build continuity between the past and the complex, contemporary world it had inherited. Cret and his team of skilled architects helped shape an illusion, with chapels reminiscent of medieval castles and classic Athenian-temple-like features

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<sup>16</sup> Ibid.

<sup>17</sup> Budreau, Lisa M. *Bodies of War: World War I and the Politics of Commemoration in America, 1919-1933*. New York: New York University Press, 2010, 151.

that “assured continuity of western political and cultural traditions across the rupture of the Great War.”<sup>18</sup>

Cret and Atherton’s designs do not romanticize or glorify the human losses or the war itself. Thus, there is no narrative being forced upon the viewer or visitor. One could argue, however, that Cret and Atherton are glorifying service in a way that is appreciative and commemorative. Instead of the memorial design telling the viewer what the viewer must feel by using realism in the design, it allows the viewer to engage in self-reflection; it allows the human to be human and engage in profound critical thought and be somewhat raw to emotion as a result. The memorial design is simplistic and open, yet overwhelming—it makes the visitor feel small, thus, dwarfing the ego and narcissistic problems of everyday; it requires the visitor to take time to reflect since it is not a space that can be walked through hastily. As a result, the visitor becomes removed from their everyday experiences and placed into an experience that is reflective. It is important to note, however, that the Pennsylvania memorials, like many other memorials approved by the ABMC, function as a touch-point for memorialization and commemoration to occur. In this way, the Pennsylvania memorials need to be there to remind one of what happened amidst these towns and these farmlands that look no different than other settings in rural France but are in fact sites where death once took place on a massive, mechanized scale. Visiting these liminal sites becomes somewhat of a pilgrimage in this regard—visitors contemplate the past in the present, resulting in eternal reflection, or commemoration. Critical of many memorials erected following the Civil War, Cret’s aim was to inspire those that visit the memorials he carefully designed. His designs were also intended to create calm, ordered beauty.<sup>19</sup>

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<sup>18</sup> Ibid.

<sup>19</sup> Paul Phillippe Cret papers, Kislak Center for Special Collections, Rare Books and Manuscripts, University of Pennsylvania.

Regarding the 80<sup>th</sup> Division Memorial in Nantillois, the Pennsylvania Monuments Commission initially proposed to use the site in which the ABMC decided to use for their national memorial at Montfaucon. Part of the ABMC's rationale for using this space was that lies within the Red Zone, "the zone which will be preserved by the French Government in the same condition as it as at the time of the armistice."<sup>20</sup>

All the trenches and dugouts are still to be seen, and no building or reclaiming of land will be allowed. It remains essentially a battlefield landscape, fully as impressive as any of those north of Verdun, and, in our opinion, offers a most appropriate setting for a war memorial.<sup>21</sup>

Each of the three respective Pennsylvania memorials were built with the intent for 'pilgrims' to venture to these sites in order to conceptualize the losses. They were also built with a utilitarianism, which aligned with the aims and attitudes of the ABMC. These three memorials were designed by Paul P. Cret and Thomas H. Atherton, with the collaboration of Lahalle and Levard, of Paris, for the conduct of this work.<sup>22</sup> Cret and Atherton developed designs with the intent for these monuments to be an embellishment of the little towns where they are places, without losing sight of their "principal aim, which [was] to recall the memory of the combatants of 1918."<sup>23</sup>

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<sup>20</sup> Report on 79<sup>th</sup> Division Memorial. National Archives and Records Administration. Record Group 117.

<sup>21</sup> Ibid.

<sup>22</sup> War Monuments of Pennsylvania in France. National Archives and Records Administration. Record Group 117, 1.

<sup>23</sup> Ibid, 2.



Figure 4.1: Construction of the Pennsylvania Memorial in Varennes. Taken the summer of 1926.<sup>24</sup>

The memorial in Varennes-en-Argonne “reestablishes a ‘place publique’ destroyed by the [First World War] with a more monumental composition.”<sup>25</sup> The principal motive for the memorial was for it to serve as a “terrace overlooking the valley through which the 28<sup>th</sup> Division advanced after having captured the town of Varennes, September 26<sup>th</sup>, 1918.”<sup>26</sup> On this land area that was removed of all vegetation, “popular trees” were to line the aisles leading to the monument proper.<sup>27</sup> And, the “composition was not to be complete” until the trees reached a sufficient height; thus, “time [was] required to complete the effect.”<sup>28</sup> This memorial included a special water supply, the “Buarde,” for the watering of the lawn on the memorial and memorial park plot.<sup>29</sup>

<sup>24</sup> Photographs of American Battlefield Memorials. National Archives and Records Administration. Record Group 117, 2.

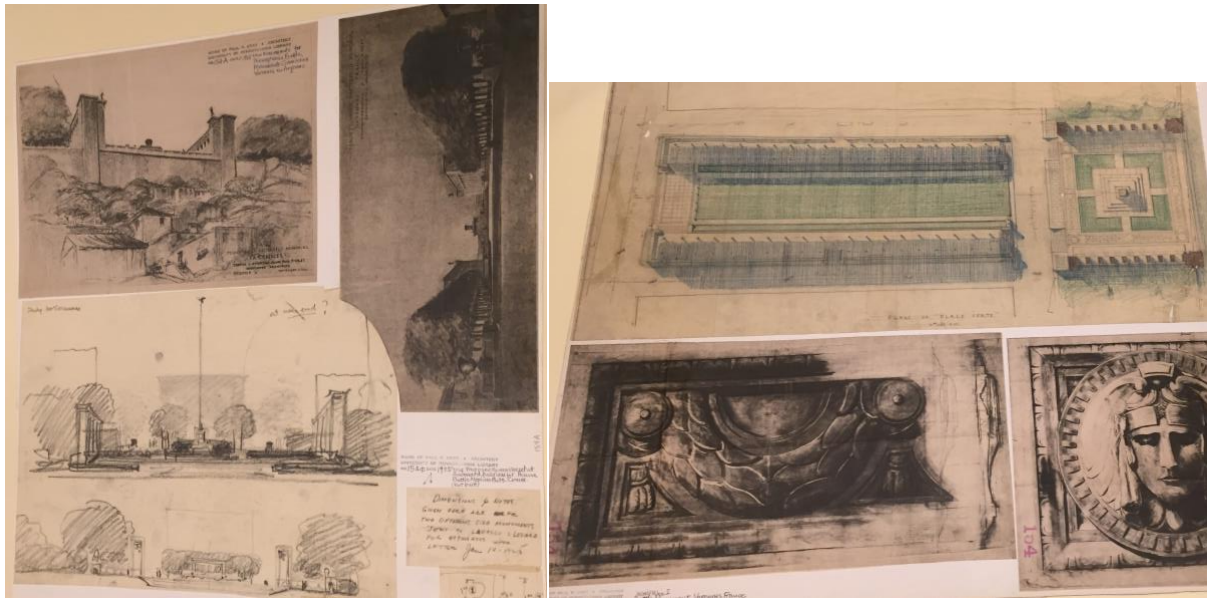
<sup>25</sup> War Monuments of Pennsylvania in France, 2; This memorial is located at 1 Rue du Gén Pershing, Varennes-en-Argonne, 55-Meuse, Lorraine, France;

<sup>26</sup> Ibid.

<sup>27</sup> Ibid.

<sup>28</sup> Ibid.

<sup>29</sup> Letter to John F. Harbeson on December 5, 1955. National Archives and Records Administration. Record Group 117, 2; It was later requested by the mayor of Varennes that the water system of the “Buarde” be restored after it fell into disrepair as a result of the United States’ engagement in the Second World War.



Figures 4.2 and 4.3: The design sketches for the Pennsylvania Memorial in Varennes.<sup>30</sup>

Cret and Atherton's grand Pennsylvania Memorial takes on Cret's signature modern classical style, defined by clean lines and symmetry throughout. Like that of ancient Greek temples, the most prominent structures within this space are the single rows of columns lining the right and left sides of the memorial. However, these columns are rectilinear with plain capitals that mimic standard crown molding. Sitting above the memorial's columns, the frieze consists of garlands and the heads of helmeted warriors resting against shields. The rectangular columns sit between the enlarged, wall-like columns that begin and end the row of smaller columns on the right and left sides of the memorial. These large columns sport a classically-derived frieze with acanthus decoration about three-fourths of the way down. A spectator can observe the similarity between this detailing and the detailing on the well-known Roman *Ara Pacis Augustae*.<sup>31</sup> There is no documentation to confirm the allusion to the *Ara Pacis Augustae*, however, Cret was well-versed

<sup>30</sup> Paul Phillippe Cret papers, Kislak Center for Special Collections, Rare Books and Manuscripts, University of Pennsylvania.

<sup>31</sup> This altar, which is an ancient monument initially inaugurated on January 30, 9 B.C., is located in Rome, Italy, within the Museum of the *Ara Pacis*.

in classical architecture. Thus, this decorative addition was likely consciously referencing the altar dedicated to the Roman goddess of Peace, Pax.

Cret and Atherton create variety within the memorial structure by occasionally interrupting the usual rectilinear pattern of the marble paving stones with paving stones set on diagonals and by incorporating a honeycomb-like design into the memorial's elbow-high wall at the rear of the memorial (facing the Aire Valley). These features contrast with the parallel nature of the stonework in the rest of the structure.

As another parallel to Cret's memorial at Château-Thierry, the Pennsylvania Memorial in Varennes-en-Argonne utilizes the same symbolism of swords (power, protection, authority, strength, and courage) and the American eagle (the national bird, signifying nation and patriotism; located on the corners of the pith, below the bronze torch) as well as the same inscription that reads, in an uppercase Romanizing font, "Time will not dim the glory of our deeds." The swords, draped with a stole and resting on a shield, face each other on the larger columns at the end of the structure. These details are nods to classicism, like many other features in the design, such as the use of lion heads.

Lion heads line the stonework on the inner walls of the memorial park and are present within the main memorial structure as well, in bronze on the pith at the base of the bronze torch. Lion paws are also incorporated into the memorial's design at the base of each of the four legs of the torch. In ancient Greece and Rome, lions were symbols of the fallen hero and were used as guardians of gates, temples, and public buildings.<sup>32</sup> Additionally, in Christian art, the lion is utilized as a symbol of Christ, courage, strength, glory, and royalty.<sup>33</sup>

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<sup>32</sup> "Lion." Buffalo Architecture and History. Accessed March 2, 2018. <http://buffaloah.com/f/glos/l/lion.html>.

<sup>33</sup> Ibid.



The Pennsylvania Memorial in Varennes' centerpiece is the torch that represents the eternal flame of remembrance—the memory of the losses and sacrifice live on beyond the historical moment. This notion of enduring memory is central to the architects' intention for this memorial as well as the other war memorials they designed. Classical motifs are utilized in this timeless aspect of the torch design as well. It incorporates several classical symbols to accomplish this. In addition to the lion heads and lion paws, the bowl of the torch reads, in an uppercase Romanizing font, "The right is more precious than peace." Further, helmeted warriors, like those within the freeze, sit atop each of the four legs of the torch.



Figure 4.4: Designs for the torch within the center of the memorial at Varennes.<sup>34</sup>

The Pennsylvania Memorial has a prominent presence in the small town of Varennes, which is located in France's Red Zone. The memorial is located on top of a hill that was captured by the 28<sup>th</sup> Division of the United States Army on September 26, 1918 during the Battle of the Meuse.<sup>35</sup>

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<sup>34</sup> Ibid.

<sup>35</sup> The 28<sup>th</sup> Division is known as the Keystone Division since many of its men were from Pennsylvania.

At the hill's climax, the battlefield memorial overlooks the Aire Valley, which consists of former battlefields reverted to farmland.

Regarding the memorial bridge in Fismes, the Pennsylvania Monuments Commission decided to reconstruct the destroyed bridge that was "situated at the place where the 28<sup>th</sup> Division crossed the Vesle river in August 1918."<sup>36</sup> This reconstructed bridge was to commemorate the "men of iron" in the 28<sup>th</sup> Division, who captured the town of Fismes from the Germans in August 1918. The Pennsylvania Monuments Commission worked closely with the French Government to reconstruct this bridge and to do so in a tasteful manner for a war memorial.

The French government bureau of Ponts et Chaussées had already prepared a project comprising a reinforced concrete slab crossing the Vesle [River] at a very low clearance to fit to the levels of the existing roads. It was decided to cover the concrete beam with stone. This system of facing is more used in the United States, since it is seen how badly reinforced concrete withstands great changes of temperature. The monumental part of the bridge consists of two pylons at the entrance to the town, surmounted by strongly modelled figures by the sculptor [Alfred-Alphonse] Bottiau.<sup>37</sup>



Figure 4.5: The main bridge between Fismes and Fismette destroyed by retreating Germans.<sup>38</sup>

<sup>36</sup> War Monuments of Pennsylvania in France, 2; The memorial is located at Rue Hildevert Lefèvre, Fismes, 51-Marne, Champagne-Ardenne, France.

<sup>37</sup> Ibid; Alfred-Alphonse Bottiau (February 6, 1889-25 February 25, 1951) was a French sculptor who Cret commissioned to help with several ABMC projects, including the Chateau-Thierry American Monument and the Meuse-Argonne Memorial. Bottiau was born in Valenciennes, France. Eventually, he studied under Jean Antoine Injalbert in Paris. In 1910, Bottiau joined the army in 1910. He served until 1919. As a note, it was standard practice for Cret to engage French or American sculptors to design sculptures for his buildings and memorials.

<sup>38</sup> "WWI." Meadville, Pennsylvania. Accessed April 03, 2018. [http://www.cityofmeadville.org/index.asp?SEC=7C93792F-14EB-43A8-B6A6-50B7EA82A3C3&DE=CD181319-AF64-4B46-95A2-62E866A81F21&Type=B\\_BASIC](http://www.cityofmeadville.org/index.asp?SEC=7C93792F-14EB-43A8-B6A6-50B7EA82A3C3&DE=CD181319-AF64-4B46-95A2-62E866A81F21&Type=B_BASIC).

On the heads of Alfred-Alphonse Bottiau's female Greco-Roman figures standing contrapposto are laurel wreaths/crowns, which were symbols of victory and honor in Ancient Greece and Rome.<sup>39</sup> Laurel wreaths/crowns were also symbols of martial victory in Rome, and were used to "crown a successful commander during his triumph."<sup>40</sup> Further significance is held in the statues' allegorical meanings: the statue to the left, holding a dove and standing aside an olive tree, symbolizes peace and the statue to the right symbolizes agriculture.<sup>41</sup> While the allusion to peace within a war memorial is somewhat self-explanatory, the allusion to agriculture has a less obvious significance.

Similar to pre-war circumstance in Fismes, agriculture was the foundation of the economy within Ancient Greece and early Greek agriculture was based in cereal crops. But the significance of agriculture is a bit deeper and more involved than this. In essence, "the story of agriculture is essentially the story of civilization."<sup>42</sup> Agriculture was the process that allowed humans to settle down in a common place and establish communities, and thus move away from the nomadic lifestyle of hunting and gathering. To this end, ancient agricultural literature presents farming as a morally superior activity imbued with political and social value.<sup>43</sup>

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<sup>39</sup> "Laurel Wreath." Accessed April 2, 2018. [https://en.wikipedia.org/wiki/Laurel\\_wreath](https://en.wikipedia.org/wiki/Laurel_wreath); Though, the crown could be an olive leaf crown, which symbolizes peace, as with the olive branch.

<sup>40</sup> "Roman Wreaths and Crowns." Accessed April 2, 2018. <http://www.tribunesandtriumphs.org/roman-clothing/roman-crowns-and-wreaths.htm>.

<sup>41</sup> René van der Krogt and Peter van der Krogt. "Pont-monument à la 28e division de l'armée américaine." Accessed April 5, 2018. <http://statues.vanderkrogt.net/object.php?webpage=ST&record=frca026>.

<sup>42</sup> Geller. "Ceres - Roman Goddess of Agriculture." Mythology.net. October 27, 2016. Accessed April 24, 2018. <https://mythology.net/roman/roman-gods/ceres/>; "Ceres Goddess of Agriculture." Goddess Names. Accessed April 24, 2018. <https://www.goddess-guide.com/ceres.html>; and Britannica, The Editors of Encyclopædia. "Ceres." Encyclopædia Britannica. February 16, 2018. Accessed April 24, 2018. <https://www.britannica.com/topic/Ceres-Roman-goddess>.

<sup>43</sup> Leah Kronenberg. *Allegories of Farming from Greece and Rome: Philosophical Satire in Xenophon, Varro, and Virgil*. Cambridge, UK: Cambridge University Press, 2009. xi-223, 77. In Volk, Katharina. *Vergilius (1959-)* 56 (2010): 77-80. <http://www.jstor.org/stable/41588684>.

Although there is no direct reference to the pagan figure of Ceres<sup>44</sup> (derived from the Ancient Greece deity Demeter<sup>45</sup>)—a Roman goddess of the common people, governing over agriculture as well as fertility in general, including activities such as marriage and having children<sup>46</sup>—within the sculpture’s design, it is necessary to briefly mention the attitudes regarding agriculture by the Greeks and Romans as well as the use of this symbolism in a modern context. The image of Ceres, a woman wearing robes, sometimes with a single bare breast, and often holding a sheath of grain, has been used to embellish bank notes from the United States Civil War as well as official artwork in government buildings.<sup>47</sup>

Classicism extends into other elements of the memorial’s design as well. The two pylons resemble Doric columns topped with acanthus detail. As with the Pennsylvania Memorial situated in Varennes-en-Argonne, Cret and Atherton, were likely alluding to the acanthus detailing on the *Ara Pacis Augustae*.

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<sup>44</sup> Ceres’ name is from where the word “cereal” is derived. She was associated with fertility, abundance, and endurance. She was worshiped alone or in combination with Tellus (an alternate name for planet earth), or Terra Mater (meaning “Earth Mother”), the Ancient Roman earth goddess, concerned with the productivity of the earth. Tellus was “invoked during earthquakes (her temple in Rome having been dedicated in 268 B.C. in consequence of an earthquake in the time of war)” as well as in “solemn oaths as the common grave of all things.” Sacred to her was soil (tellurium). She was regarded as the goddess who produces all means of existence, as with her Roman derivative, Ceres. Terra Mater was identified with the oldest of divinities, Gaia (the name from which words such as geography and geology are derived), the Greek goddess of “earth, of all living things, of healing and marriage.” Gaia was regarded by the Greeks as the universal mother (“She Whose womb coincides with the earth”; “She from Whom all things issue”; “Flower-giver”).

<sup>45</sup> Demeter was the Greek goddess of the earth, of agriculture (corn, grain, and the harvest), and of fertility in general. She symbolized the regenerative power of the earth over all living things. Some of the objects sacred to her were livestock, agricultural products, and the poppy.

<sup>46</sup> Ibid.

<sup>47</sup> Ibid.



Figures 4.6 and 4.7: A. Bottiau's sculpture symbolizing peace and a Doric-styled column.<sup>48</sup>

Other similarities to the Pennsylvania Memorial in Varennes include an American eagle (engraved into the columns' square piths on their inward faces) and the use of uppercase Romanizing font for the engraved inscriptions (on the piths of the columns). The inscriptions on the memorial in Fismes, filled with goldish coloring, read, "Ce pont dédié a la 28<sup>E</sup> Division de l'armée Américane a été élevé par l'Etat de Pennsylvanie en mémoire de ceux qui donnèrent leur vie pour la liberation de Fismes 1927." The pith on the left side contains an English translation, while the left pith contains the French translation, as written above. Below the inscription on the right pith is a sign designating that the bridge crosses the Vesle.

<sup>48</sup> Images taken by the author on May 27, 2017.



Heads of four helmeted World War I soldiers sit directly above the main pith of each pylon, below the columns. Each head rests on one of the four corners of each of the piths. The stonework containing the soldiers' heads functions as a flower box.



Figure 4.8: Face detail of helmeted World War I soldier on the memorial in Fismes.<sup>49</sup>

The Pennsylvania Monuments Commission determined it would be “out of place” to erect a large monument in Nantillois, “a little village on the Meuse.”<sup>50</sup> Therefore, the Commission opted for a retaining wall along the edge of the road consisting of a tablet commemorating the 80<sup>th</sup> Division and surmounted by the State arms.<sup>51</sup> This memorial structure used to function as a working fountain, which supplied water to the residents of the town. However, the fountain has been inactive for decades. Now, the empty fountain bowl is filled with manicured vegetation.

Regarding other memorial structures, there was vast support. When the Prefet de la Meuse was informed of the United States' intention to construct another memorial, regarding the memorial at Montfaucon, he declared that he would welcome and defend the Commission's

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<sup>49</sup> Ibid.

<sup>50</sup> Ibid; The memorial is located at Route de Brieuilles, Nantillois, 55-Meuse, Lorraine, France.

<sup>51</sup> Ibid; A building was later erected by the 315<sup>th</sup> Infantry Regiment of the 79<sup>th</sup> Division behind the Pennsylvania Memorial, to honor the regiment's dead. Though, this project was not funded and is not maintained by the State of Pennsylvania.

project, so long as it conforms to his conditions.<sup>52</sup> During this exchange in dialogue, the Prefet also noted that he “hopes very much that the Commission will be able to insure the preservation as they now are, of the ruins of the village in the area allotted to it, by pointing up the walls, etc.”<sup>53</sup> However, while first impressions of the memorial designs and functions were surely important in regard to obtaining immediate French support, Cret and Atherton were ultimately more concerned with sustaining the liminality of these spaces in regard to their usefulness to the local populations as well as the messages they conveyed through their designs.

The Pennsylvania Monuments Commission intended for these memorials to endure the tests of time. And, as mentioned, this attitude of persistence—structurally, symbolically, and as a function of memory more generally, though these are not mutually exclusive and do in fact intertwine—is represented in the memorials’ designs. Through the use of New Classicism, Cret creates three memorial spaces that are timeless and reflective. The somewhat simple nature of the spaces allows them to hold relevance and purpose among future generations of pilgrims coming to engage in reflection and mourning. In addition to the symmetry contributing to the memorials’ simple nature, it also signifies stability. This is significant for Cret, especially when he aimed for these memorials and their attached messages to endure. Stability and strength, or power, are also created through the use of classical architecture in itself since classical architecture is traditionally utilized in the United States for government, or democratic, buildings. Thus, the classicism also brings in an element of authority, as well as timelessness, into this structure. However, despite all positive intentions for preservation of these spaces, these memorials experienced a period of neglect.

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<sup>52</sup> Letter to the Secretary of the ABMC, Washington, D.C. on September 21, 1926. National Archives and Records Administration. Record Group 117.

<sup>53</sup> Ibid.

### *Maintenance Dwindles*

Between the memorials' dedications in 1928 and the onset of the Second World War, some maintenance of the memorials was carried out under the direction of Georges Levard, of the firm Lahalle and Levard,<sup>54</sup> the French architects for the Commission. These costs were subsequently reimbursed to Mr. Levard, by General Price, from an unexpended balance of the original appropriation.<sup>55</sup> ABMC records indicate that, "on his own initiative, Mr. Levard continued maintenance of the memorials on a very small scale during World War II."<sup>56</sup> However, prior to the Second World War, Pennsylvania hired a Mr. Moulinet to help with upkeep at the memorial in Varennes.<sup>57</sup> He engaged in attentive maintenance, mowing of the grass, sweeping the paving and removing dead leaves.<sup>58</sup> However, by the end of World War II, funds had been depleted.<sup>59</sup> As a result of the lack of funds and the inability to reach appropriate ABMC contacts, the city of Varennes was left with the responsibility to maintain the memorial, and even contributed to the maintenance of the memorial in Nantillois. Each year, for a period of time following the Second World War's armistice, the town employees of Varennes, either at spring time or prior to a "patriotic manifestation," cleaned the Varennes memorial site to their best ability.<sup>60</sup> Adding to the cohort of patrons was an American veteran visiting the "Argonnaise," who observed the poor

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<sup>54</sup> In reference to Pierre Lahalle, Cret's wife's brother.

<sup>55</sup> Pennsylvania WWI Memorials.

<sup>56</sup> Ibid.

<sup>57</sup> Pennsylvania Memorial. Translated extract from *The Republican de l'Est*. National Archives and Records Administration. Record Group 117.

<sup>58</sup> Ibid.

<sup>59</sup> Ibid; As written on page 3 of the first volume of the 1969-70 budget for Pennsylvania, by Governor Raymond P. Shafer: "I thought back to that time when young people started to leave after World War II and to the failure of Pennsylvania to respond strongly and creatively enough to her problems. The result was joblessness and economic stagnation."

<sup>60</sup> Pennsylvania Memorial.



maintenance and disrepair of the Memorial at Varennes and left the city of Varennes a check for 15,000 francs for future maintenance of the memorial.<sup>61</sup>

After the Second World War, in 1947, at the request of General Weber, the Adjutant General of Pennsylvania (Bryan Mawr), Wylie G. Borum, conducted an inspection of the Pennsylvania memorials in 1947.<sup>62</sup> John Harbeson, of Harbeson, Hough, Livingston & Larson, Philadelphia and Cret's successor, also conducted an inspection in 1947.<sup>63</sup> Harbeson submitted a comprehensive report to Governor Duff and General Price which included photographs and an estimate of cost of repairing the memorials at Varennes and Nantillois and reconstructing the bridge at Fismes, which was destroyed during the Second World War.<sup>64</sup> At the time of the inspection, the total estimates summed up to 25,606,000 francs—22,150,000 francs for the repair of the memorial bridge at Fismes, 1,520,790 francs for the memorial at Varennes, and 1,935,182 francs (for the memorial fountain at Nantillois).<sup>65</sup>

No action was taken in 1947 in response to these reports, and in 1950, another inspection, issued by the Governor, was conducted by General Richard K. Mellon.<sup>66</sup> General Mellon rendered a report to General Weber.<sup>67</sup> Again, the memorials were inspected by George H. Stewart, Jr. in 1952.<sup>68</sup> During this time, according to Jack D. Mage, the city of Varennes assumed the bulk of the responsibility for maintaining both the memorial in Varennes and the memorial in Nantillois.<sup>69</sup>

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<sup>61</sup> Ibid.

<sup>62</sup> Pennsylvania WWI Memorials.

<sup>63</sup> Ibid.

<sup>64</sup> Ibid; Mr. Levard helped Harbeson make estimates for the report.

<sup>65</sup> Letter dated October 13, 1949 sent from John Harbeson to General North. National Archives and Records Administration. Record Group 117.

<sup>66</sup> Pennsylvania WWI Memorials.

<sup>67</sup> Ibid.

<sup>68</sup> Ibid.

<sup>69</sup> Letter from Jack D. Mage on November 28, 1955. National Archives and Records Administration. Record Group 117.

## *Current Maintenance*

Further investigation needs to be done regarding when funding for these memorials temporarily stopped and subsequently recommenced.<sup>70</sup> However, given that there is no clear indication on previous budgets of any funds being allocated to these overseas memorials, the 1979-1980 Pennsylvania budget indicates that funding recommenced in the 1978-1979 fiscal term, with \$3,000.<sup>71</sup> Regardless of the lapse in funding for a period of time, since funding has recommenced, Pennsylvania has consistently allocated funding for the maintenance and repair of each of the memorials.

For at least the past three years, the State of Pennsylvania has allocated \$50,000 of its budget to the memorial sites overseas.<sup>72</sup> According to Tom Cavanass, Planning and Policy Specialist of the American Battle Monuments Commission, Pennsylvania has always had a fund surplus with the ABMC since he can remember, while almost all other cemeteries and monuments contract out.<sup>73</sup> Currently, there are indeed some projects underway, such as replacing one of the flagpoles at the memorial park in Varennes.<sup>74</sup> However, the cost of any such projects, particularly because of conversion rates and the sourcing of the materials, are such that they drain the seemingly substantial funding for the respective fiscal year; and thus, these projects take more time to finish than one would hope.

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<sup>70</sup> There needs to be some clarification on how else the funding could be denoted within the budget, since there isn't clear indication of funding, even in the initial fiscal years in which construction took place.

<sup>71</sup> Though this was not clearly indicated within the budget from the 1978-1979 fiscal year; Governor Dick Thornburgh. "Commonwealth of Pennsylvania: Governor's Executive Budget 1979-80." Accessed March 20, 2018. <http://www.budget.pa.gov/PublicationsAndReports/Documents/1979%20-80%20Budget.pdf>, 78; This value of allocated funds is approximately equivalent to \$11,482.55 as of May 9, 2018.

<sup>72</sup> It is estimated in the 2018-19 budget that Pennsylvania will allocate at least \$50,000 to the maintenance and repair of these memorials through at least the 2022-2023 fiscal year; Governor Tom Wolf. "Governor's Executive Budget 2018-2019." Pennsylvania Governor's Office. Accessed February 10, 2017. <http://www.budget.pa.gov/PublicationsAndReports/CommonwealthBudget/Documents/2018-19%20Proposed%20Budget/2018-19%20Governor%27s%20Executive%20Budget%20-%20Web.pdf>, E31-6.

<sup>73</sup> Transcript from phone interview with Tom Cavanass, Planning and Policy Specialist of the American Battle Monuments Commission, on April 28, 2017.

<sup>74</sup> Ibid.

These memorials were not built with the intent to mitigate all aspects of war's ecological imprint. However, impulses to memorialize have the ability to overpower the hesitance to mitigate when and where it is costly and hazardous, and some level of effective mitigation was achieved in these spaces in order to achieve usefulness for this commemorative purpose. As mentioned throughout this thesis, it was indeed the commemorative impulses from veterans in the mid-1920s that urged the French government to buy up then Red Zone so that it could direct land reclamation efforts for eventual access as a memorial. After the implementation of this policy, in some areas of the Red Zone, the French government began to clear the landscape of war's remains as well as the overgrowth that resulted from complete abandonment.<sup>75</sup> In these mitigated or partially mitigated areas, the landscape was replanted with trees which now serve as a timber resource.<sup>76</sup> This was the case in St. Hubert's Pavilion in Boureuilles, France, a former battlefield known for intense fighting and destruction.

In sum, memorials have helped individuals and entities create lasting meaning in spaces that may change in function or appearance over time. It is through the process of creating memorials within these spaces that individuals and groups have created lasting ties to these communities. It is also through memorialization that individuals and groups conceptualize themselves and their own identities and reinforce their values. Through the links we create with battlefields, these spaces become both reflective and representative. They are where life was lost, but also where hope and peace may be restored. Therefore, in many ways, it is fundamental to include the cultural components of spiritual healing as efforts are made to also sacred, war-torn landscapes within the framework of post-war environmental mitigation.

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<sup>75</sup> Pearson; Though, only some portions of the Red Zone have been mitigated or partially mitigated.

<sup>76</sup> Ibid.

## Chapter 4

### The War Wages On

The devastation resulting from the First World War was unlike anything experienced before by the world. Thus, so were the challenges and operations surrounding restoration.<sup>1</sup> Even comprehending the level of devastation was difficult, especially immediately after the armistice.

Heavy artillery wrought the most severe destruction in every scenario and landscape: in places where it remained static for long durations, in places where the fighting was particularly intense, and in places where there were rapid movements of troops.<sup>2</sup> Devastation still followed landscapes where no warfighting had actually occurred because of Germany's scorched earth policies.<sup>3</sup>

Emergency action to restore war-torn northern France began during the war itself, almost at the onset, and followed into the early months of peacetime, "when shelter was desperately needed and dangerous legacies of war had to be cleared from the land before normal economic activities might recommence."<sup>4</sup> As with war-time reconstruction, post-war reconstruction was hindered by various conflicting interests, inefficiency, and poor organization. To this end, the haste of post-war reconstruction in France caused persisting problems between and within *sinistrés*,<sup>5</sup> and between the French state and farmers, who tended to be highly critical of the

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<sup>1</sup> Hugh Clout. *After the Ruins: Restoring the Countryside of Northern France After the Great War*. Exeter: University of Exeter Press, 1996, 19.

<sup>2</sup> Clout 1996, 20.

<sup>3</sup> Ibid, 22.

<sup>4</sup> Ibid, 59.

<sup>5</sup> *Sinistrés*: French communities who suffered direct, material, and certain war-related damages; war-affected areas, or communities. This definition can also apply to Belgian communities affected by the war. Further, this term can also refer to individuals who have suffered direct, material losses as a result of war.

efforts made by the state's emergency services.<sup>6</sup>

Once the armistice was signed, France's *Motoculture* directorate was instructed to continue mitigation work on 'safe' land, but to additionally expand its activities in areas from which explosives and other debris had been removed recently.<sup>7</sup> In this way, the operation of the *Service de la Motoculture* was dependent on the successful work conducted by the *Service des Travaux de Première Urgence* (STPU).<sup>8</sup>

After the armistice, France's post-war landscape looked something like a somber nightmare, and the world-renowned agricultural fields were unrecognizable.

Weeds flourished among shell holes, trenches, barbed wire and concrete bunkers, carpeting the countryside with quite a different vegetation from the cereals and lush fodder crops that it had supported for so long. Across some stretches every tree had been felled by gunfire or had been cut down intentionally. No bird was heard; no bird remained.<sup>9</sup>

The historical scene of the unique anti-landscape that Hugh Clout describes is not far off from what viewers will witness today when visiting the same towns and fields. In fact, at almost one hundred years since the armistice, some areas of France have remained sterile, without vegetation covering the charred or chalky, and oftentimes poisoned, soil.

To begin the process of reconstruction, the French government commenced efforts to determine the different intensities of destruction throughout the warzone. As Clout notes, "shells needed to be removed from an intermediate zone of devastation, while outer areas might be brought back into cultivation if farmers could be provided with shelter, foodstuffs and some financial support to tide them through."<sup>10</sup>

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<sup>6</sup> Ibid, 63-64.

<sup>7</sup> Clout 1996, 111; The removal of unexploded ordnance was performed by the *Service de Désobusage* until 1939. The *Département du Deminage* (Department of Mine Clearance), which was established in 1946 by the French government for continued munitions clearing, now carries out this function.

<sup>8</sup> Ibid.

<sup>9</sup> Ibid, 20.

<sup>10</sup> Ibid, 22.

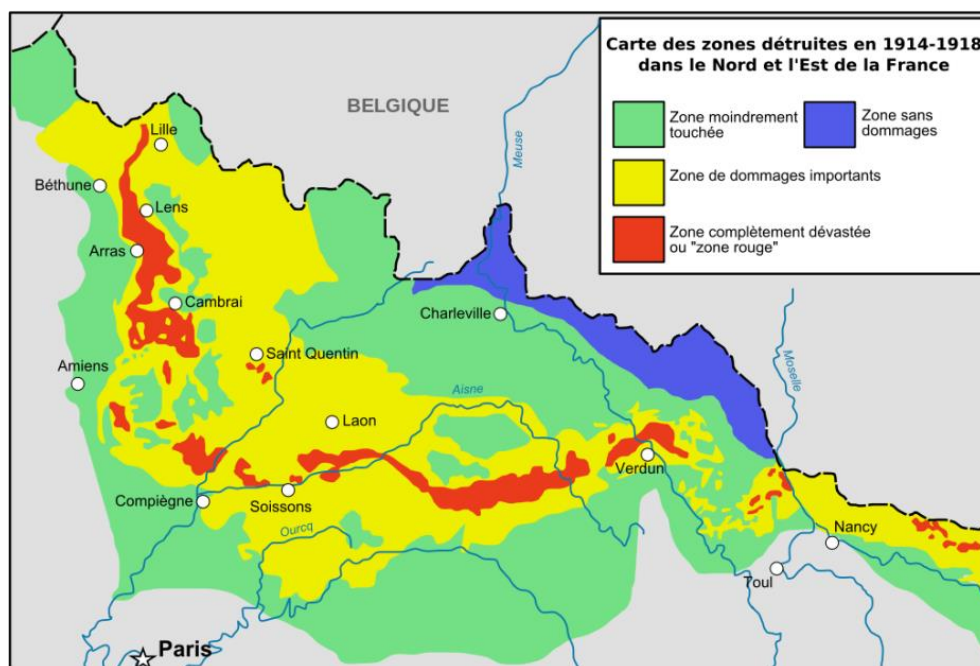


Figure 5.1: Degrees of destruction in France's *zones détruites*.<sup>11</sup>

The extent and forms of mitigation needed varied among the departments depending on the severity of devastation. Within the Marne, it was determined that 89,967 ha needed simple clearance, while 169,317 ha of land demanded considerable work.<sup>12</sup> Additionally, it was determined that the cost of work exceeded the value of land in 23,300 ha.<sup>13</sup> The Meuse department's numbers were not necessarily any more ideal. It was determined by the *Ministère des Régions Libérées* that 204,000 ha needed simple clearance, 40,510 ha demanded considerable work, and costs exceeded land value in 17,000 ha of land in the Meuse department.<sup>14</sup> Despite any statistical data telling them to do otherwise, most of France's farmers were eager to return to their land and revive their sources of livelihood.

<sup>11</sup> Martin Fletcher. "An Iron Harvest." *The Economist*. November 18, 2013. Accessed April 02, 2018. <https://www.economist.com/news/21589150-past-will-literally-resurface-iron-harvest>.

<sup>12</sup> Clout 1996, 25.

<sup>13</sup> Ibid.

<sup>14</sup> Ibid.

A distinction was drawn between the 55,898 ha that were deemed beyond the prospect of restoration and the “122,613 ha where agricultural recovery was thought to be technically possible but probably only at a cost far outstripping the intrinsic value of the land.”<sup>15</sup> Individual prefects also compiled their own estimates, separate from the Ministry.<sup>16</sup> These estimates also included local perceptions, and thus, differed from the Ministry’s estimates.<sup>17</sup> This later proved to be quite problematic, since prefects usually underestimated the land area of their prefects within the Red Zone due to the strong desire among farmers to start working their land after the armistice.<sup>18</sup>

Although several efforts were focused on revitalization of agricultural land, it was only realized within the last decade or so that soil contamination was a form of collateral damage from the war.<sup>19</sup> This realization was due to 1) the corrosion of remaining unexploded ordnance and metallic fragments of exploded ammunition as well as 2) organic compounds originating from nitroaromatic explosives and the leaking of shells containing war gasses.<sup>20</sup>

In 2004, Tobias Bausinger, a German environmental scientist, conducted a study of the soil in a location within France’s Spincourt Forest known as La Place à Gaz, where, in 1928, the French Ministry of War incinerated approximately 200,000 chemical shells filled with arsenic.<sup>21</sup> Bausinger’s study shows “arsenic levels between one thousand and ten thousand times higher

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<sup>15</sup> Clout 1996, 29.

<sup>16</sup> Ibid.

<sup>17</sup> Ibid.

<sup>18</sup> Clout 1996, 29-30.

<sup>19</sup> E. Meerschman, L. Cockx, M. M. Islam, F. Meeuws, & M. Van Meirvenne. Geostatistical Assessment of the Impact of World War I on the Spatial Occurrence of Soil Heavy Metals. *Ambio*, 40(4), 2011, 417–424. <http://doi.org/10.1007/s13280-010-0104-6>.

<sup>20</sup> Ibid.

<sup>21</sup> Pascal Brocard. Arsenic et vieux obus: casse-tête en Meuse. *Le Républicain Lorrain*. July 9, 2013. Accessed February 2, 2018. <https://www.republicain-lorrain.fr/actualite/2013/09/07/arsenic-et-vieux-obus>; Officially recognized in 2007, La Place à Gaz is an area within the Spincourt Forest, located a few kilometers from the village of Billy-sous-Mangiennes north-east of Verdun, France, where no plant life is present and there is a hectare of black calcined soil. At this location, a sign (translated) reads, “Danger, polluted soil.”

than those of unpolluted soil,” with up to 17% arsenic in the soil.<sup>22</sup> Although the department of the Meuse requested for BRGM (Bureau of Geological and Mining) to carry out soil tests in 2004, despite these damning findings, the area was not prohibited for access until a prefectural decree in 2012, after simply being gridded in 2005.<sup>23</sup> Additional research showed the water in some areas of the Red Zone “contained toxic levels of arsenic that were 300 times above the tolerated amount.”<sup>24</sup> Understandably, Bausinger, among others, is worried about the nonchalance of the French government on the issue of war-related pollution, particularly considering that Spincourt, France and Poelkapelle, Belgium are not isolated cases in regard to World War I-related soil contamination and the lack of knowledge, studies, and data, particularly in France, regarding potential areas of contamination leads to the dangerous practice of these surfaces being reused for agricultural purposes.<sup>25</sup>

There has been no coordinated and public research on the subject of World War I related contamination, despite the knowledge of existing contaminated sites.<sup>26</sup> Further, despite

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<sup>22</sup> Ibid; Messy Nussy. “The Real ‘No-Go Zone’ of France: A Forbidden No Man’s Land Poisoned by War.” Messy Nussy Chic. June 13, 2017. Accessed February 02, 2018. <http://www.messynussychic.com/2015/05/26/the-real-no-go-zone-of-france-a-forbidden-no-mans-land-poisoned-by-war/>; Arsenic compounds were used by French troops in 1915 in a mixture with phosgene and the composition of another chemical weapon based on hydrocyanic acid. From September 1917, German troops used arsenic in their shells. In addition, many chemical munitions consist of high levels of arsenic and the fuses and percussion caps used for shells and bullets contain mercury compounds.

<sup>23</sup> Brocard.

<sup>24</sup> Nussy.

<sup>25</sup> Brocard.

<sup>26</sup> Victoire Guimbal, Tamara Villarins, Elodie Crépeau, & co. “En Attendant Les Démineurs- Inventaires Des Déchets De Guerre du 1er Janvier 2008 au 31 Décembre 2011.” Robin de Bois. August 31, 2012. Accessed March 12, 2018. [http://www.robindesbois.org/en-attendant-les-demineurs-inventaires-des-dechets-de-guerre-du-1er-janvier-2008-au-31-decembre-2011/#carte\\_de\\_synthese](http://www.robindesbois.org/en-attendant-les-demineurs-inventaires-des-dechets-de-guerre-du-1er-janvier-2008-au-31-decembre-2011/#carte_de_synthese); Mustard gas’ persistent toxic effects occur several hours after exposure and worsen to second- and third-degree burns. Since mustard gas is soluble in fat, it migrates further and further into the body, destroying the mucous membranes. Its effects include blindness and death. And, it is carcinogenic/mutagenic. Between 2008 and 2011, in the Robin des Bois inventory, two discoveries of ammunition or concentrations of amperage with yperite were noted; Phosgene is an insidious gas that is colorless and smells of hay. Between 2008 and 2011, in the Robin des Bois inventory, six discoveries of ammunition or concentrations of phosgene ammunition were found; As an incendiary agent, white phosphorus ignites on contact with air and burns at extremely high temperatures (approximately 1,300 °C). Phosphorus trioxide fumes are both toxic and corrosive and tissue damage from burns is thermal, chemical, and corrosive. Following the Second World War, white phosphorus munitions were submerged in the Baltic Sea, and over the years phosphorus residues were brought back onto beaches by currents. Although dangerous, it is not considered a chemical agent, and thus its use is allowed; however, its use is theoretically prohibited against or in the midst of civilian populations. Between



Bausinger's data showing that "arsenic migrates into the deep layers of soil and the remote environment through infiltration and runoff of rainwater," no serious research has been conducted on the 1) flora and fauna of the war-affected areas and their surroundings or 2) health effects on nearby residents, forest keepers, and hunters of the area.<sup>27</sup> Bausinger asserted, "The attack on groundwater is probably moderate, but on the other hand the potential for transfers in the biosphere are very significant. These transfers can be done by wind but also indirectly by animal and plant species and runoff." This assertion was not formally denied the BRGM 2004 report. Further, Bausinger notes the two types of contaminated sites along the war's frontline, 1) diffuse contamination of heavy metals, such as lead, copper, cadmium, and zinc, in the soils of former battlefields, and 2) sites of severe contamination by chemical munitions.<sup>28</sup>

It is estimated that, throughout the First World War, 1.45 billion shells were fired by the combined German, French, and British armies, with approximately five percent of this total releasing or still containing toxic gasses.<sup>29</sup> Some chemical agents were utilized more often than others. For example, "sulfur mustard was used extensively because it caused more casualties than any other chemical agent in the war."<sup>30</sup> However, over two dozen chemical agents were used during the course of World War I.<sup>31</sup> Despite farmers' desires to revive their war-beaten land, much is still to be done to ensure agricultural products are safe for consumption. Since

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2008 and 2011, in the Robin des Bois inventory, twenty-three discoveries of ammunition or concentrations of phosphorus ammunition were identified.

<sup>27</sup> Brocard; Nussy.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

<sup>30</sup> Corey J. Hilmas, Jeffery K. Smart, and Benjamin A. Hill. "History of Chemical Warfare." Chapter 2: History of Chemical Warfare. Accessed April 2, 2018. [http://ke.army.mil/bordeninstitute/published\\_volumes/chemwarfare/CHAP2\\_Pg\\_09-76.pdf](http://ke.army.mil/bordeninstitute/published_volumes/chemwarfare/CHAP2_Pg_09-76.pdf).

<sup>31</sup> Barry R. Schneider. "Chemical Weapon." Encyclopædia Britannica. July 20, 2016. Accessed March 1, 2018. <https://www.britannica.com/technology/chemical-weapon/Weapons-of-mass-destruction>.

being made aware of possibility of soil contamination, contaminated crop yields are discovered rather frequently in the context of this short timeframe.

In July 2015, seven farms within the Meuse department were shaken with the news that their crops could not be marketed until further notice.<sup>32</sup> On July 6, 2015, the prefecture of the Meuse reported that “polluting activities of deconstruction and destruction of chemical and explosive munitions” were carried out in this area, located about thirty kilometers northeast of Verdun.<sup>33</sup> Studies of samples conducted by the Bureau of Geological and Mining Research (BRGM) reveal that several parcels located on the territory of the communes of Muzeray, Vaudoncourt, and Loison contained metals and toxic organic compounds in the soil.<sup>34</sup> As a result, the department of the Meuse and the *Direction Départementale de la Cohésion Sociale et de la Protection des Populations* (DDCSPP) implemented sanitary restrictions on the use and sale of agricultural crop produced within the plots contaminated by chemical residues.<sup>35</sup> However seemingly insignificant a lost harvest may seem, the ramifications of the contamination were multifaceted. In addition to the cultivated cereal crops being destroyed, milk produced by cows that were potentially fed these cereals was collected every two days and discarded until at least late September of that year, totaling a loss of €150,000.<sup>36</sup> Additionally, the cows intended to be slaughtered remained in their barns until at least that date. One farmer who was affected by these events asserted that “you have to have strong nerves to support this, especially in the midst of an agricultural crisis.”<sup>37</sup> Farmers, who had been cultivating these lands for generations, were shocked that

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<sup>32</sup> Léa Boschiero. “Terres Polluées Par 14-18 : La Récolte 2015 Détruite Dans Le Nord Meusien.” Exclusif | Terres Polluées Par 14-18 : La Récolte 2015 Détruite Dans Le Nord Meusien. 2015. Accessed April 02, 2018. <https://www.estrepublikain.fr/actualite/2015/09/17/terres-polluees-par-14-18-la-recolte-2015-detruite-dans-le-nord-meusien>.

<sup>33</sup> Ibid.

<sup>34</sup> Ibid.

<sup>35</sup> Ibid.

<sup>36</sup> Ibid.

<sup>37</sup> Ibid.

French authorities did not intervene sooner if there was potential for danger.<sup>38</sup> However, it is misleading to imply that these types of occurrences are not the norm for communities along the Western Front.

Nearly one-third of the 1.45 billion shells fired did not explode, and are therefore nested either above or beneath the ground's surface.<sup>39</sup> The First World War's metal and metalloid remains have culminated into a phenomenon known as the "iron harvest" in France and Belgium, where unexploded ordnance, barbed wire, and munitions are unearthed by farmers ploughing their soil as well as other means. In 2012 alone, military units in France and Belgium collected 185 tons of unexploded munitions that were unearthed by farmers, builders, utility workers, and gardeners. Many of these shells contained mustard gas or other toxic chemical agents.<sup>40</sup>

Iron harvests have increasingly reaped more yields of unexploded ordnance as the years go by for farmers are ploughing deeper and the quantity of construction in these areas has grown.<sup>41</sup> It is not unheard of for farmers to accidentally injure or kill themselves from driving their tractor over active ordnance. For instance, as of July 2014, 360 people have been killed and 500 have been injured around the town of Ypres alone from stepping on unexploded ordnance left over from WWI.<sup>42</sup>

While there is some recent data on water and soil quality, the French government only tests water of heavily populated areas frequently, unless there were any foreseeable problems. It is important to note that most of the water data is for drinking water within the French

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<sup>38</sup> Ibid.

<sup>39</sup> Fletcher.

<sup>40</sup> Ibid.

<sup>41</sup> Ibid.

<sup>42</sup> Tom Parry. "The First World War bombs that are still killing people in France." Mirror.com. July 15, 2014. <https://www.mirror.co.uk/news/world-news/first-world-war-bombs-still-3862370>.

communes/departments, not necessarily water bodies. In itself, this does not guarantee or deny that crops are not being watered with contaminated water. And, in regard to the soil quality, the data suggests that the areas of concern are specifically regarding recent industrial or agricultural pollution. To this end, there was, and there still remains skepticism regarding if the French government was/is actively taking soil and water contamination surveys or considering lasting consequences related to World War I. It appears, in fact, that World War I has been overshadowed by World War II in regard to environmental consciousness as well as memory. For, most of the sites where action by the French government has been taken have been solely World War II battlefields or both World War I and II battlefields since these were thought to be of the greatest concern. This notion has been disproven by recent soil surveys, however.

In addition to the lack of data in general (especially data related to a specific commune), within the data sets that are available, it is not exactly clear if all of the types of pollutants that would remain from the First World War are being accounted for, such as chemical agents. This answer is even more vague in regard to data from soil surveys. In sum, these studies appear limited to information about industrial or agricultural pollution, not war-related pollution. (For example, the data for Verdun did not instances of well-known pollution from munitions disposal.) The government has appeared to neglect these types of studies. Some French farmers argue that this is from embarrassment and to avoid further resentment by the French people.

Commune	Physicochemical Parameters	Organic Materials	Quality of Drinking Water
<i>Fismes</i>	Good <sup>43</sup>	Not specified	Good
<i>Montfaucon d'Argonne</i>	Good	Not Specified	Satisfactory <sup>44</sup>
<i>Nantillois</i>	Good	Not Specified	Satisfactory <sup>45</sup>
<i>Varennnes-en-Argonne</i>	Poor <sup>46</sup>	Satisfactory <sup>47</sup>	Poor
<i>Boureuilles (commune of St. Hubert's Pavilion)</i>	Poor <sup>48</sup>	Poor <sup>49</sup>	Poor

Table 2.1: Water quality data for 50 contaminants and physicochemical parameters from February 2014 to August 2016.<sup>50</sup>

As of February 2, 2018, the water networks (for human consumption) in Nantillois, Varennes, Fismes, Verdun, and Montfaucon are within compliance, but only limited contaminants were tested for (particularly regarding those that would result from activities other than agriculture/farming), and the contaminants tested for were not consistent across the

<sup>43</sup> Less than 25% of non-compliant analyzes or less than 5 % of non-compliant analyzes depending on what was tested for; The range that quantifies the different categories depends on the type of contaminant.

<sup>44</sup> Between 5% and 25% of non-compliant analyzes; Seems to be due to the bacteriological quality component.

<sup>45</sup> Between 5% and 25% of non-compliant analyzes; Seems to be due to the bacteriological quality component.

<sup>46</sup> Iron and low/very mineralized water: more than 50% of non-compliant analyzes. Slightly mineralized water can be corrosive to pipes and heaters and lead to the dissolution of toxic metals (lead, etc.). If this water is also acidic, then it is considered aggressive because it can attack the pipes (e.g. lead, copper, zinc).

<sup>47</sup> Between 25% and 50% of non-compliant analyzes.

<sup>48</sup> Aluminum (poor: between 25% and 50% of non-compliant analyzes), low/very mineralized water (poor: more than 50% of non-compliant analyzes), iron (satisfactory: between 25% and 50% of non-compliant analyzes).

<sup>49</sup> More than 50% of non-compliant analyzes.

<sup>50</sup> "Qualité de l'eau potable." Ministère des Solidarités et de la Santé. October 1, 2014 (updated February 21, 2018). Accessed March 21, 2018. <http://solidarites-sante.gouv.fr/sante-et-environnement/eaux/article/qualite-de-l-eau-potable>; "Carte interactive de la qualité de l'eau: Découvrez la qualité de l'eau du robinet de votre commune." Que Choisir. Accessed March 24, 2018. <https://www.quechoisir.org/carte-interactive-qualite-eau-n21241/>; "Eau potable: Glossaire des paramètres analysés pour la qualité de l'eau potable." January 25, 2017. Accessed March 24, 2018. <https://www.quechoisir.org/glossaire-eau-potable-glossaire-des-parametres-analyses-pour-la-qualite-de-l-eau-potable-n23933/#arsenic>; The values tested were in the framework of bacteriological quality, agricultural pollutants, radioactivity and physicochemical parameters. It is important to note that customers' tap water is 'frequently' tested for lead, copper, nickel, vinyl chloride, and epichlorohydrin. This means that the presence of any contaminant does not imply that the pollution affects the entire network or city, for it may concern only certain network connections, buildings, or housing. These analyses testing for 50 pre-specified contaminants and physicochemical parameters were conducted between February 2014 and August 2016 within the 36,568 communes in metropolitan France. This data was published on the Ministry of Health website.

municipalities.<sup>51</sup> In some communes, no analyses were conducted, especially regarding studies of nitrates.<sup>52</sup>

Given the fact that there is limited available data source for soil or water surveys in the respective French communes, particularly in regard to the contaminants of interest, I collected my own samples for analysis during a trip to northern France in May 2017. My soil samples were confiscated, however, the results for the water analysis samples are in the table below.

	Arsenic (As) <sup>2</sup>	Barium (Ba) <sup>2</sup>	Cadmium (Cd) <sup>2</sup>	Chromium (Cr) <sup>2</sup>	Copper (Cu) <sup>2</sup> , running water	Lead (Pb) <sup>2</sup> , running water	Mercury (Hg)	Nickel (Ni) <sup>2</sup>	Zinc (Zn) <sup>2</sup>
<b>Sample V</b>	0.003	0.006	< 0.001	< 0.005	< 0.01	< 0.003	< 0.001	< 0.005	< 0.005
<b>Sample F</b>	< 0.003	0.045	< 0.001	< 0.005	< 0.01	< 0.003	< 0.001	< 0.005	0.007
<b>PA Drinking Water Standard</b>	0.01	2.0	0.005	0.1	1.0, 1.3	0.015	0.002	–	5.0

Table 2.2: Water Analysis Reports from the Penn State Agricultural Analytical Services Laboratory in mg/L.

The results from the laboratory analysis of water samples from the Vesle River (the river under the Pennsylvania Memorial Bridge in Fismes; Sample F) and a spring in Haumont-près-Samogneux (Sample V), one of the ruined villages associated with the Battle of Verdun, suggest that the mitigation efforts within these two towns have been successful in regard to the activities that would affect water quality (e.g. removal of shrapnel, lead, and arsenic in the areas surrounding the water source, because of the hazards of water runoff, as well from within the water source itself). The levels found in the two samples for each tested chemical element were significantly lower than the State of Pennsylvania's standards for drinking water. For example, the sample collected from the Vesle contained less than 0.003 mg/L of arsenic, compared to the

<sup>51</sup> "Ministère chargé de la santé - Résultats des analyses du contrôle sanitaire des eaux destinées à la consommation humaine." Ministère des Solidarités et de la Santé. Accessed March 21, 2018. <https://orobnat.sante.gouv.fr/orobnat/rechercherResultatQualite.do>.

<sup>52</sup> "Qualité de l'eau potable."; Nitrates can be due to agricultural pollution (pesticides, etc.) or TNT, among other less probably sources. Consumption of excessive levels of nitrates can prevent proper transport of oxygen by red blood cells, causing methemoglobinemia in infants.

Pennsylvania drinking water standard of 0.010 mg/L. Further research into pre-war environmental census data is needed to draw concrete conclusions from these results.

Each of the contaminants that were tested for have acceptable limits or standards in drinking water, as is determined by the Department of Environmental Protection.<sup>53</sup> These standards fall into one of the two categories: Health-based (primary) standards, including contaminants which have known health effects (e.g. barium, lead, mercury, arsenic), and Aesthetic (secondary) standards, including contaminants like nickel that affect the taste, odor or color of the water, and thus make water unpalatable or unusable in some regards.<sup>54</sup>

While arsenic is known to cause many health problems in humans, such as degenerative, inflammatory and neoplastic changes of skin, respiratory system, blood, lymphatic system, nervous system and reproductive system.<sup>55</sup> In fact, there is evidence that suggests that the most common cause of arsenic-related deaths result from lung cancer.<sup>56</sup> Currently, there is no remedy for chronic arsenic poisoning.<sup>57</sup> In addition to the effects of arsenic poisoning on humans, wildlife, including both plant and animal communities, also face short- and long-term negative effects: behavioral effects, death, and inhibition of growth, reproduction, and photosynthesis.<sup>58</sup> In arsenic-affected ecosystems, species numbers are few, and in some cases, when arsenate levels are too high, only arsenate-resistant microbes can survive.<sup>59</sup> The nature of the effects, however,

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<sup>53</sup> Susan M. Boser. "Penn State Extension Offers New Online Tool To Help Interpret Water Test Results." PA Environment Digest - Crisci Associates. November 28, 2011. Accessed April 02, 2018. <http://www.paenvironmentdigest.com/newsletter/default.asp?NewsletterArticleID=20834>.

<sup>54</sup> Ibid.

<sup>55</sup> N. Singh, D. Kumar, and A.P. Sahu. "Arsenic in the environment: effects on human health and possible prevention." <https://www.ncbi.nlm.nih.gov/pubmed/17929751>.

<sup>56</sup> Young-Seoub Hong, Ki-Hoon Song, and Jin-Yong Chung. "Health Effects of Chronic Arsenic Exposure." *Journal of Preventive Medicine and Public Health* 47.5 (2014): 245–252. *PMC*. Web. 9 Mar. 2018.

<sup>57</sup> Singh, Kumar, and Sahu.

<sup>58</sup> "Arsenic." Arsenic: 6. What Are the Effects of Arsenic on the Environment? Accessed April 03, 2018. <https://www.greenfacts.org/en/arsenic/1-2/arsenic-6.htm>.

<sup>59</sup> Ibid.

are dependent on the species as well as the length of exposure. So, the remains of arsenic leftover after armistice could potentially be extremely hazardous to the respective wildlife communities, as well as the human communities reaping harvests and utilizing contaminated water sources.

Like arsenic, lead has many known negative health effects. Long-term exposure to lead in concentrations exceeding the drinking water standard has been linked to health effects such as high blood pressure, stroke, and cancer.<sup>60</sup> Children are even more at risk to lead poisoning, for they absorb lead more abundantly in a shorter time frame.<sup>61</sup> Children affected by lead poisoning may suffer from seizures, behavioral disorders, brain damage, lowered IQ, reduced birth weight, and premature birth. Examples of lead poisoning's harmful effects can be seen in instances like Flint, Michigan, a city that does not even rank as one of the United States' most "dangerous lead hotspots."<sup>62</sup> Similar to the ecological effects of arsenic, elevated concentrations of lead in the natural environment can result in "decreased growth and reproductive rates in plants and animals, and neurological effects in vertebrates."<sup>63</sup> In addition to the other harmful substances one can consume, poisoning from copper, which can be found within World War I era artillery shells, has been hypothesized to cause intestinal illness and stomach cramps.<sup>64</sup>

These contaminants have been found to have devastating impacts on aquatic and terrestrial ecosystems. However, the ecological problems that result from leftover munitions from World War I have tremendous implications for public health as well as economic prosperity. As is the

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<sup>60</sup> Bryan Swistock. "Corrosive Water Problems." Penn State Extension. Accessed April 02, 2018. <https://extension.psu.edu/corrosive-water-problems>.

<sup>61</sup> Ibid.

<sup>62</sup> M.B. Bell and Joshua Schneyer. "Thousands of U.S. Areas Afflicted with Lead Poisoning beyond Flint'." Scientific American. Accessed April 02, 2018. <https://www.scientificamerican.com/article/thousands-of-u-s-areas-afflicted-with-lead-poisoning-beyond-flints/>.

<sup>63</sup> Environmental Protection Agency. "Basic Information about Lead Air Pollution." EPA. November 29, 2017. Accessed April 02, 2018. <https://www.epa.gov/lead-air-pollution/basic-information-about-lead-air-pollution>.

<sup>64</sup> The author's 2017 water analysis report of samples from the Vesle River (Sample F) and a spring in Haumont-près-Samogneux (Sample V).



case with agricultural crops, plants can absorb these harmful contaminants through their root (from the soil) or shoot (through lead dust in the air) systems. Despite the fact that experts from the United States estimate that some two-hundred hazardous chemicals can be contained or derive from World War I military munitions, there are still countless French farms that neighbor poison forests and unmitigated wastelands.<sup>65</sup> Even more concerning, perhaps, is the fact that the great bulk of these sites are not being monitored by French authorities for crop contamination.

As with the new war strategies, the new mechanisms of modern warfare used during the First World War created enduring consequences for the landscape on which war was waged, as well as for the surrounding areas. Today, soil contamination from chemical weapons and artillery shells is a form of lasting collateral damage from World War I. The environmental persistence of some military-origin contaminants is demonstrated by the heavy metal contamination in soils and leachates. Scientists have recommended that even the surrounding land should not be used for agricultural purposes because of the high concentration of contaminants at these abandoned disposal sites. The Battle of Verdun turned stable soil ecosystems into loose, unconsolidated sediment,” thus altering the surface hydrology, water table characteristics, and soil development rates.<sup>66</sup>

Keller argues that “combat on the Western Front altered the makeup of forests and the composition of soil.”<sup>67</sup> He claims that prior to 1914, “the majority of forests along the Western Front were deciduous, comprising European Beech, European Hornbeam, European Oak, and English Oak.”<sup>68</sup> During the French government’s reforestation program, “Austrian Pine and

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<sup>65</sup> Victoire Guimbal, Tamara Villarins, Elodie Crépeau, & co.

<sup>66</sup> Joseph P. Hupy. “The Long-term Effects of Explosive Munitions on the WWI Battlefield Surface of Verdun, France.” *Scottish Geographical Journal*, 122:3, 2006, 167-184.

<sup>67</sup> Tait Keller. “Destruction of the Ecosystem.” *International Encyclopedia of the First World War*, 2014.

<sup>68</sup> Ibid.

Scotch Pine (*Pinus sylvestris*) seedlings, fast-growing coniferous species that tolerated nutrient-poor soil” were planted in the “obliterated sections.”<sup>69</sup> After this initial effort, foresters reintroduced European Beech (*Fagus sylvatica*) as a way to combat thinning and clearing of pine.<sup>70</sup> Keller notes that “today some areas remain covered with conifers, although the majority of the battlefield is covered with a beech-dominated, deciduous forest.”<sup>71</sup>

In addition to the lasting impacts on plant life, wild animals have also suffered persisting effects as a result of the First World War, in addition to farm animals, as already discussed. In 2004, France’s national forestry office, the *Office national des forêts* (ONF), conducted a study of the livers of wild boars hunted in Verdun national forest, which covers ten thousand hectares and was partially replanted following a ten-year operation aimed at removing ordnance.<sup>72</sup> The data from this study illustrated that ten percent of the livers tested were “highly contaminated by lead and cadmium poisoning.”<sup>73</sup> This contamination was attributed to the remaining ordnance buried in the forest, slowly corroding over time, leaking its toxic metals and explosives (“including fulminate of mercury used in percussion caps”) into the soil.<sup>74</sup> Despite this new insight, as of June 1, 2014, there have not been subsequent study of the health effects on the local population regarding the many natural water sources within the Verdun national forest used for tap water.<sup>75</sup> However, in other instances, contaminants have been studied and discovered in water sources. Such was the case in 2012, when the government banned the consumption of drinking water in 544 municipalities with locations that correspond to old frontlines within the

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<sup>69</sup> Ibid.

<sup>70</sup> Ibid.

<sup>71</sup> Ibid.

<sup>72</sup> Oliver Saint Hilaire. “The Great War time bombs scattered around France.” June 1, 2014. Accessed February 2, 2018. <https://www.mediapart.fr/en/studio/portfolios/great-war-time-bombs-scattered-around-france>.

<sup>73</sup> Ibid.

<sup>74</sup> Ibid; These munitions have become more dangerous than they were at the time of their manufacture.

<sup>75</sup> Ibid.

Red Zone that demarcate major battles in both world wars due to excessive levels of perchlorate, an endocrine disruptor and a chemical anion used as an explosive in shells by the German army and in the manufacturing of munitions, including rocket propellants.<sup>76</sup> Because of the correlation found between the maximum levels of salts and the regions most impacted by the two world wars, these high concentrations of perchlorate salts in tap water were attributed to the delayed effects of buried ammunition leaking the salts into groundwater bodies before reaching the tap.<sup>77</sup> As this data shows, according to Victoire Guimbal, Tamara Villarins, Elodie Crépeau, & co., for almost a century after the war, the First World War was ‘forgotten’ by the Water Framework Directive.<sup>78</sup>

Another study conducted on plant and animal life in the Red Zone around Verdun reveals the extinction of salamanders as well as the “rarefaction and very slow recolonization of newts, toads, frogs, and reptiles.”<sup>79</sup> The authors of this study also found that the species that returned to the area most readily were those that migrated from adjacent “refugia islands.”<sup>80</sup> When they conducted the same studies, without establishing a definitive, or formal, correlation with the use of chemical agents in Verdun, they found genetic abnormalities and significant variations in color among several species, including plants species.<sup>81</sup>

As of May 26, 2016, approximately 100 square kilometers, an area roughly the size of Paris, France, is still strictly prohibited by law from public entry and agricultural use is nearly impossible due to the amount of unexploded ordnance and human remains not yet recovered

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<sup>76</sup> Nussy, “Perchlorate in Drinking Water.” United States Environmental Protection Agency. Accessed March 24, 2018. <https://www.epa.gov/dwstandardsregulations/perchlorate-drinking-water>; Victoire Guimbal, Tamara Villarins, Elodie Crépeau, & co.

<sup>77</sup> Victoire Guimbal, Tamara Villarins, Elodie Crépeau, & co.; This is particularly the case for the agglomerations of Arras, Lens, and Douai, France.

<sup>78</sup> Ibid; The Water Framework Directive’s objective is to preserve and restore aquatic resources.

<sup>79</sup> Ibid.

<sup>80</sup> Ibid.

<sup>81</sup> Ibid.

from the world wars.<sup>82</sup> Even in the “less dangerous and re-populated” blue and yellow zones, farmers still die or injure themselves while plowing over hundred-year-old unexploded ordnance. With all things considered, French authorities estimate that at the rate in which they were working as of the summer of 2016, complete environmental mitigation would take between three hundred and seven hundred years.<sup>83</sup> Though, other experts, such as Joseph Hupy and Christina Holstein, doubt the Red Zone will ever be entirely unmarked by the First World War, even in regard to the clearing of munitions.

The dangers and implications of chemical warfare have just resurfaced in public consciousness as a result of the chaos in Syria. But, for the people of France and Belgium, they’ve been fighting a war of destruction and devastation since 1914.

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<sup>82</sup> Nussy.

<sup>83</sup> Ibid; Stuart Thornton. “Red Zone: France’s Zone Rouge is a lingering reminder of World War I.” National Geographic Society. May 1, 2014. Accessed February 2, 2018. <https://www.nationalgeographic.org/news/red-zone/>.

# Conclusion

## Environment and Memory: The Battlefield as a Liminal Space

Lawrence H. Keeley, in his work entitled *War Before Civilization*, asserts, “Collective violence between structured social groups is as old as human societies themselves, and resulting ecological change must have just as ancient a history.”<sup>1</sup> In this regard, it is fundamental to recognize effective ways to mitigate war-affected landscapes and to heal the spirits of war-affected communities. As Chapter 4 demonstrates, certain landscapes have not been adequately mitigated to be reverted to their pre-war use. This has been especially true in regard to agricultural land, and even more so in regard to reclaimed agricultural land within France’s Red Zone.

I maintain that while mitigation efforts can be costly, the costliness of such efforts should prevent them from occurring. Otherwise, the livelihoods of locals cannot truly be restored, public health risks are present, and both the internal and external struggle with the First World War cannot cease. In that regard, both the healing of lands and peoples affected by war can be a simultaneous process, as is the case with memorialization. This logic is consistent with Hynes’ argument that “monuments are “crucial icons for the official act of closure.”<sup>2</sup>

As Pierre Flatrès insists, the battle zone “remains a fact in the geography of northern France many decades after the conclusion of the war. At one extreme are the military cemeteries and great memorials, which are such unusual insertions in an otherwise ordinary scene (in source

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<sup>1</sup> Lawrence H. Keeley. “War Before Civilization.” Oxford University Press. December 1997. Accessed April 2, 2018.

<sup>2</sup> Michael Heffernan. “For Ever England: The Western Front and the Politics of Remembrance in Britain.” *Ecumene* 2, no. 3 (July 1, 1995): 293-323. doi:10.1177/147447409500200304.

citation).”<sup>3</sup>

After World War I, many battlefields within the Red Zone were abandoned and the remnants of war remained. Large expanses of agricultural land were never re-ploughed due to the tens of millions of craters and unexploded shells lying on or just beneath the surface. Many of the villages that once dotted the Verdun region were never rebuilt, and instead were considered “a casualty of the war.”<sup>4</sup> Eventually the barren, cratered surface became covered with a thick mass of shrubby vegetation.<sup>5</sup> French officials believed the area was a wasteland and abandoned any plans for restoration.

It was not until the mid-1920s that the French government decided to revive mitigation efforts in the Verdun area. The impetus for this renewed commitment was the pressure from veterans’ groups who were complaining that they “could no longer visit their former positions due to the dense vegetation.”<sup>6</sup> Before mitigation efforts began, however, the French government purchased large portions of the former battlefield and allocated severely devastated areas as the ‘Red Zone.’<sup>7</sup> As aforementioned, civilians that inhabited these areas were subject to a minor forced relocation. To this day, some of these individuals are not yet permitted to return. Tait Keller, in his article, “Destruction of the Ecosystem,” asserts that “this policy allowed the government to direct land reclamation efforts for eventual access as a memorial.”<sup>8</sup> After implementing this policy, the French government began the process of “clearing the thick vegetative cover, corpses

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<sup>3</sup> Hugh Clout. *After the Ruins: Restoring the Countryside of Northern France After the Great War*. Exeter: University of Exeter Press, 1996, 1.

<sup>4</sup> Hupy.

<sup>5</sup> Ibid.

<sup>6</sup> Tait Keller. “Destruction of the Ecosystem.” *International Encyclopedia of the First World War*, 2014.

<sup>7</sup> Ibid.

<sup>8</sup> Ibid.

and unexploded shells from the surface of the battlefield.”<sup>9</sup> Then, the landscape was replanted with trees and managed as a timber resource.

The former battlefields of France’s Western Front, like all other landscapes touched by conflict, are dynamic, but not arbitrary. Their meaning is in part derived from the trauma as well as the nostalgia. Yet, within these complex landscapes, memorialization has played a powerful role in healing broken spirits, healing landscapes, reverberating economies, as well as building strong international bonds. The Pennsylvania memorials in France have helped form and maintain integral bonds between the State of Pennsylvania and the communes of Nantillois, Varennes, and Fismes, in addition to the bond between the United States and France. Even more interesting, perhaps, and unusual, is the bond established between the city of Meadville and the commune of Fismes, Meadville’s ‘sister city.’

The relationship between Meadville and Fismes is built upon the sacrifices of the men of the 28th Infantry Division during the Battle of Fismes in 1918 and the relief from the Commonwealth of Pennsylvania and Meadville residents that followed.<sup>10</sup>

This bond is still very much alive, with a large-scale ceremony planned to take place in Fismes on September 15, 2018 to inaugurate a memorial, which will be located next to the memorial bridge on the bank of the Vesle River, honoring the United States troops who fought in the Battle of Fismes and Fismette.<sup>11</sup> The event brochure notes that the Fismes 2018 Committee anticipates participation and attendance from French locals and officials in addition to a delegation of individuals representing the Commonwealth of Pennsylvania as well as the City of Meadville.<sup>12</sup> The Meadville Fismes Memorial 2018 Committee has even made a tour package available for

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<sup>9</sup> Ibid.

<sup>10</sup> 2018 Fismes Memorial Brochure; This aid included material aid (three boxcars of clothing and food) and \$42,700 in post-war construction funds to rebuild the Pennsylvania memorial bridge after it was destroyed in the Second World War during a German Offensive in 1944.

<sup>11</sup> Ibid; The memorial site is supported by the City of Fismes in partnership with the Fismes Office of Tourism and its region. The Association of Leisure and Recreation Services will also be involved with the project.

<sup>12</sup> Ibid.

individuals who desire to travel to Fismes for the ceremony that takes place almost exactly one hundred years since the liberation of Fismes during the First World War.<sup>13</sup> The event brochure also notes that this new memorial will reinforce the ties that bind” the citizens of Fismes and Meadville.<sup>14</sup>

In their presentation for the 2018 memorial’s application of certification, the County Centennial Committee for the city of Fismes writes that the memorial “will not only be an object of [historical and geographical] knowledge, but will also be a source of emotion.”<sup>15</sup> This emotional link is part of what has allowed memorials to remain important as avenues of exchange and reconstruction.

Similar to the Pennsylvania memorials, and other battlefield memorials, when they were first installed, the ceremony that will take place in September 2018 serves these respective communities in two main ways: for tourism and for pilgrimage.

The near-complete phase of massive commemoration in Belgium and France in the late 1920s triggered “the battlefield pilgrim.”<sup>16</sup> Given the distance, only more affluent Americans could afford to journey to Europe.<sup>17</sup> However, commercial tours to northern France began as early as April 1919, where visitors set out to view the unprecedented devastation for themselves.<sup>18</sup> But at this point, much of the land was not made suitable for tourists. Even the *Illustrated Michelin Guide to Battlefields* warned of the fatal mistake of departing from designated paths, for one may

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<sup>13</sup> Ibid.

<sup>14</sup> Ibid.

<sup>15</sup> County Centennial Committee for the city of Fismes. “Application for Certification” (English version). August 18, 2015. Accessed March 10, 2018. <https://docs.google.com/viewer?a=v&pid=sites&srcid=ZmlzbWVzLmZyfGZpc2l1cy1tZW1vcmlhbC0xOHxneDoyZWRIbGUxMzg4OGQ0YTZl; http://www.fismes.fr/public/documents/presentationlabelcentenaire.pdf>.

<sup>16</sup> Budeau.

<sup>17</sup> Ibid.

<sup>18</sup> Hugh Clout. *After the Ruins: Restoring the Countryside of Northern France After the Great War*. Exeter: University of Exeter Press, 1996, 273.



stumble upon unexploded shells and other munitions.<sup>19</sup> Despite the warnings from various sources, tourists, children, and workmen were often maimed or killed due to the prevalence of unexploded ordnance, fuses, and other weapons.<sup>20</sup> Indeed, in the Marne, accidental deaths were a daily occurrence.<sup>21</sup> However, the money that entered the local economy from tourism and pilgrimage helped restore the local economy. Tourism and pilgrimage still function in this way among the communes of the Western Front.

Over the course of each modern war and tragedy, post-conflict repair and commemoration has taken on many different forms. In regard to repair and memorialization following the First World War, in some instances, populations or officials determined that the powerful images of devastation should serve as memorials of the war and to the war dead as well as material reminders that “perpetuate in history the testimony of German barbarism.”<sup>22</sup> However, within these ruined towns, many buildings required intensive repair in order to make them safe for visitors.<sup>23</sup> Despite the costs associated with repair, since the reparation of war damage was bound by law for the first time in history, the decision to restore these ‘monuments’ was made without much hesitation, for this form of repair was considered a debt of national, and even perhaps international, solidarity.<sup>24</sup> French examples of this type of memorialization and repair can be found at Vauquois (part of numerous battles, including the Battle of Vauquois and the Battle of Verdun), Haumont-près-Samogneau (distinctly part of the Verdun battlefield), and Somme (the site of the Lochnager mine crater, the largest mine crater on the Western Front which is now a

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<sup>19</sup> Ibid.

<sup>20</sup> Ibid, 274.

<sup>21</sup> Ibid.

<sup>22</sup> Ministère de L’Environnement, de l’Energie et de la Mer and Ministère du Logement et de l’Habitat Durable. “Pour Mémoire. La Grande Guerre et les Travaux publics. Revue Des Ministères De L’Environnement, De L’Energie Et De La Mer Du Logement Et De L’Habitat Durable.” [https://www.ecologique-solidaire.gouv.fr/sites/default/files/TP-\\_de\\_guerre\\_et\\_d\\_apr\\_s-guerre.pdf](https://www.ecologique-solidaire.gouv.fr/sites/default/files/TP-_de_guerre_et_d_apr_s-guerre.pdf), 216.

<sup>23</sup> Ibid.

<sup>24</sup> Ibid.

national memorial). While serving as perpetual representations of the war, these sites also help individuals conceptualize the experience and the notion of conflict more generally by standing within the landscape.<sup>25</sup>

Vauquois, the most important location of the “War of the Mines” and a site maintained and managed by the *Association des Amis de Vauquois et de sa region*, shows no trace of the hilltop town that once stood.<sup>26</sup> Instead, thanks to two key weapons used extensively during the Butte de Vauquois, the flamethrower and the landmine.<sup>27</sup> Now a French heritage site, Vauquois’ extreme devastation serves as a reminder for visitors of war’s carnage and the intense, relentless nature in which the war was fought. While Vauquois is a memorial in itself, there was also a ‘traditional’ memorial structure erected within the battle site, on a mound overlooking French lines, in honor of those who fought and died in the battle.<sup>28</sup> This approach of preserving memory through war-affected landscapes has been extended beyond the case of France’s World War I battlefields, and can even be observed in the United States’ Civil War battlefield of Gettysburg and in the French town of Oradour sur Glane, which underwent brutal bombing during World War II.<sup>29</sup>

With the cases of Haumont-près-Samogneux, the Somme, and Vauquois, mitigation took place in order to create these memorial spaces. The people of Vauquois could not imagine returning to the home that was no longer there, and in each instance, the example of architectural

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<sup>25</sup> There is also usually an overtly educational element with these types of memorial sites, where signs detail the respective battle, and so on. In the case of Vauquois, for example, one can even go on a guided tour into the French and German underground tunnel systems.

<sup>26</sup> “Guide to French Museums and Sites of the Great War.” Mildred Aldrich. Hilltop on the Marne. 1914. Accessed February 9, 2018. <http://www.ourstory.info/3/Bler/other/museums.html>.

<sup>27</sup> Keryn Means. “WWI MINE WARFARE AT THE BUTTE DE VAUQUOIS FRANCE WITH KIDS.” *Destinations, Europe*. November 23, 2016. Accessed March 20, 2018. <https://walkingontravels.com/wwi-mine-warfare-at-the-butte-de-vauquois-france-with-kids/>.

<sup>28</sup> “The War Underground.” Web Matters. Accessed April 12, 2018.

[http://www.webmatters.net/france/ww1\\_vauquois.htm](http://www.webmatters.net/france/ww1_vauquois.htm); Inside the memorial, which is decorated on the rear with a ‘distinctive’ tree (which was used as a registration marker by the French artillery) siting behind a French poilu holding a grenade, is a lantern.

<sup>29</sup> According to the desire of the French President and in memory of the atrocities perpetrated by the Nazis, the village was not rebuilt after the shelling on 10 June 1944 and the massacre of its 600 inhabitants.

and/or geographical war carnage was too impressive of a reminder of the First World War's devastating capacity. Therefore, these sites were made safe for public access, and thus, public commemoration. However, as discussed in previous chapters, sometimes interests were at odds regarding land restoration. In the case of the Lochnager Crater at the Somme's La Boisselle, a local farmer's desire to fill the crater to increase his farmland was met with opposition by those who wished to retain the geographical blemish as a memorial to those who fought in the Battle of the Somme.<sup>30</sup>

Another case where interests were at odds, was with the reconstruction of Ypres, Belgium.<sup>31</sup> Nicholas Saunders writes that, in fact, "events surrounding the reconstruction of the medieval Belgian town of Ypres are especially (perhaps uniquely) illustrative of competing memories and the shape of the future."<sup>32</sup> In Ypres, instead of partaking in modern town-planning, the town was reconstructed almost identically to its pre-war façade, "a replica of a city not yet ravaged by war."<sup>33</sup> Saunders writes that Ypres, a town often criticized for being a 'lie'—almost entirely barren of any meaningful associations or tie to the memory of the war, aside from Britain's Menin Gate and the newly installed First World War museum—and a missed opportunity in symbolizing forgiveness, regrowth, and inventiveness, conveys peoples' desire to shelter the past instead of embracing the present and future.<sup>34</sup> In this case, it is rather ironic that Ypres' post-war prosperity is dependent on battlefield tourism.<sup>35</sup>

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<sup>30</sup> N. Saunders. "Matter and Memory in the Landscapes of Conflict: The Western Front 1914–1999," 42.

<sup>31</sup> Ibid.

<sup>32</sup> Anon. 1999. In Ibid.

<sup>33</sup> Saunders, 43.

<sup>34</sup> Ibid; Vermeulen 1999: 9-10. In Ibid.

<sup>35</sup> Saunders, 43.

Sites that have not been publicly mitigated or memorialized include St. Hubert's Pavilion, in France's Argonne Forest. While the current landowner's interests lie with the environmental mitigation of the land and the reestablishment of a healthy ecosystem, she is also duly concerned with the sacredness of the land—a site where bodies remain buried either in informal cemeteries or where they fell in combat; where nature is scarred by trench systems and shell holes; where unexploded ordnance rests on the surface, symbolizing one less life lost in battle; where some were destined to rest in peace forever among the war-inflicted soil and aside buried munitions. This site, one of total death (human, animal, plant), is also inherently sacred, in spirit and in national identity. In many ways, there are several active spiritual ties to the land itself.

Out of many of the sites I visited, St. Hubert's was the most beautiful, engaging, and somber. It was the sincerest landscape, exposing the war for what it was, but also exposing the emotional power of nature as a source of healing, even when nature itself has not entirely healed from the trauma. It represented regeneration of spirit and of life, even if still marked by both human and ecological death and suffering.<sup>36</sup> In speaking to the land's owner, she expressed her desire to build a church on this devastated, but sacred, land.

Upon learning of the Hiroshima Peace Memorial City Construction Law, which asserts that when reconstituting city plans, a portion of the city would be allocated for the sole purpose of memorial, I saw further evidence of how the cultural impetus to commemorate in the aftermath of devastation can serve as a mechanism for spiritual or cultural healing as well. Looking beyond cultural context of the First World War, I can see that memorialization can function within any

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<sup>36</sup> Per in-person correspondence with St. Hubert's landowner on May 27, 2017: The area within the Argonne Forest is deceptively luxuriant. The trees are too weak to be used for timber, so the trees are instead used for resin extraction. A wolf population has just now reappeared. St. Hubert's landowner, who feels a spiritual connection to the land, is carrying out her own environmental mitigation. She expresses the disinterest of the French government to improve the ecological situation of the area, even when St. Hubert's is located beside agricultural land.

society shaken by war. I have also seen the significance of placing value on a culture when reconstructing war-torn landscapes.

While memorialization has played a significant role in post-war environmental mitigation, the same can be said about nature's role in post-war remembrance. Although the methods have differed, nature has consistently symbolized life amidst death. In northern France, red poppies still assert themselves within the landscape, marking former battlefields, such as Vimy Ridge. These poppies, often sitting next to agricultural fields, remind us of the former reality of these landscapes, and may even suggest that the ecological status quo has not been entirely reconfigured since the war's onset.

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Author's personal collection of pictures from the Pennsylvania memorials sites as well as other sites in France and Belgium.

French government documents on the mitigation processes in Fismes, Nantillois, Varennes-en-Argonne, and St. Hubert's Pavilion, France.

French government documents on the construction and maintenance processes of the Pennsylvania memorials in Fismes, Nantillois, and Varennes-en-Argonne, France.

Documents from Record Group 117 of military records, National Archives in College Park, MD.

Documents from Paul Phillippe Cret papers, Kislak Center for Special Collections, Rare Books and Manuscripts, University of Pennsylvania.

Environmental census data, provided by the local French Government.

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