Napalm, An American Biography

Robert M. Neer

Submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy in the Graduate School of Arts and Sciences

COLUMBIA UNIVERSITY

2011
ABSTRACT

Napalm, An American Biography

Robert M. Neer

This dissertation offers a history of napalm from its invention in 1942 at Harvard University to President Barack Obama’s signature on 21 January 2008 of the first U.S. treaty to limit its use. It describes the incendiary weapon’s creation through a partnership between government and academia; deployment in both Europe and the Pacific, culminating with the firebombing of Japan’s major cities in 1945; extensive use during the Korean War, and many other conflicts; and transformation in public opinion from a marvel to a monster so horrible Pentagon commanders won’t mention it, and commentators routinely cite it as an icon of savage cruelty. The history traces this change in public opinion to media coverage during the Vietnam War that raised awareness of the weapon’s effects on civilians; protests against the war and the Dow Chemical Corporation that started in 1965 and defined the gel as barbaric; U.S. defeat in Vietnam; commentary by opinion makers after the war, especially Hollywood film-makers; the rise of a global popular culture linked by electronic media; changes in international law; and development of alternative weapons. The study concludes that napalm’s story highlights the significance of worldwide communications and popular culture, the increased importance of civilian casualties in war, the important role social movements and international law play in the formulation of social norms, and the increasing power of global opinion to constrain national authorities.
CONTENTS

ILLUSTRATIONS, AND TABLES & GRAPH vi

ACKNOWLEDGEMENTS x

DEDICATION xiv

PREFATORY ILLUSTRATIONS xvi

INTRODUCTION 1

Inspiration 7

Literature Review 8

I: HARVARD'S GENIUS, 1942-43 16

Napalm Close-up: Boston, 4 July 1942 16

Fruits of the academy 20

“Bombs, Fuels, Gases and Other Problems” 28

Louis Fieser and the invention of napalm 30

Du Pont’s mysterious explosions 33

The element of fire 36

An ancient ancestry 39

Greek fire 43

The gunpowder paradigm 48

World War I 51

The airplane paradigm 54

Inquisitive cousins 59

Refighting the last war 62
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Anonymous Research No. 4”</td>
<td>66</td>
</tr>
<tr>
<td>The nature of soap</td>
<td>70</td>
</tr>
<tr>
<td>White phosphorus</td>
<td>77</td>
</tr>
<tr>
<td>Bombing Indiana</td>
<td>81</td>
</tr>
<tr>
<td>German and Japanese towns in the Utah desert</td>
<td>91</td>
</tr>
<tr>
<td>Cambridge’s secret special weapons laboratory</td>
<td>97</td>
</tr>
<tr>
<td>American Kamikaze: bats as suicide bombers</td>
<td>101</td>
</tr>
<tr>
<td>Bat bombs aloft</td>
<td>106</td>
</tr>
<tr>
<td><strong>II. UNCONDITIONAL VICTORY, 1943-45</strong></td>
<td>117</td>
</tr>
<tr>
<td><em>Napalm Close Up: Tokyo, 9 March 1945</em></td>
<td>117</td>
</tr>
<tr>
<td>The trouble with flamethrowers</td>
<td>132</td>
</tr>
<tr>
<td>Sicilian fire dragon</td>
<td>136</td>
</tr>
<tr>
<td>“The weapon … was almost invincible.”</td>
<td>144</td>
</tr>
<tr>
<td>“She carries a bundle in her arms.”</td>
<td>151</td>
</tr>
<tr>
<td>“We’ll fight mercilessly”</td>
<td>162</td>
</tr>
<tr>
<td>“If you don’t get results, you’ll be fired.”</td>
<td>165</td>
</tr>
<tr>
<td>A practical man</td>
<td>168</td>
</tr>
<tr>
<td>The end of “precision” bombing</td>
<td>170</td>
</tr>
<tr>
<td>The American Century</td>
<td>174</td>
</tr>
<tr>
<td>Brave new world</td>
<td>179</td>
</tr>
<tr>
<td><strong>III. WORLD ON FIRE, 1945-67</strong></td>
<td>190</td>
</tr>
<tr>
<td><em>Napalm Close-up: Off Sinai, Eastern Mediterranean, 8 June 1967</em></td>
<td>190</td>
</tr>
</tbody>
</table>
Made in America to take on the world 195

Greeks bearing gifts 196

“Cooking oil” 197

“A curious figure was standing a little crouched” 204

“Monstrous soul-destroying device” 207

Cold War heat 210

Bombes spécial de l’empire 214

The napalm of national liberation 216

IV: VIETNAM SYNDROME, 1962-75 218

Napalm Close Up: Trang Bang, South VietnamVietnam, 8 June 1972 218

Talons of the eagle 225

“People have this thing about being burned to death” 229

“The most transparent Communist propaganda” 233

“A small group of thoughtful, committed citizens” 237

“Would You Want Your Daughter to Marry a Napalm Producer?” 247

“The flesh runs right down their faces onto their chests” 255

Fire in the Streets 262

Physicians for Social Responsibility 269

Youth will be served 272

Louis Fieser: Hero to hated 282

Dow besieged 286

Burned out 290

iii
V. “NAPALM IN THE MORNING,” 1969-2009

Napalm Close Up: Charlie’s Point, Nung River, 1969

From “Napalm sticks to kids” to “baby burners”

Wages of failure

Great American Dream Machine

“Burn, you cocksuckers”

Merry Christmas, asshole!

You were BURNED by Napalm.Net!

VI. TRIAL OF FIRE, 1899-2008

Solferino, Italy 24 June 1859

The Age of Innocence

Rise of the Machines

Martial Law

Victor's justice

The world turned upside down

Expert witnesses

Dunant’s ghost

Diplomatic immunity

Advice of counsel

Conference on Certain Conventional Weapons

Protocol III
<table>
<thead>
<tr>
<th>VII. THE WEAPON THAT DARE NOT SPEAK ITS NAME, 1975-2009</th>
<th>394</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Napalm Close Up: Kuwait and Iraq, February to April, 2003</em></td>
<td>394</td>
</tr>
<tr>
<td>Soldier of Fortune</td>
<td>401</td>
</tr>
<tr>
<td>Judgment Day</td>
<td>407</td>
</tr>
<tr>
<td>You Can’t Go Home Again</td>
<td>409</td>
</tr>
<tr>
<td>Napalm train to nowhere</td>
<td>418</td>
</tr>
<tr>
<td>The Weapon That Dare Not Speak Its Name</td>
<td>429</td>
</tr>
<tr>
<td>Reserving judgment</td>
<td>435</td>
</tr>
<tr>
<td>Nations united</td>
<td>439</td>
</tr>
<tr>
<td>“America stands for something.”</td>
<td>440</td>
</tr>
<tr>
<td>A debatable proposition</td>
<td>447</td>
</tr>
<tr>
<td>CONCLUSION</td>
<td>450</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>458</td>
</tr>
</tbody>
</table>
ILLUSTRATIONS, TABLES & GRAPH

1. “Test Pond with Bomb and Markers” 16
2. Harvard University professor of organic chemistry Louis Fieser 17
3. “An Electric Squib Fires the Bomb” 18
4. “Fires Extinguished after One Minute” 19
5. “Hercules with the shirt of Nessus” 39
6. Byzantine navy deploys Greek fire in the 12th century 43
7. “Engine for Throwing Greek Fire. Thirteenth Century” 47
8. German troops attack with flamethrowers, September 1917 51
9. Guernica by Pablo Picasso 56
10. Terrified baby in Shanghai’s South Station, August 28, 1937 57
11. “Prime Minister Winston Churchill at Coventry Cathedral” 57
12. “Gibbs Burning Test” 59
13. “Dispensing a sample of gel” 60
14. “M-47 Bomb” 68
15. “Preparation and loading of napalm polymer gel” 75
16. “Solvation of napalm powder” 76
17. “Aged Napalm Gel” 77
18. White phosphorus burster tested in M-69 bomb filled with napalm 78
19. Distribution of napalm gel with TNT versus gunpowder bursters 79
20. Contemporary view of Harvard College soccer field 81
21. “Sectional models of AN-M-69 and M-69-WP bombs” 83
22. “Construction and summary of tests in Central German structure” 84
23. “Outside view of incendiary test in Central German structure” 85
24. German-style bedroom furnished for 1943 incendiary bomb tests 86
25. Reproduction Japanese row houses burn at Dugway Proving Ground 91
26. TABLE 1: Results from Dugway Bombing Tests 95
27. Interior of Japanese room created in Maryland for incendiary bomb tests 96
28. Fieser Christmas card with cat Georgie ("Jellied Gasoline") Pooh 99
29. Crabgrass-free lawn at Fieser home at 27 Pinehurst Road, Belmont, MA 100
30. “Mexican Free-tailed Bat (Todarida mexicana)” 101
31. Bats from Ney Cave in Texas swarm into the evening sky 102
32. Military personnel collecting bats at Ney Cave, Texas 104
33. “Bat-Borne Napalm Gel Incendiary with Time-Delay Pencil” 105
34. “Bat with napalm bomb attached” 106
35. “Early model bat bombshell with mechanical opening device” 108
36. “Egg-crate” trays: each bat dropped from its private compartment 110
37. Carlsbad Army Air Field accidentally destroyed by napalm-armed bats 113
38. “The government spent two million dollars on a plan to drop bats on Japan” 116
39. B-29 bomber next to a full load of 40 napalm cluster bombs 117
40. “E6R2 aimable cluster for the M-69 bomb” 119
41. “Woman and baby after fire attack” 122
42. Nihonbashi District in central Tokyo before bombing attack 128
43. Nihonbashi District after 9 March 1945 attack 129
44. Germans attack French positions with portable flamethrowers in 1940 133
45. M1A1 portable flamethrower firing napalm 60 yards 138
<table>
<thead>
<tr>
<th>No.</th>
<th>Image Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>46.</td>
<td>U.S. Eighth Air Force armorers fill napalm bombs in Europe in April 1945</td>
</tr>
<tr>
<td>47.</td>
<td>“Just Following Orders” WWII napalm attack in France</td>
</tr>
<tr>
<td>48.</td>
<td>Sandstone statue Gute (“Goodness”) surveys the ruins of Dresden</td>
</tr>
<tr>
<td>49.</td>
<td>Curtis LeMay is briefed about an attack on Nagoya, 26 March 1945</td>
</tr>
<tr>
<td>51.</td>
<td>Burned out areas of Tokyo at the end of the war</td>
</tr>
<tr>
<td>52.</td>
<td>Osaka after napalm attacks</td>
</tr>
<tr>
<td>53.</td>
<td>Hiroshima after atomic attack</td>
</tr>
<tr>
<td>54.</td>
<td>Damage to <em>U.S.S. Liberty</em> after 1967 Israeli napalm and rocket attack</td>
</tr>
<tr>
<td>55.</td>
<td><em>U.S.S. Liberty</em> receives assistance from the U.S. Sixth Fleet in 1967</td>
</tr>
<tr>
<td>56.</td>
<td>U.S. airplane releases napalm bombs over a North Korean town</td>
</tr>
<tr>
<td>57.</td>
<td>“Warning.” U.S. leaflet dropped over North Korea shows bombing targets</td>
</tr>
<tr>
<td>58.</td>
<td>“Pyongyang after US bombing”</td>
</tr>
<tr>
<td>59.</td>
<td>Three South Korean women burned with napalm in a U.S. air strike</td>
</tr>
<tr>
<td>60.</td>
<td>Censored image of a Korean boy burned by allied bombing</td>
</tr>
<tr>
<td>62.</td>
<td>“Kim baring her wounds for the camera”</td>
</tr>
<tr>
<td>63.</td>
<td>Image of burned “mother and child” air-dropped by activists in 1966</td>
</tr>
<tr>
<td>64.</td>
<td>Vietnamese child burned by napalm in <em>Ramparts</em>, January 1967</td>
</tr>
<tr>
<td>65.</td>
<td>Another Vietnamese child burned by napalm in <em>Ramparts</em>, January 1967</td>
</tr>
<tr>
<td>66.</td>
<td>“Children Are Not Born to Burn:” Martin Luther King, Jr. and others protest</td>
</tr>
<tr>
<td>67.</td>
<td>“Napalm Burns People,” protest sign triptych</td>
</tr>
<tr>
<td>68.</td>
<td>Police at University of Wisconsin beat anti-Dow protesters, 18 October 1967</td>
</tr>
</tbody>
</table>
69. View of 1967 University of Wisconsin protest from a broken window 275
70. Student protesters at Harvard fill corridor, 25 October 1967 279
71. Philip and Daniel Berrigan burn draft records with home-made napalm 292
72. “Face of a Vietnamese girl burned by napalm” 296
73. Baby burned by napalm sits on its mother’s lap and tries to drink water 302
74. CHART 1: Mentions of “Napalm” in N.Y. Times and L.A. Times, 1945-2010 312
75. Website for “Napalm Topical Fat Loss Matrix” skin cream 326
76. ”NAPALM Fun Club” Facebook page 331
77. YouTube video shows how to make napalm 333
78. Cartoon commentary on Disney theme park references “The Terror of War” 334
79. Cartoon commentary on Nike sub-contractors references “The Terror of War” 335
80. Artistic vision of American suburbia references “The Terror of War” 336
81. Cartoon commentary on Abu Ghraib abuses references “The Terror of War” 337
82. Napalm print, by Banksy 338
83. TABLE 2: Sorties Required for 50% Target Destruction 387
84. Worker ignites roadside grasses with a napalm torch 410
85. Japanese cargo ship New Carissa aground in Oregon, 4 February 1999 412
86. Navy and Coast Guard napalm creates fireball over New Carissa 414
87. “Napalm Park” at California Navy base holds about 34,500 bombs, 1994 418
88. 23 million pounds of napalm in bombs covers 67 acres in California 424
ACKNOWLEDGEMENTS

A dissertation is an expedition into unexplored territory. It requires an extensive support network if there is to be any hope of success. My greatest thanks are to my wife Maixuan, who supported this project from its earliest days. My children Marco and Sophia leavened an often difficult assignment with irrepressible cheer. They also reminded me of the infinite stakes behind the bland term “civilians.” My father Dr. Robert Neer and my step-mother Ann Eldridge offered critiques of immense value and exquisite grammatical accuracy. My brother Professor Richard Neer set a stellar academic example.

Columbia University is a superlative place to study American history. My teachers inspire me: they are models of erudition, accomplishment, and collegiality. Professor Herb Sloan, my advisor, gave key advice that enabled me to conceptualize this thesis. Professor Ken Jackson, my departmental sponsor, helped me see history from a perspective both analytical and personal. Professor Sam Moyn suggested a revision to the title that brought the entire study into focus. Professor John Witt galvanized me to tackle popular culture head on. Professor Moyn and he also taught me to treat international law with the respect it deserves. In the process, they brought the field alive. Professor Carol Gluck set a standard of excellence I have tried to honor in every line. Professor Eric Foner encouraged me to return to graduate school after a long absence, taught me how to formulate historical questions and deploy evidence to best effect, and demonstrated the joys of historical study. Professor Alan Brinkley also encouraged me to complete my doctorate. I have been his student, with interruptions, for 29 years: the longest such association of my life. A pair of research papers I wrote for him as a college senior planted the dream of being a historian in my mind. Many...
other members of the History Department have helped me. I thank them all, especially Professors Mark Mazower, Alice Kessler-Harris, and Pamela Smith.

My graduate student cohort embraced me as a sibling when I returned to the university. They helped me think of myself as a scholar: critical sustenance during the many years of this voyage. I carry the judgments, ambition and good humor of Nathan Perl-Rosenthal, Bryan Rosenblithe, Elizabeth Kai Hinton, Sarah Kirshen and Nick Osborne with me wherever I go. Valerie Paley, Ph.D., kept me simultaneously grounded, bemused, and enthused. Jared Manasek, daily companion at the desk next door, cast a keen last-minute eye over key portions of the text.

A great research library combined with the Internet is the most magnificent tool for accessing knowledge ever created. Columbia’s marvelous collections, supported by its reference, circulation, microform, electronic text, and inter-library loan offices, taught me more than any other single source. Butler Library’s roof-top graduate student study area proved a superb place to write. I owe particular thanks for their support to Director of the Rare Book and Manuscript Library Michael Ryan, and Lehman Curator for American History Eric Wakin.

“History should be written as philosophy,” Voltaire wrote. I agree. My time teaching the Contemporary Civilization political philosophy survey course in the Columbia College Core Curriculum helped this dissertation enormously. Thanks are due to my many colleagues in that program, in particular Professors Philip Kitcher, Michael Stanislawski, Matt Jones, and Roosevelt Montas, and Dean of Academic Affairs Kathryn Yatrakis. My students, who heard more about napalm than any likely expected when they entered college, encouraged me with their interest and enthusiasm. My colleagues in the Columbia Undergraduate Scholars Program Lavinia Lorch, Kristin Gager, Michael
Dunn, Jennifer Thompson, Sarah Dziedzic, Maria Baquero, Dehla Hannah, and Nandi Theunissen applauded progress reports, and urged me on.

Many libraries besides Columbia’s were essential in my quest to learn about napalm. Harvard University’s collections, in particular, filled important gaps. Its archives hold the papers of Louis and Mary Fieser, among other treasures. Barbara Meloni and Kate Bowers cataloged that collection, and made my research much easier. The New York Public Library, perhaps the most beautiful in the world, was also of great assistance.

Many experts gave me crucial insights, provided source materials I would otherwise have missed, and answered questions. W. Hays Parks, himself a central character in this story, was especially generous. Eric Prokosch and Malvern Lumsden, who blazed long stretches of the trail followed in this text, could not have been more cordial. Jim Dingeman supported me in ways large and small from the moment we met. He was largely responsible for my first two talks about napalm, to the New York Military Affairs Symposium and the Saltzman Institute of War and Peace Studies at Columbia’s School of International and Public Affairs, both of which generated many helpful comments. The latter also produced an invitation to speak at the Breaking Down the Walls Conference at Arizona State University: an invigorating inter-disciplinary intellectual cocktail of military officers, business executives, academics and others. I am grateful to the organizers of the G.W.U.-L.S.E.-U.C.S.B. International Graduate Student Conference on the Cold War at George Washington University for inviting me to participate in their challenging and instructive gathering. Professors Jackson and Gluck both let me lecture to their classes about napalm, which helped me organize my thoughts and generated useful feedback.
David Kravitz was supportive as only a best friend can be. He gave me access to a wooded retreat where I wrote Chapter I, and provided an exceptionally helpful last-minute review of my legal analysis. Macallan K. Nein, best friend of a different sort, helped keep me grounded and thinking sensibly. Maureen Marzano gave me peace of mind by caring for my children as if they were her own, and listened with great patience to many soliloquies about napalm. I could not have written this dissertation without her help.

I owe my education to a long line of teachers that started with my mother, Professor Eva Neer, and includes friends and fellow students at schools around the world. This thesis carries their contributions in every word.
DEDICATION

For my father, a healer.


INTRODUCEION

Napalm was born a marvel but lives a pariah. Its story, American in origin but global in scope, is heartbreaking, inspiring, and little known. It was invented on Valentine’s Day, 1942, in a secret basement laboratory at Harvard University. On 9 March 1945, just 37 months later, the incendiary gel enabled perhaps the greatest military victory in history when it killed as many, or more, people in one night at Tokyo as died at either Hiroshima or Nagasaki. After World War II, it was deployed by dozens of states in Europe, Latin America, Africa, and Asia; first by Greece during its civil war, and most recently by the U.S. in the 2003 invasion of Iraq. It has been used in virtually every significant military conflict since its creation, remains in the arsenal of every major military power, and is legal to use against combatants under international law.

Napalm was one of the first successes of the marriage between universities and the military brokered in the 1940s by the U.S. government. It also, two decades later, inspired a student-led campaign against the Dow Chemical Corporation at campuses across the United States that forced the first use of tear gas at an American university, and remains a touchstone for social movements worldwide. Napalm can terrify civilians with its name alone, and intrigues artists, directors, gamers, and marketers with its fame. In time, its notoriety undermined and eventually outweighed its military advantages. Developments in military technology that created battlefield alternatives eased the process.

America’s defeat in Vietnam was the turning point. From the early 1970s on, diplomats and international lawyers, acting primarily though the United Nations and the International Committee of the Red Cross, convened a series of conferences to study and control the weapon. In 1980, the U.N. adopted the Convention on Certain Conventional Weapons (C.C.W.). Protocol III of the con-
vention forbids use of incendiary weapons against “the civilian population as such,” or “concentrations of civilians” under any circumstances. An ever-increasing number of countries accept this principle: now 107, which together represent most of the world’s population. Today, generals who deploy napalm deny it, and its victims publicize use of the weapon for political advantage.

On his first full day in office, President Barack Obama committed the United States to Protocol III, 21 years after its promulgation … and with a diplomatic caveat that arguably lets the U.S. suspend the agreement at its discretion. Nevertheless, the United States, the nation that invented napalm and has manufactured more of it than any other, deployed it more frequently and more widely, and resisted its regulation longer than most, has accepted, however haltingly, the world’s judgment of its progeny.

Harvard chemistry professor Louis Fieser invented napalm while working for a top secret incendiary weapons research collaboration between the university and the U.S. government. America’s oldest institution of higher learning paid Fieser’s salary, released him from teaching responsibilities, and offered laboratory space in a red brick building on a quiet Cambridge street. Washington paid for everything else. Fieser stumbled on his formula when a mis-labeled chemical proved to be a crucial ingredient, and coined the name “napalm” in the mistaken belief that “naphthenate” and “palmitate” were primary constituents. In fact, his product included only a very small amount of palmitate. Therefore, he later concluded the term was “nondescriptive:” a generic for any incendiary made from thickened petroleum.

1 Louis Fieser. “Autobiographical Sketch for members of the Williams class of 1920.” 4. Fieser Papers. HUGFP 20.3. Box 1. Folder: “Louis Fieser — autobiographical accounts.” (Citations follow SimpleCitation.com format guidelines. Links to online versions of sources are included when possible.)
The first napalm bomb was tested on Independence Day 1942 in a shallow pool dug into the Harvard College soccer field. Army engineers later built model German and Japanese homes in the Utah desert to test prototype firebombs. Skilled architects, assisted by Hollywood set designers, supervised plans to the last ceiling tile and bedroom night table. Fieser spent the later part of the war devising special napalm weapons for the armed forces and agents of the O.S.S., forerunner of the C.I.A. His laboratory became a workshop worthy of James Bond’s Q Branch. A multi-million dollar Marine Corps project to attack Japan with millions of bat suicide bombers, each armed with a tiny napalm bomb glued to its chest, although never implemented, was the most remarkable of these efforts.

Napalm was first used in combat in August 1943 in Sicily, when a flamethrower team incinerated a wheat field believed to shelter enemy troops. It provided extensive support to Allied troops in Normandy, and during the invasion of Germany. Its most extensive use in WWII, however, was against Japan. On 9 March 1945, canals in Tokyo boiled, the smell of roasting human flesh nauseated bomber pilots, and 89,000 people, or more, burned to death, or died from other injuries, in a single night. The attack replaced U.S. “precision” bombing strategy, aimed primarily at military targets, with an “area” approach that targeted whole urban districts. This philosophy remains the basis for nuclear deterrence. America followed the attack with a napalm bombing campaign against more than 60 cities in Japan, except for the historic capital of Kyoto and metropolises reserved for nuclear attack, until supplies of the gel ran out. Commanders resumed the effort when new stocks arrived, and continued it until the end of the war. A post-war analysis of the Pacific conflict by the U.S. military concluded that napalm bombs alone, in combination with other conventional weapons, would have beaten Japan.
The incendiary, cheap to make and easy to deploy in bombs, has been used by air forces in nearly every significant military conflict subsequent to its invention. France, Britain, Portugal, Greece, Serbia, the U.S.S.R., Cuba, Iraq, Turkey, Israel, India, Nigeria, Bolivia, Peru, and Brazil, among others, have all dropped napalm on their enemies. Prior to the Vietnam War, use of the weapon was generally considered unremarkable. America used up to 70,000 gallons per day, for example, during the Korean War, without significant criticism.

Attitudes began to change in the late 1960s, when opponents of the Vietnam War seized on the effects of napalm on civilians as a metaphor for their criticisms of the conflict. Improved media access to the battlefield, combined with developments in communications technology, accelerated the process. In late 1965 and 1966 anti-war activists in northern California began to protest gel production at local plants. They took their campaign nationwide when local officials rebuffed their complaints. From 1966 to 1968, college students across the country protested against the presence on campus of recruiters for napalm manufacturer Dow Chemical Corporation. Publication in 1972 of the photo “The Terror of War,” which showed nine-year-old napalm victim Phan Thị Kim Phúc running naked and in agony down a highway in South Vietnam, intensified criticism. During and after Vietnam, movies, books, poems, music, and other forms of cultural expression made napalm a synonym for barbaric cruelty and American misadventure, and distributed this vision around the globe. “I love the smell of napalm in the morning,” from the 1979 film Apocalypse Now, became a catch phrase for carnage.

International law judged some forms of incendiary combat illegal before 1939 — but the field was fragmented, and efforts to clarify rules after World War I largely failed. Whatever remained of the law fell silent after Germany, Japan, Britain, the United States, and others, successively ignored
it in World War II. Jurists began to recover their voice only in the 1970s, during the Vietnam war, as gauged by resolutions adopted at international conferences and actions at the United Nations and other multilateral bodies. This movement culminated with U.N. approval of Protocol III of the C.C.W. Although international law now protects civilians from napalm, no regulation of the incendiary’s use against combatants has been given significant consideration.

American leaders initially ignored these cultural and legal developments. President Jimmy Carter banned the export of napalm and replaced flamethrowers with portable rockets filled with napalm, but made no significant changes to U.S. deployment policies. Presidents Reagan and George H. W. Bush refused to accept Protocol III of the C.C.W., although they did endorse other portions of the treaty. Other world leaders adopted a similar approach.

Public opinion, however, continued to move against napalm abroad and at home. Dozens of nations ratified Protocol III in the last years of the 20th century. Popular culture painted an unflattering picture of the incendiary. Proposals for peaceful uses of napalm in the U.S. engendered hysteria. In 1996, President Bill Clinton, supported by the Pentagon and the State Department, urged the Senate to approve Protocol III, subject to the reservation that the U.S. retained the right to attack concentrations of civilians with incendiary weapons if, in its sole judgment, doing so would result in less injury than would forbearance. Administration officials argued to Congress that destruction of a biological weapons facility staffed by civilians — incineration of which might prevent release of deadly pathogens — could be one such instance. Critics claimed the reservation rendered the treaty meaningless. President George W. Bush endorsed Clinton’s position. Senators, however, refused to bring the measure to a vote.
Serbia’s decision to drop napalm on Bosnia in 1994 — the gel’s first use in Europe since the Greek civil war — revealed an international consensus against the incendiary. A “new threshold” had been reached, said U.S. Secretary of State Madeline Albright. A “deadly threshold” had been crossed, *Time* wrote, with greater conviction and less authority. NATO responded with the largest military campaign in its history against Serbia. That only one napalm bomb fell, a dud that did not explode and injured no one, appeared immaterial.

Shortly after these dramatic events, the U.S. Navy reopened a shelved plan to destroy its napalm stockpile, which had been stored north of San Diego since the Vietnam War. On 4 April 2001, following a torturous process that included protests across half the country, and denunciations from Illinois Congressman Rod Blagojevich among others, Navy officials held a well-publicized “last canister” ceremony at the Fallbrook Naval Weapons Station next to the Camp Pendleton Marine base to mark an apparent end to U.S. napalm. Pentagon authorities stopped using the word to describe their weapons. In fact, however, they maintained extensive stocks of napalm.

The 9/11 attacks on New York and Washington, D.C. five months later prompted a wave of militarism in the U.S. and concomitant enthusiasm for brutal solutions. Films, books, and other popular culture bellwethers presented napalm as a powerful, even exciting, weapon, with little acknowledgment of its contested past.

In general, however, notwithstanding this sub-trend, the post-Vietnam consensus remains definitive: napalm is barbaric and counter-productive. Many civilians, as the Navy’s travails indicate, recoil at the mere mention of the weapon. None of the numerous proposals for large-scale peacetime uses of napalm, from airport snow removal to incineration of animal carcasses, has been im-
plemented. Military deployments elicit harsh worldwide condemnation. American officials continue to deny the U.S. uses napalm, even when directly contradicted by field commanders and third-party observers, as after the 2003 war. These denials have produced ridicule, and led to a scandal in Great Britain in 2005 when members of Parliament accused Prime Minster Tony Blair’s government of alliance with a state that committed war crimes. President Obama’s signature of Protocol III, after decades in which America declined to endorse the treaty, is a recent manifestation of the strength of this shared conclusion.

The juxtaposition of napalm’s remarkable power against its gradual abandonment offers an example of the limits of force in a globalized world: today’s enemies may be tomorrow’s allies, communications are cheap, instant and worldwide, and mutually assured destruction limits unconditional combat. More practically, nuclear weapons can reduce cities to ash more efficiently than napalm. America’s turn away from its invention — demanded first, and with greatest vehemence, by its youth — reflects the country’s continuing integration with the world, however delayed and halting.

**Inspiration**

This project was inspired by my observation during the many years I lived overseas of the gap between the way the U.S. is perceived abroad — beautiful, rich, and admirable, but also aggressive, brutal, and ignorant — and how it is seen by many Americans: peaceful, just, well-intentioned and inspirational. I was especially struck by the vast overseas presence of our military, from Japan to Antarctica to Central Asia and Europe, and how little these outposts are discussed or understood domestically. Napalm’s history is one aspect of the global expansion of the U.S. military since WWII, and reveals some of the consequences, foreign and domestic, of that growth.
My literary guides for this project were *The Making of the Atomic Bomb* by Richard Rhodes and *The Social History of the Machine Gun* by John Ellis. The first explains how the bomb came to be, and gives a rich understanding of the relationship between contemporary science and the military. It also provides a highly effective description of the effects of atomic weaponry. The latter shows how influential inanimate things, in particular military technology, can be on human societies, and how useful it can be to study the lessons they offer.

My hope is that structuring this history as a biography will enliven the subject, as it were, and make it easier to follow.

**Literature Review**

I have not been able to locate a single book or scholarly article about the history of napalm. The best popular source is Wikipedia. The best academic materials are: *Incendiary Weapons*, a 1975 survey of the field by Malvern Lumsden, a researcher at the Stockholm International Peace Research Institute, published by M.I.T. Press; *Flame On! U.S. Incendiary Weapons, 1918-1945* by John W. Mountcastle, a history of U.S. incendiary weapons with a focus on flamethrowers published in 1999 by White Mane Books and based on his 1979 Duke University Ph.D. dissertation; *The Scientific Method: A Personal Account of Unusual Projects in War and Peace*, Professor Louis

---


Fieser’s personal memoir, issued in 1964 by Reinhold Publishing; and various U.S. government histories of World War II. All of these books had small print runs and are out of print.


---


Expansion of the search term to “incendiary weapons” was similarly unsatisfying. It yielded in order: a 1976 review of Lumsden’s book; a review of a precursor monograph by Lumsden on the same subject; a review of Mountcastle’s book; an article on World War I U.S. chemical weapons tests; a one-page 2006 review in the *The American Journal of International Law* of U.S. responses to criticisms of white phosphorus use in Iraq; a 2005 analysis by U.S. Department of Defense law of war expert W. Hays Parks of a review of international law produced by the International Committee of the Red Cross; reviews of: *Chile 1970-73. The Political Economy of the Rise and Fall of the Unidad Popular, Kärnkraft och atombomber, and The Law of War and Dubious Weapons*; and a list of treaties approved by the Senate in 2009.\(^6\)

Napalm is discussed in numerous other publications, which provide the source materials for this study. Newspapers and periodicals, where even the briefest citations can now be traced through computerized searches, offer a particularly rich trove of information. Reports by experts,
diplomats, and international lawyers that accompanied review conferences organized by the United Nations and the Red Cross are another key resource.

This lack of historical analysis has been years in the making. “During the Second World War, fire became a very potent weapon. But it has received singularly little attention, either in the histories of the War, or in the disarmament discussions of the post-war years,” weapons scholar, political leader, and Nobel Peace Prize laureate Philip Noel-Baker lamented in 1958.7

A consequence of this neglect is that an extraordinary amount of inaccurate information about napalm has been published in such ostensibly reliable sources as histories, encyclopedias, periodicals, and reference websites. More insidious results include an inability to evaluate assertions about napalm because there is no easily accessible historical record; potentially inaccurate understandings of legal standards because of ignorance (starting, for example, with the definition of “napalm”); and, ultimately, an inability to learn from the past. A positive consequence is that there is ample room for further study. Areas that merit more detailed examination include comparisons between napalm and other infamous weapons such as nuclear devices and poison gas; issues of race, gender, and social and economic class related to napalm; current stockpiling and usage of the weapon; efforts to expand regulation; environmental consequences of napalm deployment; attitudes towards napalm in other countries, in particular portrayals of the incendiary in overseas media; and the influence of weapons manufacturers on policy formulation.

Examples of mistakes in current reference materials include the following:

---

• **What napalm is.** “The word napalm derives from two of its principal components, naphthenic acid and palmitic acid,” reports the 1995 *People’s Almanac.* ⁸ “The [storage] tanks are filled with naphthenic and palmitic acids used to thicken gasoline. That’s napalm!” explained an American veteran of the Korean War.⁹ Widely respected military reference website GlobalSecurity.org reports that initially, “Napalm was formulated for use in bombs and flame throwers by mixing a powdered aluminum soap of naphthalene with palmitate (a 16-carbon saturated fatty acid) — also known as naphthenic and palmitic acids — hence napalm [another story suggests that the term napalm derives from a recipe of Naphtha and palm oil].”¹⁰ In fact, Fieser and his colleagues believed they had mixed naphthalene with palmitate, but learned in short order that the reason their concoction worked so well was because it included lauric rather than palmitic acid: the name has no chemical meaning.

• **Who invented it, and when.** The 1994 *Encyclopedia of the American Military* asserts that, “British research led to napalm — thickened gasoline — which was used mainly by U.S. forces in World War II.”¹¹ In fact, napalm was a U.S. creation. A British officer did advise Fieser during an initial stage of his research, but U.K. incendiaries at the time used rubber to thicken gasoline; napalm uses different chemistry. The same reference volume explains that

---


“New developments since 1945 include more potent conventional explosives, cluster weapons, napalm and other advanced incendiaries ....”  

In fact, napalm was invented in 1942.

- **How hot it gets.** “Initial tests showed that napalm burned at a much higher temperature (5,000 degrees Fahrenheit), and for a much longer time, than any other incendiary composition then in use,” the *People’s Almanac* advised.  

In 2001, the *San Francisco Chronicle* reported of napalm, “It burned through everything, at more than 5,000 degrees ....”  

In fact, original napalm formulations burned at 800-1,200°C (1,472-2,152°F). Later formulations burned at 1,500-2,000°C (2,732-3,632°F). This is significant both for an understanding of the power of the weapon, and in order to make informed comparisons (water, for example boils at 100°C (212°F), the jet fuel fires at the World Trade Center on 9/11 reached a maximum of about 1,000°C (1,800°F), normal building fires generate temperatures of up to about 1,100°C (2,000°F), and steel melts at about 1,500°C (2,800°F).)

- **When it was first used.** The invasion of Tinian on 22 July 1944 is frequently cited as the first use of napalm: — “Napalm, a new weapon employed on Tinian [22 July 1944] for the first time,” for example, in the 1995 volume *Tinian: The Final Chapter.*  

In fact, napalm delivered

---


15 National Institute of Standards and Technology. “How could the steel have melted if the fires in the WTC towers weren’t hot enough to do so?” *NIST & The World Trade Center: Fact Sheets.* 30 August 2006: [NIST.gov](http://NIST.gov).

by flamethrower was used by U.S. troops in August 1943 during the invasion of Sicily. The first important operational use of a bomb specifically engineered for napalm — as opposed to improvised weapons fashioned from barrels and other containers — was on 15 February 1944, two years and a day after the gel’s invention, when the Seventh Air Force attacked the town of Pohnpei (or “Ponape”) on the lush Micronesian island of the same name.

• Whether it is still in the U.S. arsenal. “Napalm has recently been dropped from the U.S. inventory …” the People’s Almanac reported.\(^\text{17}\) As the 4 April 2001 San Francisco Chronicle article cited above recounted, “At a low-key ceremony this morning at the Fallbrook Naval Weapons Station in San Diego County, the final two canisters of Vietnam-era napalm will be recycled and sent on their way to Texas and Louisiana, where they will be blended into fuel used in industrial furnaces.”\(^\text{18}\) Non “Vietnam-era” napalm, however, is still part of the U.S. arsenal and was used during the 2003 invasion of Iraq.

• Uses by United States. In her 1972 Pulitzer Prize-winning history of America’s involvement in Vietnam Fire in the Lake, Frances Fitzgerald wrote “In Europe the Americans rejected the use of chemical warfare, but in Vietnam they used napalm, phosphorus, tear gas, and various kinds of defoliants as a general practice and in such quantities as to render certain parts of the country uninhabitable.”\(^\text{19}\) In fact, the U.S. used napalm extensively in Europe during World War II. Indeed, the first use of napalm in combat was in Sicily. In his 2001 book A His-

\(^\text{17}\) Sheeter and Fadness. “Napalm.” In Wallechinsky. The People’s Almanac Presents The Twentieth Century. 238.


Swedish author Sven Lindqvist wrote, “The next step was to create a life-sized model of a Japanese village, complete with paper walls and tatami mats. It was situated in Utah, where the napalm bomb was tested successfully during the summer of 1943. … Obviously it was against Japan that the Americans planned to use napalm. Why not against the Germans? … It was considered more legitimate to use napalm on the Japanese.” In actuality, technicians built a replica German village next to the Japanese model in Utah. “Napalm itself, as a ‘strategic’ weapon was reserved for people of color,” Rutgers University professor of English and American Studies H. Bruce Franklin wrote in his 2000 text *Vietnam and Other Fantasies*. History records that napalm was used against Germany during World War II, and that its first major post-war use was in Greece.

Readers of this study will be well positioned to assess these and other claims about napalm.

---


I. HARVARD’S GENIUS, 1942-43


1 The day was clear, with a high temperature of 73 and a low of 62 degrees Fahrenheit. The Boston Globe. 4 July 1942: 16.

in water to make a pool four to nine inches deep. By mid-morning, all was ready for the arrival of Louis Fieser, Sheldon Emery Professor of Organic Chemistry, one of Harvard’s most brilliant scholars and head for more than a year of “Anonymous Research Project No. 4:” a top-secret incendiary weapons war research collaboration between the university and the U.S. government.


Fieser arrived. He was 43 years old, tall, bald, with traces of the Williams College varsity football lineman he once was still present in his bearing. An octet of assistants followed. He equipped four of the young men with boots, buckets, long sticks, and gloves, and positioned them at work stations to the North, South, East and West of the pool. With assistance from the others, he gingerly lugged a live 70-pound napalm bomb, bolted nose down to a metal stand, through mud and water to the center of the lagoon. A wire ran to a control box outside the pool. Firemen and groundskeepers looked on with interest. Players 50 feet away lobbed blithely.

"An electric squib fires the bomb." First field test of a napalm bomb with white phosphorus burster, 4 July 1942. Fieser. The Scientific Method. 38: Fig. 3.3.

Professor Fieser flipped a switch. High explosives blasted incendiary white phosphorus into 45 pounds of jellied gasoline. A spectacular, billowing 2,100-degree fire cloud rose over the campus.

4 Appearance in 1943. Fieser. The Scientific Method. 126: Fig. 13.4. Appearance in 1945. Fieser. The Scientific Method. 202: Fig. 20.1. Undefeated football team:


6 Fieser. The Scientific Method. 36, 40.
Clods of searing, flaming napalm splashed into the water. Oily smoke filled the air. Assistants plunged into the mire, splashed water on burning blobs, and poked larger lumps into the water with their sticks to extinguish them. They noted the location and size of globules, and scooped any salvageable jelly into buckets for weighing. The tennis players scattered.⁷

"Fires extinguished after one minute." Assistants submerge gobs of burning napalm, make measurements, and collect unburned gel. Note empty tennis courts.

Fieser. The Scientific Method. 39: Fig. 3.4.

World War II was just seven months old for the U.S.: at once close, and far away. Boston Globe newspaper headlines that day announced desperate battles at El Alamein in Egypt and Sevastopol in the Crimea, an end to automobile and bicycle racing to conserve rubber, revised sugar rations, and the start of death penalty hearings for German saboteurs arrested on Long Island. Lil’ Abner, in the comics section, explained what the struggle was about: “A world where a fella and his gal can look up at the moon just for the foolishness of it, and not because there may be planes up there coming to blast ‘em both off the earth, a world where a fella is free to be as wise or as foolish as he

⁷ Fieser. The Scientific Method. 40.
pleases, but, mainly, a world where a fella is free! That world has disappeared, until we win this war.”

Not completely. At 10:00 a.m. that morning a crowd had gathered at Boston City Hall, raised the Stars and Stripes, paraded to the Old Granary Burial Ground on Tremont Street to set flowers at the tombstones of John Hancock and Samuel Adams, and continued to the Old State House. Beneath a tiny balcony flanked by wood carvings of the King of England’s lion and unicorn, an orator read the Declaration of Independence, just as had been done in 1776 at that very spot.

Fieser’s firestorm was over in seconds. Chunks of gel hissed, flickered, and died. A pungent aroma of phosphorus, like garlic or burning matches, mixed with the oily smell of gasoline, hung in the air. Napalm bombs had arrived in the world.

Fruits of the academy

The soccer field test was one of the earliest successes for the government’s National Defense Research Committee, conceived by Massachusetts Institute of Technology electrical engineer Vannevar Bush, who also co-founded armaments giant Raytheon. President Franklin D. Roosevelt established the organization on 27 June 1940 with a budget of about $100 million in current

---


dollars. In addition to napalm, the committee, which helped create the “military-academic” and “military-industrial” complexes, oversaw development of the atomic bomb, radar, sonar, proximity fuses, bazookas, amphibious landing craft, and some 200 other projects. By the war’s end, Bush had practically unlimited funding and supervised tens of thousands of scientists.

“General Physics,” as Time magazine called him in an April 1944 cover story, was tall and thin, with a wry smile, close-cropped hair, and round rimless glasses. He had been born in 1890 in Everett, Massachusetts, then as now a working-class town, and graduated from Tufts College in Medford in 1913. After he lost his job as a test engineer at General Electric — a fire shut down the facility where he worked — he taught elementary mathematics to women “not in the slightest degree interested,” and a “somewhat absurd” physics courses for premedical students, then enrolled in a joint Harvard-M. I. T. chemistry Ph.D. program in 1915. In 1916, he got married. Under financial pressure, he wrote his thesis in one year and received his Ph.D. in 1917. During World War I, he worked with the National Research Council — a branch of the National Academy of Sci-

---


ences and National Academy of Engineering established in 1916 to coordinate war research — to develop a magnetic submarine detector. Bush’s group built a working device but bureaucratic mismanagement, in his estimation, prevented it from being used. “That experience forced into my mind pretty solidly the complete lack of proper liaison between the military and the civilian in the development of weapons in time of war, and what that lack meant,” he wrote. He taught at M.I.T. after the war, made important breakthroughs related to the development of analog computers, and rose to become Vice President of the Institute from 1932-38, a position roughly equivalent to Chief Operating Officer. In 1939, he turned down an offer to be M.I.T.’s president in order to lead the Carnegie Institution of Washington, a research institute that made grants for basic scientific research.

Hitler invaded Poland on 1 September 1939, and by mid-June 1940, German armies stood triumphant across an arc that stretched from northern France to the Russian frontier. Bush gathered key leaders of the U.S. scientific research establishment, each of whom he had previously met individually or in small groups, for a collective lunch: Frank Jewett, newly elected president of the National Academy of Sciences and founding president of Bell Telephone Laboratories; James Bryant Conant, a chemist and president of Harvard University; Karl Compton, a physicist and president of M.I.T.; and Richard Tolman, a physicist and professor at the California Institute of Technology. “We were agreed,” he wrote, that America was sure to be drawn into the war, “that it would

---


be a highly technical struggle, that we were by no means prepared in this regard, and finally and most importantly, that the military system as it existed … would never fully produce the new instrumentalities which we would certainly need.”

Universities, Bush believed, had to be integrated into the war effort. A coordinating committee was required.

Bush brought this idea to Secretary of Commerce Harry Hopkins, who was one of Roosevelt’s closest advisors and outspoken in his opposition to the Nazis. The Secretary was the fourth of five children of a peripatetic Grinnell, Iowa harness store owner and his devoutly Methodist wife. He graduated from Grinnell College in 1912. Mindful, perhaps, of the progressive college’s motto “Veritas et Humanitas” (Truth and Humanity) — or John Wesley’s adjuration to community service — spent the early part of his career working in New York City for social welfare organizations like the Board of Child Welfare and Tuberculosis Association and, later, for the American Red Cross in New Orleans and Atlanta. In 1921, back in New York, he helped establish the American Association of Social Workers, and was elected its president in 1923. Hopkins came to the attention

---

18 Bush. *Pieces of the Action*. 33. He later expanded: “It was our fight, and we would inevitably be in it … in with all we could muster. And it was evidently going to be a highly technical war, one in which techniques might indeed determine the outcome. If we had any doubt on that score, it was resolved as we pondered the possibility of an A-bomb, in Nazi hands or ours.” Bush. *Pieces of the Action*. 34.


of Governor Franklin Roosevelt in 1931, when he directed New York’s Temporary Emergency Relief Administration for unemployed workers.\textsuperscript{23} After FDR was elected president, he rose through New Deal bureaucracies to head the Works Progress Administration, the nation’s largest employer.\textsuperscript{24} Roosevelt appointed him Secretary of Commerce in 1938. He was sworn in on Christmas Eve.\textsuperscript{25}

Hopkins immediately grasped the Director of the Carnegie Institute’s proposal for a military-academic partnership. “We found that we spoke the same language,” Bush wrote.\textsuperscript{26} (Indeed, Hopkins simultaneously organized a similar National Inventors Council at his department to coordinate private entrepreneurs and the War Department.)\textsuperscript{27} On 12 June 1940, the Secretary arranged for Bush to meet Roosevelt. Britain’s desperate evacuation of its Army from Dunkirk was just eight days in the past. Italy declared war on France and Britain, and Norway’s last division surrendered to the wehrmacht, two days before the meeting.\textsuperscript{28} The N.D.R.C. plan was in four paragraphs on a


\textsuperscript{24} McJimsey. \textit{Harry Hopkins}. 79.


\textsuperscript{26} The concord was “among the minor miracles,” Bush wrote, given a “deep seated distrust of social innovators, whom I regarded as a bunch of long-haired idealists or do-gooders” on his part and “similar doubts about the men who were geared into the current industrial scene” by Hopkins, as the scientist recalled. Bush. \textit{Pieces of the Action}. 35.


\textsuperscript{28} The Battle of Dunkirk ended on 4 June 1940. Italy declared war on France and Great Britain on 10 June. Fighting in Norway ended on the same day when the last Norwegian troops surrendered to German invaders. History.com. “June 10, 1940: Norway surrenders to Germany.” 1996-2011: \texttt{History.com}. See The History Place. “World War II in Europe.” 1996: \texttt{HistoryPlace.com}. 
single sheet. “The whole audience lasted less than ten minutes (Harry had no doubt been there before me). I came out with my ‘OK-F.D.R.’ and all the wheels began to turn,” Bush recalled.  

The N.D.R.C.’s remit was open-ended. “The Committee shall correlate and support scientific research on the mechanisms and devices of warfare … and may conduct research for the creation and improvement of instrumentalities, methods, and materials of warfare,” read its establishing order. 

Ostensibly, the body reported to the Council of National Defense, an assembly created for a similar purpose in August 1916 and composed of the Secretaries of the Army, Navy, Interior, Agriculture, Commerce, and Labor departments. This designation made it part of the Executive Office of the President, which funded it. In practice, since the Council’s work had ended after the 1918 World War I armistice, and few knew of its continued existence, the group reported directly to Roosevelt. 

“There were those who protested that the action of setting up N.D.R.C. was an end run, a grab by which a small company of scientists and engineers, acting outside established channels, got hold of the authority and money for the program of developing new weapons. That, in fact, is exactly what it was,” Bush wrote.


32 Bush. Pieces of the Action. 36. Funding came by direct Congressional appropriation after the Office of Scientific Research and Development was organized on 28 June 1941.

33 Bush. Pieces of the Action. 31-32.
The founder chose executives in his own image. Conant from Harvard got responsibility for bombs, fuels, gases and chemical problems on 14 June; Compton from M.I.T. for detection, controls and instruments; and Tolman from CalTech for arms and ordnance. The men served, like Bush, on a voluntary basis and kept their existing jobs. Lyman J. Briggs, Director of the National Bureau of Standards, brought the Uranium Committee he headed, which supervised atomic research, into the group. Bush eased him out of power over the following year, in favor of Conant whom he believed more competent, as the significance of this area became apparent. The rest of the committee’s members joined ex officio: Jewett from the National Academy, the Commissioner of Patents, the head of the Committee on Scientific Aids to Learning, and representatives from the Navy and Army.

Perhaps the most extraordinary feature of the new committee was the way it planned to do its work. Rather than rely on government laboratories staffed by uniformed members of the military, or grants to individual researchers, as had been the practice up to that point, the N.D.R.C. planned to contract its work to universities and private industry on a cost-plus basis. The new administrative structure was conceived by Bush. “We proposed to contract with the university itself, thus placing

34 Conant. My Several Lives. 234.


on it the responsibility for all such [business] matters, and also giving it the authority necessary for proper performance. In return we proposed to pay its overhead costs …,” he wrote. Harwood’s President Conant explained the consequences: “Creation of the committee marked the beginning of a revolution … [and] has had a transforming effect on the relationship of the university to the federal government …. The essence of the revolution was the shift in 1940 from expanding research in government laboratories to private enterprise and the use of federal money to support work in universities and scientific institutes through contractual arrangements.”

Academic facilities were extensive and researchers did not require civil service certification, which allowed for fewer administrative restrictions and greater speed. Academic administrators responded with enthusiasm to the new structure, which allowed faculty members to work on military projects in their spare time and, in some cases, permitted students to submit N.D.R.C. projects as theses for advanced degrees. Private industry, the committee found, was less interested in cooperation in 1940, when budgets were tight, than after 1941 when funds flowed more freely. Nonetheless, many companies did important work even in the early days of the N.D.R.C.

Disbursements followed the institutional affiliations of the leaders. In its first year, 41 schools received 155 N.D.R.C. contracts. M.I.T. led with 20, followed by Harvard with 13 and the University of California and Princeton with 10 each. CalTech and the Carnegie Institute of Washington


each received eight contracts. Division D, managed by Jewett at M.I.T., which was responsible for radar among other projects, received just over half of all funds: about $50 million in current dollars. Division B under Conant was next with about $17 million. A total of 22 private businesses received 52 contracts. The Uranium Committee got just $2.8 million in today’s dollars in the first year.

“Bombs, Fuels, Gases and Other Problems”

Conant leapt into action. Harvard’s president was nothing if not ambitious. When he was 27, he told his wife that his life goals were to be the premier organic chemist in the U.S., president of Harvard, and a Cabinet member. He was born in Dorchester, Massachusetts in 1893, graduated from Harvard College in 1914 after three years of study, completed the work for his Ph.D., with a dual concentration in organic and electro-chemistry, in 1916, and received his diploma in 1917. In World War I, he led an Army Chemical Warfare Service research team that researched lewisite, the “Dew of Death” poison gas, then returned to Harvard in 1919 as an assistant professor of

---


46 Conant. My Several Lives. 52.

chemistry. With respect to gas warfare, he wrote, I do not see “why tearing a man’s guts out by a high-explosive shell is to be preferred to maiming him by attacking his lungs or skin.”

The prodigy was appointed president of Harvard in 1933 at age 40 and supervised sweeping reforms, from the use of standardized aptitude tests and an embrace of admissions based on merit rather than social standing, to modernization of the undergraduate curriculum away from Greek and Roman classics and toward the sciences. True to his penchant for fast action, by 18 June 1940 — six days after Roosevelt’s O.K. of the N.D.R.C., and four days after his own appointment was made official — he recruited Roger Adams, a fellow Bostonian, descendant of president John Adams, Harvard chemistry Ph.D., and chair of the Chemistry Department at the University of Illinois at Urbana-Champaign, and M.I.T. professor Warren K. Lewis, as vice chairmen of Division B. France capitulated one week later; the Battle of Britain began two weeks after that.

Conant, Adams and their colleagues spent the summer and early fall of 1940 recruiting chemists for the new organization. It was not easy. “Apparently there were very few chemists indeed in this country having a knowledge of military explosives, which is quite a different subject than commercial explosives. Hence it has been necessary for organic chemists to learn a somewhat

---

48 Civilian casualties, he wrote after the war, were “not only a necessary consequence of bombing, but one might almost say an objective of the fleets of bombers directed by the British, the Germans and the Russians, as well as by the Americans.” Conant. My Several Lives. 49-50. On Lewisite the “Dew of Death” see: Thinkquest. “Code Red: Blister Agents.” 2006: Thinkquest.org.

49 Conant did not reform Harvard’s policies toward students of color. When the Navy refused to play the Harvard lacrosse team at Annapolis because the only black member of the Class of 1942 was on the squad, for example, he apologized to the commanding admiral for his school’s breach of etiquette. Roger Angell. “Legacies: Class Report.” 17 November 2008: NewYorker.com.

50 Adams had left a position at Harvard to take the the Illinois job. Conant, after an unsuccessful foray with two friends into chemical manufacturing — a partner and he started a fire that burned down the small building they had rented in Queens; a later explosion killed their third partner, and another man — returned to Cambridge in 1917 to fill the position vacated by Adams. Conant. My Several Lives. 45-46, 242. Noyes. “The Organization of the National Defense Research Committee.” Chemistry: A History. 4.
new art,” the N.D.R.C. explained in its first annual report.\textsuperscript{51} By mid-October, they had located enough to start. The Tripartite Pact launched the Axis alliance of Germany, Italy and Japan at the end of September, and the U.S. began the first peacetime draft in its history in the second week of October. On 23 October, Fieser and about 20 other top chemists gathered in Adams’ Illinois living room to begin the work of Division B.

**Louis Fieser and the invention of napalm**

Conant laid out the program. He explained the N.D.R.C., described its innovative contracting system, outlined the War Department’s most pressing technical problems, and explained how each of the researchers might help. The men were eager to assist. Fieser agreed to synthesize new compounds for evaluation as possible explosives.\textsuperscript{52}

Fieser worked in two secret rooms in the basement of the Converse Chemistry Laboratory at 12 Oxford Street in Cambridge (off Divinity Avenue and within musket range of Memorial Hall, built to honor university graduates who fought for the Union in the Civil War).\textsuperscript{53} He signed up four of his graduate students, all in their early 20s, as assistants. By the spring of 1941, the group had developed two new compounds superior in ballistic strength to TNT.

Louis Fieser had been born on 7 April 1899 in Columbus, Ohio.\textsuperscript{54} His father was an engineer who traced his lineage to a village outside Heidelberg in Germany; his grandfather, a banker and


\textsuperscript{52} Fieser. The Scientific Method. 9.


one time head of the Columbus school system, owned and published the first German-language newspaper in Ohio.\footnote{55} Louis attended the public East High School and adopted two mottos there which, he wrote 42 years later, summarized his life philosophy: \textit{omnia possum} (anything is possible) and \textit{labor omnia vincit} (and is attainable by hard work).\footnote{56} The ambitious, industrious student graduated in 1916 and headed east to Williams College in northwestern Massachusetts.\footnote{57} He lettered in football, basketball, and track and in his senior year was a lineman on the unbeaten 1919 varsity football team.\footnote{58} In 1920, he collected his college diploma and continued east to study chemistry at Harvard. His instructors included young professor James Conant. In 1922, the two published a paper about the synthesis of quinone compounds, and two years later Fieser received his Ph.D. for research on the substances. His travels concluded with a postdoctoral year at Frankfurt and Oxford.\footnote{59}

Dr. Fieser began his career as an assistant professor of chemistry at Bryn Mawr college for women in 1925. “Girls can be very satisfactory students, or even superior ones; they also can have

\footnote{55}{“Marty.” Letter to Fieser. Fieser Genealogy Folder. 13 May 1977: Fieser Papers. HUGFP 20.3 Box 1.}


other qualities appealing to a 26-year-old male instructor. I fell in love with a member of my second class at Bryn Mawr,” he wrote.\(^{60}\) He continued to work in quinone chemistry and published some 20 academic papers during his years in Pennsylvania. In 1930, Harvard, where Conant was then a full professor, offered Fieser a position as an assistant professor.\(^{61}\) Mary Peters, a student who became enamored of both professor and profession, followed and enrolled in the university’s chemistry Ph.D. program. They were married in 1932. Peters, stifled by the sexism of the Harvard department — she was not allowed in the laboratory with male students and forced to conduct her research, without supervision, in the deserted basement of a separate building — left the program after she received her M.A. degree in 1936 and went to work as an assistant to her husband.\(^{62}\)

At Harvard, Fieser concentrated on Vitamin K, a quinonoid, and developed a new interest in carcinogens.\(^{63}\) In the mid-1930s, with Mary’s help, he published the first of a series of influential textbooks. In 1937, he became a full professor.\(^{64}\) In 1939, he was appointed to the prestigious Sheldon Emery professorship; announced the first successful synthesis of Vitamin K — a procedure


that had important medical implications because of the role the vitamin plays in blood clotting; and received an honorary degree from his alma mater Williams College. Fieser ultimately authored 341 research papers, including 36 that he wrote with his wife and 40 written as a sole author, and 13 books, many also co-authored with his wife, of which five went through three editions, and was Elected to the National Academy of Sciences in 1940. He taught thousands of students during his almost four decades at Harvard.

**Du Pont’s mysterious explosions**

Fieser presented work on explosives at an N.D.R.C. conference in Chicago on 28 May. He then listened, intrigued, as Conant described a mysterious series of explosions at a Du Pont paint factory. The plant produced divinylacetylene, a liquid that could be mixed with paint pigment and which set to a tough, adhesive, protective film when exposed to air. The mishaps implied that the

---


material was explosive and, since oxygen was excluded from the manufacturing process, perhaps spontaneously combustible. Military possibilities were obvious. Conant asked for an investigator. Fieser volunteered his laboratory for the task.68

Emanuel Benjamin Hershberg drew his first breath on 28 July 1908 in Lynn, Massachusetts, north of Boston. His father was a shoemaker who later owned a tobacco shop on the Boston waterfront.69 E.B., as he came to be known, was a master of invention with a Da Vinci-esque range of mechanical ability: “A masterful experimentalist in organic chemistry, he was also versed in engineering, in mechanical drawing, in carpentry, in machining, in glass blowing, and in photography, and he had invented and constructed a number of laboratory devices which later found wide use, for example, the Hershberg stirrer, the Hershberg stirring motor, the Hershberg melting-pot apparatus,” Fieser wrote.70 He received a degree in chemical engineering from M.I.T. in 1929, and his Ph.D. in chemistry from the Institute in 1933, spent a year studying in Germany on a traveling fellowship, and joined Fieser’s laboratory in 1934 in the depths of the depression.71

Fieser put E.B., who was also an Army Chemical Warfare Service reserve officer, to work in the Converse basement. The professor traveled to Du Pont headquarters in Wilmington, Delaware, where paint chemists debriefed him on the explosions and their manufacturing processes. In Cambridge, the two researchers produced successive batches of divinylacetylene and exposed the liq-

68 Fieser. The Scientific Method. 11.


70 Fieser. The Scientific Method. 11.

uid to air in pans placed in the window wells of their laboratory, shielded from wind and observers. They watched as the material transformed into a gel that increased in viscosity over time. The experimenters poked at the pans with sticks, and dropped stones on them to try to produce an explosion or fire, but without encouraging results.72

Because they couldn’t get the gels to explode or burn on their own, the scientists did it themselves. “At day’s end we usually destroyed the gels … by setting fire to them with a match. … [T]hey burned with an impressive sputter and sparkle,” Fieser wrote.73

This produced the crucial insight that led to napalm. Hershberg attributed their success to his mentor’s inspiration. Fieser wrote that the men had the idea together.74 “We noticed also that when a viscous gel burns it does not become fluid, but retains its viscous, sticky consistency,” Fieser wrote, “The experience suggested the idea of a bomb that would scatter large burning gobs of sticky gel.”75

Hershberg made some improvised bombs from tin cans filled with divinylacetylene gel packed around gunpowder and the chemists tried them out in a remote section of Everett, “City of Pride, Progress and Possibilities,” just up the Mystic River from Boston. Results were promising: the sticky

72 Fieser. The Scientific Method. 11-12. The front, or east side, of the Converse laboratory has window wells approximately 10 feet deep built into an embankment that covers the foundations of that side of the building. Harvard University. Converse Chemistry Lab. 30 May 2011: Visit by the author. Harvard.edu.

73 Fieser. The Scientific Method. 12.


gel ignited “with a sputtering, vicious-looking flame.” Fieser speculated, “[T]hese probably were the first experiments on gelled fuels in this country.” As his colleague from the Harvard Chemistry Department Robert Woodward later observed of Fieser’s scientific philosophy, “Louis, the prototypical man of action, was impatient of sustained abstract thought. Facing any problem or opportunity, his instinct was to dash into the laboratory, there to search for new facts, solidly based upon indefatigable experimentation — and Louis was par excellence a man to act without hesitation on his always superbly robust instincts.”

The element of fire

Napalm is a devastating weapon because it is sticky and burns at an extremely high temperature. Fire, in chemical terms, is the process of combustion, and occurs when a given molecule combines with a molecule of oxygen (which makes up about 18 percent of the atmosphere). This releases heat and light that radiate in all directions. The most intense radiation takes place into whatever material the combustion occurs upon (which makes sticky incendiaries especially effective), after that upward and, finally, to the sides. Molecules adjacent to the combustion absorb radiated energy until they reach the temperature of the transmitting body or combust themselves, whichever comes first. If enough energy is released, visible flames appear and the material is said to burn. Flames on a burning piece of wood, therefore, are just one aspect of a complex and


largely invisible sequence of events. This process was first explained by the eighteenth century French scientist Antoine-Laurent de Lavoisier who, as a result, is considered the founder of modern chemistry.\textsuperscript{79}

The hotter something gets, the more likely it is to combust. Molecules become more agitated when they get hot, which causes a greater number to come into contact with the surface of the material they comprise and, in turn, heightens the probability they will combine with oxygen and combust. As a general rule, an increase in temperature of 18 degrees Fahrenheit doubles the chance of combustion. Coal, for example, will burn twice as fast at 86 degrees as at 68 degrees—and 500,000 times faster at 400 degrees.\textsuperscript{80} The best way to start a fire is to place an incendiary in direct contact with whatever is to be burned, below it, or next to it, in descending order of preference, and ensure there is plenty of oxygen. Thus, the best incendiaries ignite easily, burn at high temperatures, and stay close to their targets.\textsuperscript{81}

A fearsome weapon results. People and other animals dread fire, so it can induce panic: the flames of hell and fire-breathing monsters are common terrors. Almost everyone has experienced mild burns, so the pain of being burned to death is easy to imagine compared with less common


\textsuperscript{81} “Early types of incendiaries frequently burnt out on floor surfaces without kindling combustible materials, or, if they scattered, their fire was so diffused that it could ignite only the most inflammable materials.” Fisher. Incendiary Warfare. 25. A distinction can be drawn between “intensive-type incendiaries,” like thermite, which burn at very high temperatures and emit large amounts of radiation that directly ignite other objects, and “scatter-type incendiaries,” like napalm, which burn at a lower temperature but are sticky and transfer their energy more through convection than direct radiation. Group of Consultant Experts on Napalm and Other Incendiary Weapons. Napalm and Other Incendiary Weapons and all Aspects of their Possible Use: Report of the Secretary-General. 17 October 1972 rpt. 1973: United Nations Doc. A/8803/Rev. 1. 18-19: 59-62.
injuries like a bullet wound. Most importantly, fire uses the energy contained in things themselves to destroy them. It propagates: the larger the target, the greater the potential devastation. The Great Chicago Fire of 1871 is illustrative: a conflagration that leveled much of a substantial metropolis started, allegedly, when a cow knocked over a lamp.\(^{82}\) As Geoffrey Chaucer wrote with reference to ancient liquid incendiaries called “wildfire” in *The Canterbury Tales*, “Thou liknest wommenes love … to wilde fyr; The moore it brenneth, the moore it hath desir.”\(^{83}\) In World War II, “large targets (as an entire city) suffered more damage per ton of [incendiary] bombs than small targets, because fires had more opportunity to spread widely,” a 1961 U.S. Air Force Air University textbook expounded to R.O.T.C. students.\(^{84}\) Explosives, by contrast, carry all of their energy within themselves and seldom cause damage beyond the immediate area of impact. Nuclear weapons combine elements of both types of munitions but, arguably, cause the greatest damage by the intense

---

\(^{82}\) Mrs. Catherine O’Leary is said to have owned the cow. Chicago History Museum. “The O’Leary Legend.” 8 October 1996: ChicagoHistory.org. See “Late one night, when we were all in bed,/ Old Mother Leary left a lantern in the shed;/ And when the cow kicked it over, she winked her eye and said,/ ‘There’ll be a hot time in the old town, tonight.’” Unknown Author. “Old Mother Leary (or ‘Mrs. O’Leary’s Cow’ or ‘There’ll be a Hot Time in the Old Town Tonight’).” No Date: NIEHS.NIH.gov. Population of Chicago in 1871 was approximately 324,000. History.com. “Oct 8, 1871: Great Chicago Fire begins.” 1996-2011: History.com.


\(^{84}\) Air Force ROTC Air University. *Fundamentals of Aerospace Weapons Systems*. May 1961: Government Printing Office. 133. The 1972 U.N. Group of Consultant Experts on Napalm and Other Incendiary Weapons observed: “The spread of fire from one building to another usually follows the ignition of exterior surfaces, particularly roofs. Convection of flames and sparks, as well as heat radiation, may cause the actual transfer. This occurs most easily between adjoining buildings, but even where there is a gap of several tens of meters, a neighboring house can be set on fire by thermal radiation. The projection of blazing fire-brands may spread fire over still larger gaps, even up to distances of a hundred meters or more. … Once flames from burning houses begin to project into the open air, the subsequent spread of fire is largely wind-controlled. … The wetness or dryness of the exteriors of burning buildings, and of buildings adjacent to them, has a certain effect, but not as a major determinant of fire spread. … In contrast to wildland fires, there seems to be little difference between the night-time and day-time rate of spread of urban fires.” U.N. Group of Consultant Experts on Napalm and Other Incendiary Weapons. *Napalm and Other Incendiary Weapons and all Aspects of their Possible Use*. 23-24: 79-80.
heat. They generate. Finally, as incendiary weapons specialist George Fisher has noted, explosives damage, fire annihilates: a shattered structure can perhaps be repaired, but an incinerated facility, its contents vaporized, melted, warped or reduced to ash, is ruined.\[^{85}\]

**An ancient ancestry**

"Hercules with the shirt of Nessus." Hercules unsuccessfully attempts to tear the burning shirt from his body. Attributed to Tiziano Aspetti (1559-1606). 2011: RoyalCollection.org.uk.

A few early examples give a sense of the antiquity and flexibility of this weapon. In 1000-1400 B.C., the biblical hero Samson, angered to find that his father-in-law had given away his wife, “went and caught three hundred foxes, and took firebrands, and turned tail to tail, and put a fire-

brand in the midst between two tails. And when he had set the brands on fire, he let them go into the standing corn of the Philistines, and burnt up both the shocks, and also the standing corn, with the vineyards and olives." 86 Ninth century B.C. Assyrian reliefs show combatants fighting with flaming arrows and pots filled with blazing material. 87 The Indian Mahabharata and Ramayana epics, probably initiated around 750-800 B.C., describe the use of fire arrows as does the myth of Hercules, who used burning arrows to kill the Hydra monster and complete the second of his twelve labors. Similarly, the Chinese theorist Sun Tzu listed five ways to attack with fire in his *Art of War*, written around 500 B.C. 88 Thucydides described a flamethrower in 424 B.C. Engineers from Boeotia, he said, routed an Athenian garrison with a bellows-driven fire pot. The attackers, he wrote, “sawed a great log in half, hollowed it out, and fitted [it] together again like a pipe. They suspended a cauldron from chains at one end, attached to an iron tube that projected from the beam, rolled it on carts to part of the wall made of vines and timber, inserted a huge bellows into their end of the beam, and blew. The blast passed into the cauldron filled with lighted coals, sulfur and pitch, made a great blaze, and set fire to the wall.” 89

Liquid and gel incendiaries have as ancient a provenance as these fire weapons. Mythical Hercules was consumed by a flaming shirt that could not be removed and could not be extinguished with water (centaur blood woven into the fabric by the hero’s misinformed wife caused its incendi-

---


ary qualities, according to legend). Legendary Greek princess Glauke, popularized by Euripides in his 431 B.C. play Medea, died similarly. According to the story, Jason promised to marry Medea, a princess from Colchis in modern Georgia, if she helped him win the Golden Fleece from her homeland. She did and they wed, but he then left her for Glauke. Medea sent her rival a beautiful crown and gown, perhaps impregnated with petroleum, which was common in surface deposits near Baku in neighboring Azerbaijan. When Glauke put on the garments and approached an altar, possibly illuminated by hot open fires, she burst into flames. “The chaplet of gold about her head [sent] forth a wondrous stream of ravening flame, from her bones the flesh kept peeling off beneath the gnawing of those secret drugs, e’en as when the pine-tree weeps its tears of pitch, a fearsome sight to see,” Euripides wrote. More conclusively, an Athenian attendant to Alexander the Great was severely burned during the Macedonian conquest of Mesopotamia when he agreed, at the suggestion of his inquisitive lord, to cover himself in naphtha, or petroleum, in a bathhouse. The


91 Euripides. Medea. E. P. Coleridge trans. 1910. 431 B.C. rpt. 2000: Classics.MIT.edu. Scholar of ancient weaponry Adrienne Mayor observed “striking similarities to modern napalm” in this description. She and others have speculated that spontaneous combustion might have resulted from a combination of quicklime, sulphur or oil, and water in the garments. Mayor notes that “Medea” can mean either the Greek name for petroleum (“Medean oil”) or the land of the Medes (Iran). Mayor. Greek Fire. 228, 230.
oil ignited — flames from nearby lamps, again, may have sparked volatile vapors — and the volunteer almost died.  

Romans suffered the first recorded military attack with liquid fire in 69 B.C. when the army of consul Lucius Lucullus attacked the city of Samosata on the Euphrates in what is now southeastern Turkey. According to Pliny the Elder, residents of the city poured “maltha” — flaming mud — on the soldiers. The material “adheres to every solid body which it touches, and moreover, when touched, it follows you, if you attempt to escape from it. ... It is even set on fire in water. We learn by experience that it can be extinguished only by earth,” he wrote. The flames grilled the legionnaires in their armor and broke the assault. Rome didn’t capture the city until 72 A.D.

---


Greek fire


Romans quickly incorporated incendiary liquids into their arsenal, and came to consider them divine in origin. In the 10th century, a millennium after Lucullus, Byzantine emperor Constantine Porphyrogenitus told his son that Constantine the Great, who ruled from 306 to 337 and moved the imperial capital from Rome to Constantinople, obtained the recipe for “automatic,” “prepared,” or liquid fire directly from an angel. Flame weapons were holy, Porphyrogenitus explained, and it was anathema — punishable by a lightning strike — to disclose their secrets. Imperial armorers who produced fire weapons, he said, practiced a “divine art.”

Byzantine craftsmen developed a pump system that allowed their soldiers to shoot liquid flames — “Greek fire,” so-called in their honor — onto their enemies.\(^95\) Constantinople was a center of mechanical innovation under the empire. Porphyrogenitus, for example, told of a golden tree with artificial birds that flapped their wings and sang, a model lion that moved and roared, and a jeweled lady who walked powered by clockwork.\(^96\) Around 673, as the Muslim Arab armies of the Umayyad caliphate advanced from the south and west, a refugee named Kallinikos (“handsome winner”) arrived from the Syrian town of Heliopolis. He adapted a pump, perhaps a double-action water pump, so that it could be mounted on a ship. The device projected an incendiary stream through a moveable pipe, or “siphon,” set into the bow — often decorated like the head of a monster.\(^97\) As emperor Leo wrote sometime between the mid-700s and late 800s: “The front part of the ship had a bronze tube so arranged that the prepared fire could be projected forward to the left or right and also made to fall from above. This tube was mounted on a [platform] above the deck …. The fire was thrown either on the enemy’s ships or in the faces of the attacking troops.”\(^98\) This “sea-fire” of Kallinikos, which like its predecessors could not be extinguished with water (but ap-

\(^95\) Scholarly consensus favors the 1905 assessment of C. W. C. Oman that Greek fire was a “semi-liquid substance, composed of sulphur, pitch, dissolved nitre and petroleum boiled together and mixed with certain less important and more obscure substances.” C. W. C. Oman. *The Art of War in the Middle Ages*. 1905. 131 f., 543 f. In Partington. *Greek Fire and Gunpowder*. 32.


parently could be quenched with vinegar or urine), destroyed the Umayyad navy and saved the empire.  

Subsequent improvements miniaturized the technology so that it could be carried by soldiers in the field. Leo rhapsodized: “Small siphons discharged by hand from behind iron shields, which are called hand-siphons and have recently been manufactured in our dominions. For these can throw the prepared fire in the faces of the enemy.” This allowed a variety of delivery options. “Flexible apparatus with [artificial] fire, siphons, hand-siphons … are to be used, if at hand, against any tower that may be advanced against the wall of a besieged town,” Porphyrogenitus instructed. By the 1100s, a breath-powered system had also been developed. Anna Komnena, daughter of the emperor Alexios I Komnenos, described a Byzantine incendiary attack in 1103 on a Pisan fleet near Rhodes: “This fire they made by the following arts. From the pine and certain such evergreen trees inflammable resin is collected. This is rubbed with sulphur and put into tubes of reed, and is blown by men using it with violent and continuous breath. Then in this manner it meets the fire on the tip and catches light and falls like a fiery whirlwind on the faces of the enemy.” The canny princess in all likelihood omitted a key ingredient: petroleum. With this addi-

---

99 Vinegar and urine were the only liquids said to be able to quench Greek fire. Theophanes. *Chronography*. In Partington. *Greek Fire and Gunpowder*. 12.


tion, her recipe is close to the scholarly consensus of the past two centuries for the composition of Greek fire. As itemized, her formula yields an inferior incendiary.\textsuperscript{103}

Arab armies also made extensive use of liquid incendiaries but used soldiers, catapults or trebuchets (slings powered by counter-weights), rather than pump-powered jets, to deliver the flaming materials. Special “naptha troops” called “naffatun” protected by asbestos clothing and armed with copper “naffata” fire pots or ceramic hand grenades accompanied archer corps in Abbasid armies from 750. Arabs who besieged the Greek port of Salonika in 904 left numerous small ceramic pots believed to have been fire grenades,\textsuperscript{104} and a workshop that manufactured similar devices was found at the city of Hama in Syria and dated to the 1200s.\textsuperscript{105}

\textsuperscript{103} Gibbon 1776: “It would seem that the principal ingredient of the Greek fire was the naptha, or liquid bitumen, a light, tenacious, and inflammable oil, which springs from the earth ...” Edward Gibbon. The History of the Decline and Fall of the Roman Empire. William Smith, ed. 1874: Harper & Brothers. 481. \texttt{Books.Google.com}. A “semi-liquid substance, composed of sulphur, pitch, dissolved nitre and petroleum boiled together and mixed with certain less important and more obscure substances.” Partington endorses Oman’s conclusion. C. W. C. Oman. The Art of War in the Middle Ages. 1905. 131 f., 543 f. In Partington. Greek Fire and Gunpowder. 32.


Siege engines that hurled giant flame pots, or masses of small grenade-like containers, created terror. The French crusader John of Joinville described an Arab “perronel,” assault (literally, “stone thrower,” probably a trebuchet), that hurled blazing tubs of Greek fire during the 1250 siege of a fortified camp near the Egyptian city of Al Mansura. “This was the fashion of the Greek fire: it came on as broad in front as a vinegar cask, and the tail of fire that trailed behind it was as big as a great spear; and it made such a noise as it came, that it sounded like the thunder of heaven. It looked like a dragon flying through the air. Such a bright light did it cast, that one could see all over the camp as though it were day, by reason of the great mass of fire, and the brilliance of the light that it shed.”

The battle ended with the capture of the French King Louis IX, and the deaths of tens of thousands Europeans. The Seventh Crusade then collapsed.

The gunpowder paradigm

Liquid incendiaries declined in importance after the mid-1200s as gunpowder spread across the world from China.\(^{107}\) Explosives dramatically increased the range of projectile weapons and made it difficult or impossible to use traditional fire weapons, which had to be delivered at relatively close range. Heated shot, an ineffective incendiary compared to petroleum-based liquids, was the most gunnery officers could offer as an alternative. Rockets—used by the Chinese and the Mongolians from the mid-1200s—delivered burning materials from a distance, but were inaccurate and unreliable.\(^{108}\)

Engineers attempted to change this paradigm for half a millennium, but it was not until 1805 that British designer William Congreve, inspired by Indian rockets encountered in the 1767-99 Anglo-Mysore wars, devised a circular iron shell mounted on a 15-foot wooden pole that could deliver a 32-pound “carcass” incendiary warhead about a mile and a half.\(^{109}\) For the first time in centuries, fire weapons had a greater range than artillery. England firebombed the French port of Boulogne with hundreds of rockets on 8 October 1806 — the first rocket attack in Europe — but met with limited success. In 1807, however, Britain supplemented artillery and grenades with approximately 300 fire rockets during a three-day bombardment of Copenhagen that left one-third of the city in ashes and thousands dead and forced the surrender of virtually the entire Danish

---

\(^{107}\) Greek fire was not mentioned in Byzantine accounts after 1200, which led many to speculate the recipe was lost, perhaps as a result of over-zealous secrecy. A more likely explanation, since the use of similar incendiary weapons decreased everywhere during the same period, is that the development of artillery diminished the technology’s utility.


Red glare from British rockets fired at Baltimore’s Fort McHenry on 13 September 1814 inspired Francis Scott Key to compose what is now the U.S. national anthem. In the same year, also in Baltimore, Uriah Brown, one of the earliest American incendiary engineers, remarkably produced a steam-powered flame thrower — a modern version of the medieval Byzantine siphon — and demonstrated it to a “vast concourse” of citizens.

The pace of innovation in artillery, however, was even faster. Rifling inside gun barrels improved accuracy. Percussion caps, which spark on impact, eliminated ignition systems that relied on smoldering fuses and thus improved reliability. Incendiary weapons, even those powered by rockets, couldn’t keep up and deployments remained rare.

The American Civil War spurred a flurry of incendiary research but a similar result: few deployments. President Abraham Lincoln urged aggressive development of incendiary munitions. In 1861, he ordered the Army to help New York inventor Robert L. Fleming advance a proposed firebomb. On 14 January 1862, the president met with Levi Short of Buffalo, who claimed to have rediscovered the recipe for Greek fire. Short test-fired a pair of 13-inch shells later that month on the

---


Ellipse just south of the White House. The bombs blew fire 40-50 feet into the air and covered a 50-foot radius with flames for 10 minutes.\textsuperscript{113}

General George McClellan found the weapons barbaric — “Such means of destruction are hardly within the category of those recognized in civilized warfare,” he wrote — but others thought more like Lincoln.\textsuperscript{114} Benjamin Butler invited Short to display his devices over Boston Common, and subsequently purchased 100 shells for use against New Orleans.\textsuperscript{115} Rear Admiral David D. Porter rented part of his family mansion on the Delaware River to Short to produce “Solidified Greek Fire” in tin cylinders three inches long and five-eighths of an inch in diameter, then ordered 10 gross (1,440) and used them to bombard Vicksburg, Mississippi in May 1863. The barrage prompted outrage by the defenders for its indiscriminate use of fire, but yielded just three significant conflagrations.\textsuperscript{116} A “Greek fire” incendiary attack on Charleston on 22-23 August, carried out on the direct order of Lincoln himself, produced similarly disappointing results.\textsuperscript{117} “My conscience will not permit me to recommend his greek fire, which I know to be good for nothing,” Porter wrote of Short’s invention, in a letter to his mother.\textsuperscript{118}


\textsuperscript{114} McClellan turned down 2,000 shells offered at two dollars each. Bruce. Lincoln and the Tools of War. 182. Books.Google.com.


World War I

The Great War sustained the essential paradigm of the previous eight centuries for incendiary weapons, but offered a harbinger of things to come. German engineers introduced gas-powered *Flammenwerfer* (flame throwers) that shot gasoline, or fuel oil, thickened with rubber about 20 yards. Zeppelin airships motored over London and launched incendiary bombardments. In both cases, however, principle was more impressive than practice: the weapons did relatively little damage.

Germany attacked French troops with flamethrowers at Malencourt, in northeastern France north of Verdun, on 26 February 1915. An observer applauded “The fiery serpents which, as if rising out of the earth, fell roaring and hissing on the enemy’s trenches and drove him to precipitate
That summer, British Field-Marshal Sir John French reported “A new device has been adopted by the enemy for driving burning liquid into our trenches with a strong jet. … Most of the infantry occupying these trenches were driven back, but their retirement was due far more to the surprise and temporary confusion caused by the burning liquid than to the actual damage inflicted.”

A U.S. Chemical Weapons Service official history concluded: “After the initial terror had subsided, however, Allied soldiers found that their own circuitous trenches provided them with adequate protection, since flame throwers at that time could not project fuel around corners or into most underground passages. … The maximum range of the portable German weapon was 20 yards; its small tanks were quickly exhausted of fuel, and its operator, after firing, became a helpless target out in No Man’s Land, defenseless and hampered with a heavy load.”

Over 90 percent of the fuel burned in vast clouds of black smoke before it reached its target.

“Unthickened fuel made a great show,” the N.D.R.C. concluded in its own history, “There were many who believed that the almost sole effect of the portable flame thrower was psychological.”

---


122 Baxter. Scientists Against Time. 295.

123 Baxter. Scientists Against Time. 295.
British, French and U.S. engineers developed similar devices in response, but they were used on only a handful of occasions, and never by U.S. troops. After the war, the C.W.S. abandoned the program and destroyed its stock. “In general, it was not considered a successful munition,” the service concluded of these early flamethrowers.

Zeppelin airships attacked London with firebombs on 31 May 1915, but the bombs were relatively few (90 incendiaries and 30 explosives from a single dirigible in the first attack), many did not ignite, and firefighters easily contained the fires that did result. Artillery shells, equipped with streamers to ensure a straight descent, were the first aerial incendiaries. German engineers later produced a bucket-shaped bomb that contained a core of thermite (a mixture of powdered aluminum or magnesium and metal oxides that burned white hot at around 5,000 degrees) packed in cotton, doused with naptha and tar, and bound with tarred rope. Flaming bullets, invented in 1916 by the British in response to the air attacks, however, effectively defeated the dirigibles. British, French and U.S. scientists developed firebombs of their own — the “Baby Incendiary” dart filled with a “Thermalloy” blend of thermite and powdered aluminum; the Chanard dart; and the Mark I and II bombs, and darts filled with various combinations of thermite, solid oil and other flammable

---


material, respectively — but the small devices played an insignificant role in the conflict. The U.S. did not use any of its bombs or darts.\(^\text{127}\)

**The airplane paradigm**

Airplanes restored incendiary weapons to their medieval pride of place. On 26 April 1937, the Luftwaffe demonstrated modern fire warfare when it used 43 airplanes to drop 50 tons of thermite incendiaries and explosive bombs on the Basque town of Guernica to support the Nazis’ fascist allies in the Spanish Civil War. The historic cultural center of the Basque people, far from front lines and packed with thousands of civilians on a market day, was annihilated: about three quarters of its buildings burned, 300 people died, and thousands were injured.\(^\text{128}\) *Times of London* correspondent George Steer described the new warfare:

The tactics of the bombers, which may be of interest to students of the new military science, were as follows: First, small parties of aeroplanes threw heavy bombs and hand grenades all over the town, choosing area after area in orderly fashion. Next came fighting machines which swooped low to machine-gun those who ran in panic from dugouts, some of which had already been penetrated by 1,000 lb. bombs, which make a hole 25ft. deep. Many of these people were killed as they ran. A large herd of sheep being brought in to the market was also wiped out. The object of this move was apparently to drive the population under ground again, for next as many as 12 bombers appeared at a time dropping heavy and incendiary bombs upon the ruins. The rhythm of this bombing of an open town was, therefore, a logical one: first, hand grenades and heavy bombs to stampede the population,

---


then machine-gunning to drive them below, next heavy and incendiary bombs to wreck the houses and burn them on top of their victims.129

Japanese commanders made a similar point about incendiaries dropped from airplanes on a larger scale that August: their attack on Shanghai killed tens of thousands.130

Then, on 7 September 1940, Germany launched the first sustained incendiary bombing campaign in history when the London Blitz began.131 During the Battle of Britain as a whole, the Luftwaffe dropped about 23,500 clusters of 36 one-kilogram magnesium shells packed with thermite. The bombs burned so hot they ignited their magnesium casings, which burned for up to 15 minutes, and threw lumps of molten metal up to 50 feet. They could not be extinguished with water.132 Larger German firebombs combined up to 500 pounds of thermate (similar to thermite), oil, and


magnesium shavings. The Luftwaffe bombers did to cities with fire what many, after World War I, feared might be done with poison gas.

![Guernica by Pablo Picasso](image)

*Guernica by Pablo Picasso*, June 1937: Museo Nacional Centro de Arte Reina Sofia.

---


A triptych of images from the period illustrate the new paradigm. Pablo Picasso painted Guernica, a grey-and-white vision of the disaster that befell the city, in June 1937. In Shanghai, rescuers...
plucked a burned baby from the rubble of the main railway station and set it, sobbing, by a track. H. S. Wong snapped a photo.\textsuperscript{135} In England, news cameras recorded a grim Prime Minister Winston Churchill in 1942 as he walked through the charred remains of Coventry Cathedral, gutted in November 1940 by an attack of over 1,000 firebombs.\textsuperscript{136} British analysis of the London Blitz concluded that a ton of the new incendiaries produced about five times more damage than the same amount of conventional high explosives.\textsuperscript{137} Churchill agreed about the potential for ruination from the air. “The Navy can lose us this war, but only the Air Force can win it,” he said, just before German bombardments began.\textsuperscript{138}

\textsuperscript{135} Japanese authorities alleged that because the baby was placed in position on the tracks by a rescuer, likely its father, the photo was not a faithful depiction of events. Its iconic status, however, is undisputed. John Faber. “The Baby in the Shanghai Railway Station.” \textit{Great News Photos and the Stories Behind Them}. 1978: Courier Dover Publications. 74-75. \url{Books.Google.com}, For image of baby with its rescuer see Eric Barnes. “Bloody Saturday.” 10 April 2011: \textit{Famous Pictures: The Magazine}. \url{FamousPictures.org}.


\textsuperscript{138} Winston Churchill. In Alan J. Levine. \textit{The Strategic Bombing of Germany, 1940-1945}. 1992: Praeger. 25. Indeed, although Allied ground troops brought the Second World War to an end in Europe, the conclusion of the comprehensive post-war United States Strategic Bombing Survey was as follows with respect to the war against Germany: “Allied air power was decisive in the war in Western Europe. Hindsight inevitably suggests that it might have been employed differently or better in some respects. Nevertheless, it was decisive. In the air, its victory was complete. At sea, its contribution, combined with naval power, brought an end to the enemy’s greatest naval threat -- the U-boat; on land, it helped turn the tide overwhelmingly in favor of Allied ground forces. Its power and superiority made possible the success of the invasion. It brought the economy which sustained the enemy’s armed forces to virtual collapse, although the full effects of this collapse had not reached the enemy’s front lines when they were overrun by Allied forces. It brought home to the German people the full impact of modern war with all its horror and suffering. Its imprint on the German nation will be lasting.” United States Strategic Bombing Survey. \textit{Summary Report (European war)}. 30 September 1945: \url{ANESI.com}.
Inquisitive cousins


Given this history, the British were interested in Fieser’s research on incendiary gels. In August 1941, two months after the Everett tin can tests, Major Gerrard Rambaut of the Air Ministry, who helped develop the U.K.’s magnesium incendiary, arrived at the Oxford Street laboratory for a visit. His key piece of advice was to establish a measurement system to allow quantitative comparisons between alternative gels and existing munitions. “An obviously sound suggestion,” Fieser noted. Harvard’s team built a structure with four upright pieces of wood attached to a wooden base and connected by two cross-pieces. Hemlock cured to a standard moisture content formed the upright pieces; tulipwood, which was easy to cut, was used for the base. The chemists dispensed a stan-
standard amount of gel from a modified grease-gun, set the apparatus in their window well testing area, and lit the incendiary. After the fire stopped, the scientists scraped the fresh charcoal from each piece of wood with a wire brush and weighed what remained. “I used to come home at night looking like a blackface comedian,” Fieser recalled.139 The Converse Burning Test, later renamed the Gibbs Burning Test when the team changed laboratories, was ready to evaluate incendiaries.140
Rambaut’s presence at the top secret project was a small example of the tight connections between British and U.S. scientists in the early years of WWII. The British moved first. In the desperate days after Dunkirk, when it appeared in the summer of 1940 that Germany might invade England, Churchill approved a mission of seven scientists and military officers, led by chemist Henry Tizard, to pass the empire’s greatest military secrets to the United States. Researchers packed their treasures, including a stunning innovation that made radar practicable, in a black metal deeds box that one of the technologists had purchased in an army and navy store. Physicist Edward Bowen, a leading defense engineer, nearly lost this early “black box,” filled with some of the world’s greatest secrets, in a crush at Euston Station. “With my luggage, the box was more than I could handle, so I called a porter and told him to head for the Liverpool train. He grabbed the box, put it on his shoulder and headed off so fast that (an old cross country runner and still pretty fit) I had great difficulty keeping up with him,” he recalled. “He got well ahead and the only way of keeping track of him was to watch the box weaving its way through the mass of heads in front,” Bower later reminisced. The mission, which arrived in late September 1940, “carried the most valuable cargo ever brought to our shores,” an official U.S. government history concluded. America reciprocated in a fashion in January 1941 when Conant traveled to London to open the


143 Baxter. *Scientists Against Time*. 142.
only overseas office of the N.D.R.C.\textsuperscript{144} He was “hailed as a messenger of hope,” he said, and met with virtually every leader in the country, including the King and Prime Minister.\textsuperscript{145}

**Refighting the last war**

The U.S. Chemical Warfare Service (C.W.S.), however, was slow to recognize the return of incendiary bombardment as a devastating weapon after an eight hundred year absence. Gas was its focus. At the end of August 1941, after a bureaucratic reorganization in June that created a new Office of Scientific Research and Development (O.S.R.D.) to manage all war-related scientific research — Vannevar Bush moved up to head the new group and Conant was promoted to the top

\textsuperscript{144} Conant. *My Several Lives*. 251.

job at the N.D.R.C. division — administrators abruptly told Fieser to stop his work on gels and start a new project devoted to blister agents, “vesicants” in chemical parlance: poison gas.\textsuperscript{146}

“This reallocation did not please me,” Fieser wrote. Gas was intended for use solely against people and banned under the Geneva Convention of 1929—although that treaty had been rejected by the U.S. and Japan, among others. It seemed inhumane to the professor. “Furthermore, I doubted very much that vesicants would be used in the war that seemed increasingly imminent, and I would much prefer to work on something of practical value to the war effort,” he wrote later.\textsuperscript{147} Nonetheless, Fieser swallowed his feelings and hired a group of Harvard chemists to begin poison gas research.


The C.W.S.’s lack of interest in incendiaries was shared by other elements of the armed forces. As a 1934 Army Ordnance Department study concluded, “everything that can be accomplished by an incendiary bomb can, in most cases at least, be accomplished as well or better by either a smoke bomb loaded with white phosphorus (WP) or a demolition bomb loaded with high explosive.” Maj. Hermann H. Zornig. “Memo Study.” 17 January 1934: Ordnance Department. In Alton L. Kibler. “Brief Review of Work Done to Date on Incendiaries.” 10 April 1934. In Kleber and Birdsell. \textit{United States Army in World War II}. 616.

Officers ignored a prescient 1936 warning by C.W.S. reserve officer and Columbia University professor of chemistry Enrique Zanetti: “The small size of these [incendiary] bombs may appear almost ridiculous, particularly after considering the tons of gas that are required to produce lethal concentrations; but here comes the essential difference between gas and incendiaries that makes fire far more dangerous to a large city. Gas dissipates while fire propagates. Each of these small bombs held within itself the devastating possibilities of Mrs. O’Leary’s cow.” J. Enrique Zanetti. “The Forgotten Enemy.” The Independent Journal of Columbia University. 10 January 1936: 3.6. In Kleber and Birdsell. \textit{United States Army in World War II}. 616.

\textsuperscript{147} Fieser. \textit{The Scientific Method}. 14. He was more blunt in a memoir he wrote around 1970 for the 50th reunion of his Williams college class: “[I] by-passed an assignment on poison gases, which I correctly thought would not be used.” Louis Fieser. “Autobiographical Sketch for members of the Williams class of 1920.” 4. Fieser Papers. HUGFP 20.3. Box 1. Folder: “Louis Fieser — autobiographical accounts.”
The chemist, however, was experienced in the ways of bureaucracies. Hazardous vesicant research required installation of ventilator hoods in the laboratory. Fieser seized this opportunity to prepare a survey of U.S. incendiary research. He found that the N.D.R.C. had not commissioned any work in the area other than his own limited project.\textsuperscript{148} The country had just two fire bomb designs in 1941, both of which relied on British prototypes. The first was a four-pound magnesium shell twenty-one inches long and two inches in diameter filled with thermite, or thermate. A substitute was made of steel, which did not ignite like magnesium but was cheaper and more readily available.\textsuperscript{149} Flamethrower technology was unchanged from 1918.\textsuperscript{150} When Fieser visited the headquarters of the C.W.S. at Edgewood Arsenal (now part of the Aberdeen Proving Ground), near Edgewood, Maryland, he learned that the entire national incendiary research effort consisted of two men, one a former reservist and the other an Air Force pilot, assigned to improve the two existing bombs. A half-dozen civilian members of the C.W.S. staff provided part-time support.

Fieser was not impressed. “I suspected from the start that the molten iron would have little power to start a fire and hence that the bomb was a flop,” he wrote with respect to the thermite

\textsuperscript{148} The C.W.S. asked the N.D.R.C. to review fuel composition and nozzle design for flamethrowers in February 1941 after the Service failed to interest Army and Navy researchers in the project (see below). The Committee issued contracts to M.I.T. and the Associated Factory Mutual Fire Insurance Companies, but there was little progress on fuels. Baxter. \textit{Scientists Against Time}. 290. Limited N.D.R.C. projects related to incendiary materials and containers also existed at Brown and the University of Chicago. E. P. Stevenson. “Incendiary Bombs.” \textit{Chemistry}. W. A. Noyes, ed. 388.


\textsuperscript{150} Just before Pearl Harbor, the C.W.S. ordered 1,000 of the “M-1” devices, despite their doubtful efficacy. Mountcastle. \textit{Flame On!} 28. Myers says the range of the M1 was just 10-15 yards and adds the device frequently misfired. Lewis Meyers. “Tactical Use of Flame: Modern Warfare is based on historic principles. The Jap fell back on man’s earliest defense—the cave. To defeat him, we employed one of history’s most primitive weapons —fire.” November 1945: \textit{Marine Corps Gazette}. 19-22. PQArchiver.com.
designs. Moreover, “No burning tests had been applied and the only basis for evaluation was qualitative observation of the firing of bombs in the absence of combustible material.” The incendiary team at Edgewood expressed interest in his work on gels and a standardized fire measurement system, but said a shortage of manpower made it impossible for them to follow up on his research.151

He telephoned Roger Adams, his supervisor, in Illinois and implored the former member of his department to allow him to divert the money for poison gas to incendiary gel research: “I appealed … for permission to use the new manpower and funds for work on incendiaries rather than vesicants,” he wrote. Adams, perhaps aware that Air Corps commander Henry “Hap” Arnold was alarmed by a possible shortage of magnesium and had asked Bush to investigate alternate incendiaries, approved the proposal on the spot.152

The Army caught up a few weeks later. On 7 October, the C.W.S. designated incendiary warfare an official project of the Department of War.153 Later that month, the N.D.R.C. awarded its first incendiary research contract — not counting Fieser’s hijacked poison gas budget — to the Standard Oil Development Company, a division of the oil giant. The charge was to produce a small firebomb filled with a petroleum product.154

---


154 Baxter. Scientists Against Time. 290.
“Anonymous Research No. 4”

Fieser’s team was already off and running. The professor stopped teaching and threw himself full-time into the new project, listed as “Anonymous Research No. 4” in Harvard’s ledger. University funds paid his salary. A $5.2 million N.D.R.C. grant, in today’s dollars, covered research expenses.¹⁵⁵

The first requirement for a comprehensive investigation was to improve the Converse Burning Test. The researchers moved the reference apparatus out of the basement window wells and into a glass-walled room-within-a-room in the Gibbs Chemistry Laboratory on the third floor of the same building.¹⁵⁶ Physicist Theodore W. Richards had earlier designed the facility to house precision balances for determinations of atomic weights — and had won the 1914 Nobel prize in chemistry for his efforts. A large ventilator fan was now installed in one wall. “Incendiary materials and bombs could be allowed to burn in the complete absence of drafts and the experiments could be viewed from all sides through the glass windows,” Fieser explained.¹⁵⁷ Rather than the earlier charcoal scraping procedure, the team could now compare the weight of the entire testing structure before and after a fire with great precision. “The initial weight of the structure less the weight of the charred pieces gave a measure of the incendiary effectiveness of the sample tested. Results


¹⁵⁷ Fieser. The Scientific Method. 16.
were reproducible with accuracy,” Fieser said.\(^\text{158}\) The team renamed the apparatus the “Gibbs Burning Test” in honor of its new home.\(^\text{159}\)

Experimenting with numerous compounds, they tried rubber cements (which are made from raw rubber dissolved in nonflammable solvents), rubber dissolved in flammable liquids like benzene and gasoline (the former suggested by Major Rambaut), divinylacetylene, magnesium, thermite, and other materials in a variety of concentrations. Hershberg designed and built a special apparatus to measure the density and viscosity of samples using a glass tube, centrifuge, and observation of the time required for a small steel ball to fall between upper and lower “viscosity marks.” Magnesium, they concluded, was the best incendiary in an absolute sense, but not much better than rubber-gasoline gels, which had the added advantage of being sticky and therefore more effective at starting fires, and in plentiful supply. Raw material from what is now Malaysia, Indonesia and Sri Lanka, the three primary sources, worked equally well, although different concentrations of each type produced best results. Vulcanized and recycled rubber, interestingly, were unsatisfactory. Thermite performed relatively poorly.\(^\text{160}\)


\(^{160}\) Fieser. *The Scientific Method*. 21. Vulcanized rubber is raw rubber treated with sulphur or other chemicals at high heat to make it more durable. Charles Goodyear of Springfield Massachusetts patented the process in 1844: Massachusetts was an early center of rubber manufacturing.
Field tests came next. The C.W.S. provided a truckload of M-47 bombshells designed for mustard gas.\(^{161}\) The shells were almost four feet tall and about eight inches wide and made from thin steel that shattered easily. A metal burster tube about one and one-half inches in diameter filled with gunpowder ran through the center of the bomb and screwed into a hole in the top. An impact fuse screwed into the buster. The fuse ignited the burster, which exploded the shell and scattered the device’s contents over a wide area.

The chemists loaded the shells with gel and gunpowder at the Gibbs laboratory, replaced the impact fuses with electronic triggers, drove across the Charles River, and tested the bombs on the athletic fields behind the Harvard Stadium. They had an excellent view of the explosions from the top of the stadium and recorded the area of distribution, average size of the globs of gel, and estimated percentage burned at various formulations. It was, “an exciting line of experimentation,” Fieser recalled. Security on the open fields in an urban neighborhood was nonchalant: “a film to be shown to the military had to be edited carefully for removal of an occasional small-boy spectator,” the professor wrote.\textsuperscript{162}

Researchers tinkered with optimal concentrations of rubber, gasoline, and gunpowder for a few weeks until they were satisfied. Then they recorded a final test on film, packed a demonstration 70-pound M-47 in a box, and dispatched Fieser on an express train to the C.W.S. headquarters at Edgewood. When the professor handed his parcel to a station porter the man said, “It feels heavy enough to be a bomb.”\textsuperscript{163}

C.W.S. officers acted quickly. On November 27, Thanksgiving Day, Fieser received a call. The Army wanted the recipe for his firebomb to fill an urgent shipment of 10,000 shells ordered for U.S. forces at Manila in the Philippines colony. The instructions were simple: cut rubber into strips and feed them through the hole in the nose of the bomb. Stand the shell on its end and fill it with gasoline until the liquid is three inches from the top. Screw in the burster tube and rest the bomb on its side. Rotate 180 degrees three times at one to two hour intervals.\textsuperscript{164}

\textsuperscript{162} Fieser. The Scientific Method. 23.

\textsuperscript{163} Fieser. The Scientific Method. 23.

\textsuperscript{164} Fieser. The Scientific Method. 23.
But not quickly enough. On 7 December 1941, Japanese carrier-based aircraft attacked the U.S. Pacific Fleet at its primary base at Pearl Harbor in the Hawaii territory. Japanese troops soon attacked British, Dutch, and U.S. colonial possessions in present-day Malaysia, Indonesia and the Philippines. A large fraction of the U.S. rubber supply was cut off. The Manila bombs never arrived.\textsuperscript{165}

A few days after the surprise attack, Fieser attended the opening of a C.W.S. laboratory at M.I.T. “Now find us something to use in place of rubber,” said Colonel M. E. Barker, the Chief of the C.W.S. Technical Service. Research began the next morning.\textsuperscript{166}

The nature of soap

The C.W.S. set stringent requirements for the rubberless replacement incendiary gel. It had to be made from widely available, preferably inexpensive, materials, simple enough to be prepared in the field, tough enough to withstand an explosive blast without dissolving into a mist, stable enough to store for long periods, and able to withstand temperatures between the -40 Fahrenheit chill of a high-altitude bomb bay and the 150 degree heat of a tropical storage facility.\textsuperscript{167}

War brought a surge in the N.D.R.C. budget and a corresponding rush of interest in incendiary research from private businesses. In short order, chemists from the Arthur D. Little company in Cambridge, Du Pont, the Nuodex Products Company of Elizabeth, New Jersey, and others, joined

\textsuperscript{165} Their specific fate is unclear. Fieser. \textit{The Scientific Method}. 24.


\textsuperscript{167} Fieser. \textit{The Scientific Method}. 25.
Standard Oil Development (S.O.D.) as corporate incendiary researchers. The groups were in frequent contact with each other and the university investigators and exchanged ideas and results.\(^{168}\)

The Harvard team tried every available synthetic rubber. None produced an effective gel. Their only other clue was the knowledge that certain single-element metal powders, chemically known as “soaps” although they do not mix with water and are not detergents, dissolved in lubricating oil to form grease. The slurry that formed was not tough enough to withstand an explosion without dissolving into a mist, or sticky, but it established the principle that oil might be thickened in this way. And as Fieser wrote, “there are other metals and other acids.”\(^{169}\)

Arthur D. Little scientists suggested that Fieser’s group experiment with aluminum naphthenate, a dark brown sticky byproduct of petroleum refining comprised of numerous elements. The tar could not be dissolved in gasoline at room temperature, but the Little researchers found that the two substances did form a tough gel if heat was applied or the aluminum naphthenate was washed with alcohol before being added to gasoline. Neither procedure met the field-filling requirement set by C.W.S., but Fieser was impressed that complex aluminum naphthenate produced a gel superior to any of the simple soap mixes his group had created. He suggested they try to mix multiple soaps with gasoline.\(^{170}\)

---


\(^{169}\) “Lubricating oil is a mixture of long-chain hydrocarbons, and a metal soap such as lithium stearate or calcium stearate resembles a lubricating oil in having one or more long hydrocarbon groups. These metal soaps are insoluble in water and not detergents but, in accordance with the principle that like dissolves like, they dissolve in lubricating oil and form greases.” Fieser. *The Scientific Method*. 25-26. See Louis Fieser. “Acceptance Address: The Scientific Method.” *William H. Nichols Medal Meeting*. 15 March 1963: Fieser Papers. HUGB F461.72. Box 9. 28-34.

The laboratory filled with gels of various metal soaps and gasoline. The most intriguing result came from a substance called aluminum palmitate made by the Metasap Chemical Company of Harrison, New Jersey. On its own in gasoline, it produced a slushy gel. When aluminum naphthenate was added, however, a tough and sticky goo formed at room temperature. An early formula called for five percent aluminum naphthenate, five percent aluminum palmitate, one percent sawdust, and gasoline. Fieser combined the first two letters of naphthenate with the first three letters of palmitate and christened the mixture “napalm.” He reported his findings to the N.D.R.C. on Valentine’s Day 1942.\footnote{Fieser.  \textit{The Scientific Method}. 27.}

The results captivated a chemical weapons conference held 10 days later at the Edgewood Arsenal. When could the C.W.S. see a demonstration? Tomorrow. One of Fieser’s laboratory “war boys” named Stearns Putnam, a 25-year-old chemistry Ph.D. student with close trimmed brown hair and a wide smile, caught an afternoon Pullman from Boston.\footnote{See photo of Stearns T. Putnam in Fieser.  \textit{The Scientific Method}. 15.} Metasap representatives brought 25 pounds of aluminum palmitate to the train when it stopped at Newark. Fieser and his acolyte filled 10 M-47 shells the next day in the arsenal’s Smoke Shop No. 2 workshop.\footnote{Fieser.  \textit{The Scientific Method}. 28.}

They had competition. Next door, in Smoke Shop No. 3, S.O.D. chemists loaded their own bombs with what they called Formula 122: a brew of stearic acid, rosin, castor oil, sodium hydroxide, water, kerosene, and gasoline. The Harvard group derisively nicknamed the rival gel “apple-
“sauce” because of its loose consistency. Airplanes dropped the sample bombs from 10,000 feet onto Maryland mud the following day. Results were inconclusive. The teams returned home.

Fieser intensified his focus on aluminum palmitate and asked every known manufacturer for samples and a quote on 500 tons of the substance — a monthly minimum for bulk production. Metasap, American Cyanamid, Hershaw Chemical Company, Mallinckrodt Chemical Works, Armour and Company — a Who’s Who of the U.S. chemical industry in 1942 — responded. Jars of samples poured in. The scientists mixed batches from each. The Metasap powder, however, was the only one that produced a gel: aluminum palmitate from all of the other companies yielded only slurry.

Fieser headed to Metasap in Harrison, New Jersey, just across the Passaic River from Newark. What was different about their aluminum palmitate? The answer: it wasn’t aluminum palmitate. The product that created napalm was an aluminum soap derived from coconut oil that was 48 percent lauric acid and just 8.2 percent palmitic acid — packaging and invoice descriptions notwithstanding. Satisfactory alternatives, it transpired, could be produced from soaps obtained from palm kernel oil and oil from common South American babassu palm trees.

174 Fieser. The Scientific Method. 28.

175 Fieser. The Scientific Method. 28.

The term “napalm” had no chemical meaning. It was, Fieser wrote, “now seen to be nondescriptive:” a generic for any incendiary made from thickened petroleum.\textsuperscript{177} “‘Nalaur’ would have been a more accurate designation,” he observed.\textsuperscript{178} The chief of the Stockpile and Shipping Branch of the government’s War Production Board, another Harvard professor, issued an immediate order to freeze a supply of coconut oil sufficient for the foreseeable needs of the research team.\textsuperscript{179}


\textsuperscript{178} Fieser wrote: “The name, coined by me, is derived from ‘Aluminum napthenate-palmitate’ and actually is a misnomer. Our initial experiments utilized a material marketed under the name aluminum palmitate but, as we later learned, this actually consisted of the soap of the total coconut oil fatty acids of high lauric content.”

\textsuperscript{179} William Yandell Elliot from Harvard’s Government Department was the professor. Fieser. \textit{The Scientific Method}. 29.
Aluminum naphthenate and the Metasap coconut oil soap did not mix easily. The scientists requisitioned a meat grinder from a Harvard College dining hall to combine the chemicals with a small amount of kerosene. They stirred the spaghetti-like strands that resulted into gasoline, then ran the mixture through a pump to stir it. The C.W.S. field-filling requirement remained elusive.

“Preparation and loading of napalm polymer gel.” Meat grinder from Harvard College dining hall slices napalm into strands before it is mixed into gasoline by a stirring pump and siphoned into bombshell. Note threads of gel emerging from grinder, and stabilizing fins on bomb. Fieser. The Scientific Method. 30: Figure 2.1.

Nuodex Products of suburban Elizabeth, New Jersey found the final piece of the puzzle. The company manufactured aluminum naphthenate and told Fieser it could be produced in powder form, rather than as tar. They suggested that all of the ingredients of napalm could be assembled as powders and then mixed with gasoline. The material arrived on 13 April 1942: dry brownish grains in a jar. Troops later dubbed it “fire roe” because of its resemblance to caviar.\textsuperscript{181} A 12 percent solution in gasoline, agitated with a single stir, produced a runny, pourable jelly. A few hours later, unattended, the material hardened into a tough, sticky gel. It kept these characteristics from -40 to 150 degrees Fahrenheit, was impervious to vibration, stable in storage, and produced excellent results in the burning test.\textsuperscript{182} Napalm was born.


A weapon is only as effective as its delivery system. The Harvard inventors made their second major contribution to modern warfare when they devised a way to scatter the gel in chunks over a wide area and simultaneously ignite it in a cloud of fire.

Films of the field tests shot from the top of the Harvard stadium revealed that the M-47 bombs with gunpowder bursters often exploded in an irregular fashion. Much of the gel consequently failed to ignite. Some parts of the field became infernos while other areas remained untouched. A significant amount of napalm often was trapped in the fragments of the bombshell.

Hershberg theorized that the gunpowder exploded too slowly. Rather than blowing the device apart in an instant, it allowed pressure to build up within the casing. The shell then ruptured along a seam and the napalm spurted out through the resulting tear, rather than in every direction. He
proposed to fill the burster tube with TNT or another high explosive to cause a more violent and immediate explosion.183

![White phosphorus burster tested in napalm bomb in front of Harvard Stadium. Note streamers, sparks and thick smoke from the phosphorus, used in combination with explosives to ignite napalm.](image)

TNT, however, produces no flame. Hershberg’s solution was to surround the central tube with a container of white phosphorus, which ignites when it comes into contact with air. After consultations with experts at the U.S. Ballistics Research Laboratory in Aberdeen, Maryland and Picatinny Arsenal in New Jersey, and manufacturing assistance from Noblitt-Sparks Industries in Columbus, Indiana, which made the bomb casings, a set of redesigned shells and bursters arrived in Cambridge.184 “The performance, from the start, was most impressive. ... The high explosive cuts the inner well into ribbons and opens the casing down the entire length. Pieces of phosphorus are

---


Driven into the gel, and large, burning globs are distributed evenly over a circular area about 50 yards in diameter. Extinguished with carbon dioxide or water, the phosphorus-containing gel may later reignite,” Fieser wrote.\textsuperscript{185}

Ultra slow-motion films shot at 1,000 frames per second by M.I.T. electrical engineering professor Harold Edgerton (later famous for his work with stroboscopic photography and images of a balloon in mid-burst and an apple being shot by a bullet) confirmed the superiority of Hershberg’s design.\textsuperscript{186}

\begin{center}
\begin{figure}
\includegraphics[width=\textwidth]{distribution_of_napalm_gel}
\caption{Distribution of napalm gel in test pond after soccer field trials. “Bomb 1,” with Harvard-designed TNT burster, left large chunks that required up to one minute to extinguish in water. “Bomb 2,” with a gunpowder burster, left finer particles that were extinguished almost immediately. Fieser. The Scientific Method. 40.}
\end{figure}
\end{center}

The researchers tested four bombs that Independence Day. The TNT-white phosphorus burster, “Bomb 1” went head to head with the old gunpowder-based system, “Bomb 2.” Results were un-

\textsuperscript{185} Fieser. The Scientific Method. 36.

\textsuperscript{186} Fieser. The Scientific Method. 36.
ambiguous. Hershberg’s shell threw about 96 percent of its cargo compared to just 60 percent for the gunpowder design. Even better, about one-third of the napalm blasted by high explosives fell in large chunks that took the men around the pool a full minute to extinguish even in water. The big sticky blobs were fearsome incendiaries. The gunpowder design, by contrast, sprayed fine particles of gel that went out as soon as they hit the water.¹⁸⁷

Not everyone was delighted by this triumph of chemical engineering. On 30 July 1942, Captain H. C. McIntosh of the Navy Supply Corps School wrote to Donald K. David, Dean of the Business School:

Dear Dean David: As you will recall, a few weeks ago some bomb experiments were carried out on the soccer field. A circular embankment approximately 175 feet in diameter was thrown up, which remained for about two days. This rendered about one-fourth of the drill area useless for that time. Also, after the explosions, irritating vesicant fumes clung to that corner of the field for several days. Effects of these fumes were still visible in the eyes of one officer six days after exposure. In addition, some seventeen officers required treatment during the night.

The soccer field has been designated by the University as a drill field for the Navy Supply Corps School, and makes possible an important part of our indoctrination. In addition to a student body of approximately six hundred, two companies of Business School students start participation in our drill periods on August 3. This number cannot be accommodated on the field unless its entire extent is available, nor, except for Sundays, is the field left idle any day of the week.

It has come to my attention that further experiments on this field are contemplated. If so, they will seriously hamper the training and athletic program at the Navy Supply Corps School. It is earnestly requested that another site for these tests be selected.

Fieser replied:

Dear Captain McIntosh: I greatly regret that the bomb firing experiments which we carried out on July 4th on a directive from the Chemical Warfare Service took up some of the space on the drill field area for a few days. Your comments on the ef-

fectiveness and persistence of fumes from the bomb may possibly represent an interesting commentary on the efficacy of this new munition, but I find it difficult to believe that there could have been a direct connection with the disabling of some of your personnel. There were eight men in all in my group of operators and we not only spent the day near the embankment but ran directly into the water-covered area immediately after each of the four explosions and spent practically the whole time making measurements and collections at the site of the bomb crater. A number of workers and firemen were exposed to some extent and there was no instance of any illness with any of these individuals or among my operators.

As for the future, we have no plans for further experiments calling for the soccer field and thus should cause you no further concern.”

Case closed.

Contemporary view of Harvard College soccer field. Note tennis courts behind scoreboard, with golden dome of Baker Library in the distance. Building between tennis courts and library was constructed after 1942. 26 April 2008: photographed by the author.

Bombing Indiana

The Harvard team had completed its work just in time: C.W.S. scheduled final gelled incendiary weapon qualification tests for 11-12 July 1942 at the Jefferson Proving Ground in Madison, Indiana. Army Ordnance seized several farms and small villages and relocated residents so that the

188 Fieser. The Scientific Method. 41-42.
properties — a deconsecrated church, stores, a banker’s large home, chicken coops, and pig pens … but no factories or commercial buildings — could be used as targets. Observers included representatives from the Army, Navy, and Marines, the Office of the Chief of the C.W.S., the N.D.R.C. including both Bush and Adams, and the British Air Commission, among others. Harvard’s gel and an alternative produced by Du Pont from gasoline mixed with their own chemical cocktail were finalists. Hershberg’s white phosphorus burster was also to be tested. Judges disqualified Standard Oil’s “applesauce,” and a late entry from Eastman Kodak based on ground-up newsprint, because of insufficient toughness.

---


The Standard Oil Development team took comfort in the knowledge that their design for a new incendiary gel bombshell was an uncontested masterpiece. The weapon was a hexagonal steel container 19 inches long and just under three inches wide that held 2.6 pounds of jelly and weighed about six pounds in total. The shape allowed bombs to be stacked in clusters like cells in a honeycomb. When altimeters opened the clusters, plungers lifted to arm the weapons and gauze streamers unfolded from the backs of the shells. These stabilizing tails saved space and weight compared to metal fins. Impact activated a 3-5 second delay fuze that triggered an explosive charge, fortified with magnesium shavings — theoretically after the bomb had come to rest on its
side — which lit the gel and blasted it 150 feet from the tail of the bomb. Delayed gel ejection was considered a particular design masterstroke.\textsuperscript{191} “A horizontally moving flaming gob covered enormously more ground in search for a target than a stationery magnesium bomb.”\textsuperscript{192} Some models included a small cup of white phosphorus (which produces dense white smoke, in addition to combusting when it comes into contact with air) to hamper fire fighting.\textsuperscript{193}

![Diagram](image)

“Construction and summary of tests in Central German structure.” Design for German-style house used by Standard Oil engineers for 1943 incendiary bomb tests. Focus is on attic and bedroom. Performance of various bomb designs is noted in comments. Standard Oil Development Corp. U.S. O.S.R.D. N.D.R.C. Summary Technical Report of Division 11. Vol. 3. 70: Figure 16.

Subsequent wind tunnel experiments and 20,000 test shots from a mortar mounted on a crane onto three full-scale replica German houses — one built with a slate roof in the style of Rhineland


\textsuperscript{192} Bohning. “Interview with Hoyt C. Hottel.” 23.

residences, one with a Central German tile roof, and one of Eastern German design, each with an attic and furnished bedroom — allowed Standard Oil researchers to perfect the thickness of the casing, streamer length, and similar details.\textsuperscript{194} Professionals at the Factory Mutual Research Corporation, a specialist in fire prevention and insurance with an extensive test facility in Norwood, “Outside view of incendiary test in Central German structure.” Spectators observe incendiary bomb test by Standard Oil researchers. Standard Oil Development Corp. U.S. O.S.R.D. N.D.R.C. \textit{Summary Technical Report of Division 11}. Vol. 3. 71: Figure 17.

Massachusetts, near Boston, conducted additional research specifically to determine the most efficient way to burn German bedrooms. Engineers bought as much appropriate second-hand furniture as they could find in Boston stores and furnished a test room approximately 12 feet by 15 feet with a wool rug, bed and mattress, vanity with mirror and chair, dresser, and arm chairs. They covered the walls and ceiling with gypsum board for easy replacement, and set fire bombs by the door, around the head and sides of the bed, and next to the arm chairs and vanity. “After 6 min elapsed, an experienced fire fighter and helper attacked the fire with a stirrup pump, approaching through the adjoining room, where he encountered heat and smoke from the bedroom. If he was

German-style bedroom furnished for 1943 incendiary bomb tests, photographed from the door (top) and window (bottom). Factory Mutual Research Corp. United States O.S.R.D., N.D.R.C. Summary Technical Report of Division 11, National Defense Research Committee. Vol. 3. 72: Figure 19.
unsuccessful in dealing with the fire it was judged out of control,” an official history reported. Shaved white Cheshire pigs, whose skin was thought most closely to resemble that of humans, served as subjects in later stages of experimentation.

“We had some lucky hits and beautiful fires,” Fieser reported of his Indiana expedition. B-25 bombers scored numerous direct hits on the empty homes. In one case a direct hit on a large barn started a fire that also quickly destroyed two other buildings. In another, a napalm bomb placed by hand inside a house burned the building to the ground in less than three minutes. “It is difficult to imagine what happens when 42 lbs. of burning gel is plastered all over the inside of a sturdy wooden barn: flames bursting out of the windows, blasting open the door, belching forth at the eaves and then through the roof. In a matter of minutes what remained of the structure collapsed into a burning heap,” the inventor wrote. In one test, the team drove 20 miles over rough roads to observe the two competing incendiaries torch two large barns located next to each other. Napalm destroyed its target, but the Du Pont formula produced only a flash of light and a powerful


196 Bohning. “Interview with Hoyt C. Hottel.” 25. As with the Indiana tests conducted by the Army, experimenters for Standard Oil and Factory Mutual did not model industrial or commercial buildings.

197 Fieser. The Scientific Method. 50. Hottel was less enthusiastic: “Bomb sighting wasn’t good and, worst of all, the percentage coverage of a rural area with combustible stuff is minute — it’s only two or three percent! It’s not a city; it’s not even a town. It’s the country. Once in a while a rail fence would catch fire, once a barn caught fire, and once we had a bomb actually land in a banker’s prior home, and one in the churchyard. The assessment was very indifferent.” Bohning. “Interview with Hoyt C. Hottel.” 23.

198 Fieser. The Scientific Method. 51.
blast. The officers concluded that someone had forgotten to add thickening agent and that the shell must have been filled with pure gasoline, which would account for the result.\textsuperscript{199}

Despite this curious incident, the assembled brass concluded that Du Pont had the better product.\textsuperscript{200} The S.O.D. bomb, later known as the M-69, also was approved, as was Hershberg’s phosphorus burster for use in larger weapons.\textsuperscript{201} The Army ordered several million shells and millions of pounds of the Du Pont incendiary to fill them. Napalm was out. Fieser packed his bags and returned to Cambridge.\textsuperscript{202}

Hershberg had an explanation for the failure of the Du Pont incendiary at the remote farmhouse. He had discovered that if the rival gel was chilled and stirred with a paddle for a long period it underwent syneresis: gasoline separated from the gel like water from yogurt left in a refrigerator. He speculated that vibration from the long trip over rough roads to the test site had produced this reaction and that when the gasoline exploded it destroyed whatever weakened gel remained in the bomb.

This proved to be exactly the case. Toward the end of 1942, British officers reported that the gel in many of the U.S. incendiary bombs they received had started to “turn to water” and was no longer effective. Army procurement staff quickly switched production to napalm, which tolerated vibration, but not before many bombs filled with defective gel had been delivered by convoy

\textsuperscript{199} Fieser. \textit{The Scientific Method}. 51-52.

\textsuperscript{200} Hottel, who with E. P. Stevenson and Adams was one of three judges, recalled: “Many kinds of tests were set up. In one test the material was put into an acetone-dry ice mixture and cooled down to the temperature of a bomb-bay of a high-flying airplane. Another test was on dispersion. One was slamming the bomb against something hard to see if the filler was well packaged.” Bohning. “Interview with Hoyt C. Hottel.” 24.


\textsuperscript{202} Fieser. \textit{The Scientific Method}. 52.
across the perilous North Atlantic at the height of the German submarine war. This “inadequate production control,” as an official N.D.R.C. history diplomatically explained the botch, delayed introduction of U.S. gelled fuel incendiary bombs to Europe.  

The sole Japanese attack on the contiguous U.S. by an airplane, an incendiary strike, took place during this period on 9 September 1942. A tiny Japanese bomber launched from a submarine dropped a single firebomb on a mountain slope near Brookings, Oregon, just north of the California state line. The attack kindled a small forest fire. A separate Japanese “Fu-Go” or “windship weapon” balloon bombardment program between November 1944 and April 1945 released approximately 9,300 hydrogen balloons armed with small explosives into the jet stream that flowed toward North America. Japanese schoolgirls with gloved hands and fingernails cut short, painstakingly fashioned the airships from hundreds of sheets of laminated, often handmade, paper. Officials requisitioned sumo wrestling halls and large theaters for inflation tests. The bombs,

---

203 Stevenson. “Incendiary Bombs.” *Chemistry*. W. A. Noyes, ed. 394. See Baxter. *Scientists Against Time*. 293. Just before the end of the war, Fieser received a visit from a group of British officers. The men had been ordered to inspect a cache of about four million M-69 bombs and separate the ones filled with Du Pont gel, which had to be discarded, from the ones loaded with napalm that were still useful. All of the bombs, distressingly for the officers, were identical. Fieser. *The Scientific Method*. 52. See Kleber and Birdsell. *United States Army in World War II*. 157.


about 345 of which made it to the U.S., had relatively little effect. They damaged power lines from the Bonneville Dam in Washington state, which disrupted plutonium production for three days at the Hanford Engineering Works, and killed six people on a Sunday School fishing trip: Elyse Mitchell, the pregnant 26-year-old wife of an Oregon minister, and five children, aged 11 to 14. The woman and youths found a balloon bomb in the woods while the Reverend Mitchell parked their car, and died when it exploded. These appear to be the only deaths from enemy action in North America during the second world war. No German airplanes got within 1,000 miles of the U.S.


German and Japanese towns in the Utah desert


The British had another worry about U.S. incendiary bombs, aside from the inability of their Du Pont fillings to start fires: the M-69, they thought, was too small to penetrate German roofs and
upper floors — 20,000 mortar tests notwithstanding.\textsuperscript{210} Other observers argued vociferously that the farm houses and barns used in Indiana were easier to ignite than actual enemy buildings.\textsuperscript{211}

To resolve these concerns, the C.W.S. decided to build and firebomb life-sized replica German and Japanese residences at its new Dugway Proving Ground in Utah, about 75 miles southwest of Salt Lake City. The facility was larger and had better weather than Edgewood in Maryland. Army officers contracted with S.O.D., which had experience with replica targets from their mortar experiments. Workers broke ground on 29 March 1943.\textsuperscript{212}

A frenzied seven-week construction period followed during which the Army spared no effort or expense in its quest for authenticity. Officers hired Eric Mendelsohn and Antonin Raymond, noted architects who had practiced for years in Germany and Japan respectively, to design the homes

\textsuperscript{210} Stevenson. “Incendiary Bombs.” \textit{Chemistry}. W. A. Noyes, ed. 394. Incendiary weapons are most effective only if they start fires at the bottom of buildings. As the U.N. Group of Consultant Experts on Napalm and Other Incendiary Weapons explained in 1972, “Fire tends to spread upwards and horizontally through a building. The spread may be especially rapid along corridors or galleries that have combustible surfaces, a typical rate of spread along a well-papered corridor being 4 to 5 meters per minute, increasing when doors or windows are open. Downward spread, which is slower than upward spread, generally requires that a floor be burned through, burning fragments then dropping to the floor below. It follows that incendiary bombs tend to be more destructive if they succeed in penetrating through several floors of a building before igniting.” U.N. Group of Consultant Experts on Napalm and Other Incendiary Weapons. \textit{Napalm and Other Incendiary Weapons and all Aspects of their Possible Use}. 23: 78.


\textsuperscript{212} Stevenson. “Incendiary Bombs.” \textit{Chemistry}. W. A. Noyes, ed. 392-93. The S.O.D. team was familiar with the project because it grew from their work. To address the British concerns, the inventors of the M-69 hired a former German architect to design roof sections typical of German urban and industrial buildings that they could subject to tests with their crane-and-mortar apparatus. They later developed plans for entire German and Japanese settlements. S.O.D. turned over management responsibility for the project to the C.W.S. in 1943, but retained an important role as architects and engineers. Baxter. \textit{Scientists Against Time}. 292.
down to the last detail. Traditional wooden pegs, not nails, secured the Japanese structures.

Logisticians located a shipment of Russian spruce, similar to Hinoki wood used in Japan, headed for Portland. S.O.D. diverted the boat to San Francisco, commandeered the cargo, and trucked it across the continent to Fort Dix in New Jersey. Engineers conditioned timber for both sets of houses to a moisture content of about 15 percent, similar to that found in enemy territory, then pre-fabricated the buildings. “[A] line of trucks from Dix in Jersey to the Utah Proving Grounds,” carried the houses west, Raymond recalled. Esso employees across the country ensured that drivers, each of whom required a special wartime travel permit, received fuel and local assistance. Prisoners conscripted from the Utah State Prison helped erect the villages, a five-mile access road, and a water tower in just 44 days. Base soldiers watered the putative homes with hoses to simulate the mists of Japan and winter rains of Germany.

Researchers furnished the models with equal assiduousness. An S.O.D. executive traveled to Hawaii, and logged thousands of miles driving along the Pacific coast to collect traditional tatami straw mat flooring from temples and private homes for the “Japanese” dwellings. Airplanes rushed

---


the woven mats to Utah. Officials even built their own tatami factory, to cover their bets.\textsuperscript{220} Hollywood’s RKO Studios provided designs for authentic German furnishings. C.W.S. officers reopened a closed furniture factory in upstate New York to produce pieces to required specifications. A dozen fully-furnished duplex Japanese houses in four units, typical of urban row house construction for workers, and a block of six urban German residential dwellings, three in Rhineland style with slate roofs and three of a Central German design topped with tiles, stood complete on 15 May. As before, the Army did not model any industrial or commercial buildings.\textsuperscript{221} The only thing missing was people.

Bombers pounded the houses with M-50 and M-52 thermite bombs, and M-69 bombs filled with napalm, throughout the summer. The result, which necessitated three reconstructions of the villages to repair damage, was unequivocal. Napalm was a devastating weapon: a quantum improvement over thermite, lethal against dwellings, and particularly effective against Japanese homes. Uncontrollable fires started in more than one third of German homes and more than two thirds of Japanese houses spattered with gel. Officers invented a scale for incendiary effectiveness: “Any fire beyond control of the well-trained and properly equipped fire guards in 6 minutes was classified an A fire; a fire which was ultimately destructive if unattended was a B fire; and a fire

\begin{footnotesize}
\textsuperscript{220} Bohning. “Interview with Hoyt C. Hottel.” 25.

\textsuperscript{221} The tests lasted from 17 May to 1 September 1943. Stevenson. “Incendiary Bombs.” \textit{Chemistry}. W. A. Noyes, ed. 392-93. See Davis. \textit{Dead Cities}. 67. The Japanese Village not longer exists although an observation bunker remains near the site. The German Village is “currently in a deteriorated state, but is eligible for listing in the National Register of Historic Places,” according to Dugway administrators. U.S. Army, Dugway Proving Ground. “German Village.” No Date: \url{Dugway.Army.mil}.
\end{footnotesize}
judged nondestructive was a C fire,” according to an official history.\textsuperscript{222} Final results from “functioning hits” were as follows:\textsuperscript{223}

<table>
<thead>
<tr>
<th>FIRE CLASS</th>
<th>GERMAN HOUSES</th>
<th>JAPANESE HOUSES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AN-M-50 (thermite)</td>
<td>AN-M-52 (thermite)</td>
</tr>
<tr>
<td>A —</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Uncontrollable within six minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B —</td>
<td>26%</td>
<td>18%</td>
</tr>
<tr>
<td>Destructive if unattended</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C —</td>
<td>74%</td>
<td>82%</td>
</tr>
<tr>
<td>Nondestructive</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Napalm was significantly more destructive than thermite, and Japanese homes almost twice as vulnerable to catastrophic fires from the gel as German structures. C.W.S. historians explained the conclusion: “Using the results of the Dugway trials as a basis, plans for the bombing of Japan with


\textsuperscript{223} Stevenson “Incendiary Bombs.” \textit{Chemistry}. W. A. Noyes, ed. 393.
the AN-M-69 were drawn up by the Army Air Forces in the fall of 1943.” Follow-up research on existing factory structures at Eglin Field, near Valparaiso, Florida, which started in March 1944,

224 Stevenson. “Incendiary Bombs.” Chemistry. W. A. Noyes, ed. 394. The vulnerability of Japanese cities to incendiary attack was highlighted in a widely circulated 1942 article in Harper’s magazine. The authors noted the suffering such an attack might cause. “In Osaka the canals can be a refuge from fire and the tidal flow is sufficient to keep the water from becoming unbearable. In some of the slum sections of Kobe and Kyoto where there are no canals the suffering that an incendiary attack would cause is terrible to contemplate. But the fact remains that this is the cheapest possible way to cripple Japan. It would shorten the war by months or even years and reduce American and Allied losses by tens of thousands.” Charles Longstreth McNichols and Clayton D. Carus. “One way to cripple Japan: The inflammable cities of Osaka Bay.” June 1942: Harper’s. 29-36. Harpers.org.

experiments that autumn on specially constructed industrial target models at Edgewood Arsenal; and trials in early 1945 on a model Japanese room built in late 1944 at the Maryland facility, confirmed the Utah findings.

**Cambridge’s secret special weapons laboratory**

Fieser and his team returned to Harvard and turned their secret laboratory on Oxford Street into a design center for special napalm weapons. Their clients were the Office of Strategic Services (O.S.S.), predecessor of the Central Intelligence Agency, and the armed services.

An initial success came in November 1942 when the “Harvard Candle” personal napalm fire starter — intended for downed pilots or others who had to make fires in the wilderness — won an Army competition. The “candle” went into production as the M-1 Fire Starter. A “pocket incendiary” fashioned from napalm powder, kerosene, and a mechanical time delay system, all packed

---

226 U.S. O.S.R.D. N.D.R.C. *Summary Technical Report of Division 11*. Vol. 3. 81-82. British experimenters built a German village in 1943 similar to that constructed in Utah, and later added a Japanese equivalent, but had less success with napalm. A meeting between specialists from the two countries in November 1944 concluded the U.S. results for “German” dwellings at Dugway may have been too favorable because of some lucky strikes, and the “Japanese” results in the U.K. perhaps too pessimistic because of the relatively high humidity in Britain, use of wood that was relatively hard to burn, and differences in construction. James F. Droney. “One of Era’s Deadliest Weapons Came from a Village Built to Burn.” *Boston Sunday Herald*. 3. 1 July 1962: Fieser Papers. HUGFP 20.3 Box 6. Stevenson. “Incendiary Bombs.” *Chemistry*. W. A. Noyes, ed. 393-94. See Baxter. *Scientists Against Time*. 292. Bohning. “Interview with Hoyt C. Hottel.” 31. (G. I. Finch, president of the civilian British Zoroastrian Society of incendiary experts was a particularly vociferous critic of U.S. results. He had invented a 45-pound incendiary bomb that was a rival to napalm. Hottel described it as “in effect a traveling motor-driven oil burner.”)


into a box about the size of a deck of cards, emerged in the spring of 1943. Saboteurs could set it and walk away; the O.S.S. ordered more than 400,000. In the spring of 1944, the chemists perfected the lunchbox-sized “City Slicker” oil slick igniter. O.S.S. officers imagined partisans could release oil into a harbor then loose the devices like floating lanterns to ignite ships or other targets. Fieser and his wife traveled to California to supervise initial production. Subsequent modifications allowed use of the device on land as well as water and won it a new code name: the “Paul Revere.”

Additional inventions included a 14 gram pellet of napalm powder in a case that dissolved slowly in gasoline, and a Molotov-cocktail-style glass napalm hand grenade. Saboteur gas station attendants might slip the pellet into German tanks on their way to the Russian front, it was thought. The napalm swelled over a few days and formed a blob that jammed the engine. The glass grenade, equipped with a safety device so ingenious the government issued a patent for it in 1950, was nonetheless deemed too risky for battlefield use. Independently, Fieser wrote “Arson: An Instruction Manual” for the O.S.S., and traveled to Europe as a member of the Alsos mission that scoured Germany for information about its nuclear bomb program in the final months before the

---

229 A batch shipped from the manufacturer Standard Pyroxoloid corporation in western Massachusetts to Washington D.C. accidentally went off in the Boston South Station railroad station and “destroyed a certain amount of property in the baggage room,” according to Fieser. Fieser. The Scientific Method. 74-75.


231 Fieser. The Scientific Method. 113.

232 Fieser. The Scientific Method. 118. There does not appear to be any evidence the sabotage napalm pellet was used during the war.
Nazi surrender. He was armed for the trip, perhaps preposterously, with a swagger stick given to him by his wife and modified by an O.S.S. friend to conceal a triangular dagger.\footnote{Fieser. \textit{The Scientific Method}. 192, 202-03.}

A measure of the enthusiasm with which Fieser approached these projects can be seen in the name he gave a kitten acquired during his researches on napalm. “We wanted to associate the new Siamese with this discovery, but the word Napalm was a classified military secret. So the pedigree name chosen was J. G. Pooh, which to us meant Jellied Gasoline Pooh. Before long J.G. became modified to Georgie,” he wrote.\footnote{Fieser. \textit{The Scientific Method}. 230.} Along similar lines, the professor explained napalm was effective against crabgrass: he sprinkled some on his Belmont lawn and ignited it: a few weeks later, healthy grass grew back through the ashes.\footnote{Fieser Papers. HUGFP 20.3. Box 3. “Wooden photo album.” No page number. Indeed, Fieser’s garden was labeled a “Belmont Beaty Spot” and featured in a photograph published in the town newspaper. No date: no publication. Fieser Papers. HUGFP 20.3 Box 4. “Scrapbook 1937-1960.” No page number.} Military officials subsequently attributed the
genesis of the weapon to this amusing anecdote. A credulous the Associated Press reporter swallowed the story. “If a Harvard chemistry professor hadn’t battled with the crabgrass on the lawn of his suburban home, there might never have been the monster fire raids on Japan’s great cities, an army officer disclosed today,” the wire service reported in April, 1945.236

At no time did the Harvard team discuss the morality of firebomb attacks, according to Fieser. “Our testing and our thinking were in terms of the burning of structures, not personnel,” he recalled in a autobiographical note written around 1970 for the 50th reunion of his Williams college

He did concede limited circumstances in which napalm might be used against people, but did not address the implications of the Army’s bombing experiments: “To be sure, there was our Antitank Grenade, a glass jar filled with Napalm gel and containing a vial of diethyl zinc, which takes fire when a steel ball crushes the vial and allows access of air. If the grenade strikes anywhere near the powerful air intake of a tank, combustion fumes will be drawn in to make the tank untenable.” With that, his introspective review ended.

American Kamikaze: bats as suicide bombers

The most spectacular of these special projects was a plan to turn millions of bats into kamikaze warriors armed with tiny napalm time bombs. Dr. Lytle S. Adams, a Pennsylvania dentist, pilot and inventor conceived the idea when he heard about the Pearl Harbor attacks on his way home from

---


a visit to the bat-filled Carlsbad Caverns in New Mexico.\textsuperscript{239} In the late 1920s, Adams had patented a system for nonstop pickup of mail sacks by airplanes using a weighted cable and a special pickup rope. He organized the system as a business, and caught the attention of Eleanor Roosevelt in 1938 through work in rural West Virginia.\textsuperscript{240} In January, 1942, the Ohioan called the First Lady and convinced her to pass a memo that described his bat plan to F.D.R.\textsuperscript{241}

\begin{center}
\includegraphics[width=0.5\textwidth]{bats-cave.jpg}
\end{center}

Bats from Ney Cave in Texas swarm into the evening sky. “It takes up to three hours for the bats of Ney Cave [Texas] to complete the evening’s emergence.” Couffer. \textit{Bat Bomb}. 232 et seq.

\begin{flushright}
\footnotesize


\textsuperscript{241} Jack Couffer. \textit{Bat Bomb: World War II’s Other Secret Weapon}. 1992: University of Texas Press. 5.
\end{flushright}
“[The] lowest form of life is the BAT, associated in history with the underworld and regions of darkness and evil,” Adams wrote to the president. “Until now reasons for its creation have remained unexplained. As I vision it the millions of bats that have for ages inhabited our belfries, tunnels and caverns were placed there by God to await this hour to play their part in the scheme of free human existence, and to frustrate any attempt of those who dare desecrate our way of life.” A fire attack by millions of bats, he continued, “Would render the Japanese people homeless and their industries useless, yet the innocent could escape with their lives.”

Roosevelt was intrigued. “This man is not a nut. It sounds like a perfectly wild idea but it is worth looking into,” he wrote to O.S.S. director Colonel William Donovan. “Wild Bill,” as the director was known, referred the memo to the National Inventors Council (N.I.C.), a non-academic analog to the N.D.R.C. established by Harry Hopkins at the Department of Commerce; the N.D.R.C. itself; and the Army Air Force (A.A.F.). The project wound up at the Chemical Warfare Service — which dismissed it. The only practical incendiary for such a task was white phosphorus.

Captain William G. Wiles, C.W.S. liaison officer to the N.I.C., reported in May 1942. That chemical, however, had to be kept in an oxygen-free environment until ignition — but bats require oxygen to live.

---

242 Adams’ opinion of the status of bats in the scheme of life perhaps explains his lack of concern for the sacrifice of the creatures he planned to draft into the project. Lytle S. Adams to Franklin D. Roosevelt. 12 January 1942. In Couffer. Bat Bomb. 6.


Inventors Council director Thomas Taylor did not accept the rejection. He demanded that the C.W.S. review its conclusion with the office of Air Force commanding general Hap Arnold. “It is requested that this office be informed if you see any possible use for such a munition,” C.W.S. technical director Colonel W. C. Kabrich dutifully wrote on 13 June.245 The response was blunt. “Fantastic as the proposed plan appears, there might be a time in the future when it would be desirable to execute such harassing missions,” Colonel H. A. Craig replied from the commander’s office on 25 June.246 Senior N.D.R.C. chemistry administrator Earl Stevenson followed up in July with a suggestion to the Navy that hibernating bats might be transported to Japan by submarine and released just off the coast.247 Summer turned to winter, however, and no chiropterian incendiary


247 Stevenson acknowledged damage would be indiscriminate. “It cannot conceivably have any value as an incendiary for use against purely military objectives, as the chances are that the bats would seek the countryside rather than urban districts.” E. P. Stevenson. “Letter to Office of the Coordinator of Research and Development, 10 July 1942.” In Andrew Carroll, ed.. Behind the Lines: Powerful and Revealing American and Foreign War Letters and One Man’s Search to Find Them. 2005: Simon & Schuster. 271-72. Books.Google.com.
time bomb emerged from the C.W.S. Finally, in March 1943 officers at Edgewood appealed to the N.D.R.C. for assistance. Stevenson assigned Fieser to the project.\textsuperscript{248}

The professor had an immediate solution. A research team recruited by Adams from the Natural History Museum of Los Angeles County had determined that the best bat for the job was the 10-11 gram Mexican free-tailed bat. The animals could carry a 15-18 gram payload; millions migrated to Texas each summer.\textsuperscript{249} Fieser drew on his work with the pocket incendiary to design a tiny napalm bomb and timer that weighed just 17.5 grams.\textsuperscript{250} “These were to be attached to hibernating bat vectors which would be flown over Japanese cities at night and parachuted down into warm-

\textsuperscript{248} Couffer. Bat Bomb. 42.

\textsuperscript{249} Couffer. Bat Bomb. 48.

\textsuperscript{250} Fieser. The Scientific Method. 121. See Couffer. Bat Bomb. 89.
air, when the bats would awaken and carry the bombs onto or into highly combustible Japanese
houses,” he wrote.\textsuperscript{251}

**Bat bombs aloft**

![Mexican free-tailed bat carries napalm bomb and time-delay fuse.](image)

An initial test for the system was scheduled for May 1943 at the Muroc Army Air Base (now Edwards Air Force base) outside Los Angeles. A large dry lake on the base, bleached white by the sun, would, it was thought, facilitate bat recovery. The Standard Pyroxoloid company in western Massachusetts prepared 3,000 tiny bombs and filled some with napalm. Harvard technicians at

Gibbs loaded the rest with red phosphorus, which produces a dense smoke, to further aid vector recovery. Connecticut toy company A. C. Gilbert, famous for its Erector Set building kits, manufactured the timers.\textsuperscript{252} An Army team at Wright Field in Dayton, Ohio built a special refrigerated truck to chill and transport hibernating bats, loaded it with the bombs and timers, and drove it to Los Angeles. A B-25 bomber assigned to the test flew to California from Eglin Field in Florida. Fieser and two C.W.S. officers from Edgewood arrived in Los Angeles on Monday 17 May and proceeded to Adams’ home for an evening review before the test scheduled for the next day.

The men discovered a large dinner party in progress at the home of the dentist. Adams had decided to celebrate progress on the top secret project by inviting a large collection of friends and associates. “We were horrified to find that Adams had invited a large company, including ladies, to a dinner party in celebration of the initiation of field tests on the Adams Plan, supposedly a highly secret project,” Fieser recalled.\textsuperscript{253} Worse, from the perspective of the team from the East coast, he had gathered only 150 test bats, rather than the agreed 3,000. It was mating season for bats in Los Angeles and they were hard to catch, the inventor explained.\textsuperscript{254}

Improvisation followed. C.W.S. Lieutenant Colonel R. Bruce Epler and some of Adams’ staff from the Natural History Museum made an emergency trip in the B-29 the next morning to Carlsbad in New Mexico — site of the project’s initial inspiration. They landed at a nearby Army air base, requisitioned a car, obtained a permit from the Parks Department, collected eight large crates

\textsuperscript{252} Company founder Gilbert was known as “the man who saved Christmas” because he helped convince war regulators not to ban toy production in 1918. A. C. Gilbert Heritage Society. “A. C. Gilbert Company History.” No Date: ACGilbertHeritageSociety.com. Fieser. \textit{The Scientific Method}. 121-23.

\textsuperscript{253} Fieser. \textit{The Scientific Method}. 124.

of bats, and flew back to Muroc that evening. “Shortly after dinner the bomber flew in loaded with shrieking, kicking bats,” Fieser recalled. The men loaded the creatures into the refrigerated truck and turned on the cooling system full blast. When the cacophony did not diminish after a few hours, they wrapped blocks of ice in towels and tucked them in with the bats, and positioned fans to blow air over additional chunks of ice stacked around the mammals. The noise subsided around midnight.255


The plan was to pack the bats into five foot tall steel bombshells the size of a standard 500-pound bomb. Each shell was filled with circular steel trays about one and one-half inches tall,

subdivided into small rectangular bat-sized niches and fitted upside down one on top of the other. Hibernating bats with napalm time bombs attached to their breasts with surgical clips — thought to simulate the teeth of a baby bat — were to be placed in each compartment, like eggs. Timing and safety wires connected each bat to the tray above and to the compartment walls. Strings two to three inches long connected the trays. On release, a parachute deployed and a mechanical device jettisoned the casing. The trays fell to the bottom of their connecting strings like an accordion and released the timing wires. As the deployed bat bomb descended into warmer air, the bats were expected to wake up, wiggle or fall out of their cubicles, and fly away — in the process removing the safety wires and arming the bombs. Each shell could carry 1,030 bats. A two-engined B-25 could carry 25 shells: almost 26,000 bombs. A Del Mar, California company owned by entertainer Bing Crosby and his brother Larry was contracted to manufacture the devices.256

Adams produced only cardboard mockups, however, for the test. These disintegrated as soon as staff launched them from the B-29. Fieser, for his part, hadn’t completed the safety mechanism for the miniature napalm bombs to be attached to the bats, and the pilot refused to allow them on board. The team was forced instead to clip small weights designed to imitate the bombs to the bats, and throw them out of the bomber by hand. A ground crew raced after the airplane in jeeps on the lake bed. The first batch of test subjects was released at 2,000 feet. They plummeted straight to the ground in free fall. “Few if any of the bats had come out of hibernation,” Fieser wrote. More altitude was required. The bomber circled higher and higher with additional tests at various heights.

“Egg-crate” trays: each bat dropped from its private compartment into the roof of the tray below, which then became its launching platform. The bat bomb trays hung from a parachute on a chain after the bombshell split away. United States Navy. Couffer. *Bat Bomb.* 232 et seq.
Eventually, the plane was so high it was difficult to see from the ground. Moreover, the results seemed the same no matter what the altitude. “Eventually it became clear that the bats were not in hibernation but dead,” the Harvard professor wrote. “What had happened was that instead of freezing them to hibernation, we had frozen them to death the night before,” he added. A follow-up test was scheduled for the next month.

Fieser and Epler decided that the air base at Carlsbad, close to the giant bat caves, was the best location for the next experiment. On his previous visit, Epler had noticed that a new auxiliary landing field, complete with control tower, barracks, offices, hangars and outbuildings, had just been completed at a remote location on the base. Fieser and he visited the commander. They couldn’t explain their mission, they said, but displayed their orders marked Top Secret. The chief agreed to delay inauguration of the auxiliary field, a flight training facility he had conceived and whose construction he had supervised, for a few days to allow the allegedly critical research.

The second test was more successful. The team collected a fresh set of bats, chilled them more gently, and loaded them into a completed Crosby company shell. Fieser’s continued inability to perfect a safety mechanism, as well as judicious concern for local civilians, forced the use of dummy bombs rather than live incendiaries. The B-29 dropped the device over a group of observers that included Marine Corps General Louis DeHaven, Epler, and an Army captain. The C.W.S.

---


official insisted, the fact that he was only a lieutenant colonel notwithstanding, that the base commander, a full colonel, be excluded to maintain secrecy.\textsuperscript{260}

The bomb dropped. Its parachute deployed at 4,000 feet. “Soon tiny motes began to flutter across the sky, flying in all directions, most borne northward in a fluttering clump by the breeze,” team member Jack Couffer, a junior chiroptologist from the L.A. County museum, recalled. The researchers leaped into jeeps and set off after the animals at high speed over rough country. They tracked a large group for miles to the barn of a local rancher, rushed onto his front porch, and asked if he had noticed anything unusual. “Like bats flyin’ ‘round in broad daylight? Unusual like that?” he answered. The officers begged for secrecy. “I got two sons somewhere in Europe fightin’ the Hun. If you tell me that’s what yer doin’, however damned fool as it looks to me, is a military secret, nobody’s goin’ to get me to say a peep even by puttin’ bamboo splinters under my fingernails and alightin’ fire to ‘em,” he said, according to Couffer. He gestured to a bat that peered down from a niche between ceiling boards and a roof joist just above them on the porch. It straddled a dummy bomb. The delivery system worked.\textsuperscript{261}

That would have been a good place to end the day’s research. Adams, however, wanted to conduct a second trial to confirm the first results. Fieser decided to take advantage of this opportunity to demonstrate his miniature timing device and napalm bombs for motion picture and still photographers assigned by the Army Signals Corp to cover the event.

Team members handed him six torpid chilled bats with bombs attached. The delay device used corrosive copper chloride to dissolve a trigger wire. A thicker wire produced a longer delay. The


\textsuperscript{261} Couffer. \textit{Bat Bomb}. 116.
demonstration units had 15 minute wires. Fieser ceremoniously injected chloride into one timer after another from a large steel and glass hypodermic syringe. He armed all six bat bombs as the cameras whirred and clicked.

Then, in an instant, the mammals woke up and took off. The hot New Mexico sun had revivified them with unexpected speed. The small shapes flapped away into the sky.


Couffer explained what happened next. “Exactly fifteen minutes after arming, a barracks burst into flames; minutes later the tall tower erupted into a huge candle visible for miles. Offices and
hangars followed in order corresponding to the intervals between Fieser’s chemical injections.” A second confirmation of the plan’s viability.262

Unfortunately, the team had deemed fire equipment unnecessary at the remote location to preserve secrecy, and because the plan was to use dummy bombs. By the time the base commander — alerted by plumes of thick black smoke — arrived with three fire engines, the time for remedial measures was past. The blaze had spread between buildings and many structures lay in ashes. Moreover, the guards — under C.W.S. command during the test — refused to unlock the gates for their commander. A heated discussion ensued, with the fire trucks and base commander, a full colonel, outside and Lieutenant Colonel Epler, lower in rank, inside. Not only did the C.W.S. officer refuse to modify his secrecy rules, he asked the colonel for a bulldozer to raze whatever might be left of the facility after the fires burned out.263 “We made a little mistake out there,” Fieser said later in a talk to a group of engineers.264

The Army decided it wanted no further part of the project. General DeHaven, however, was impressed by the evident destructive capability of bats armed with napalm. The Marine Corps stepped into the breach. In the autumn of 1943, the Marines renamed the venture “Project X-Ray” and put Colonel R. H. “Dusty” Rhoads in charge. The service designated the Marine Air Station at El Centro California X-Ray headquarters, posted armed guards at the two largest bat caves in the
U.S. (near San Antonio, Texas), and assigned a twin-engined Lockheed Lodestar airplane full-time to the effort.\textsuperscript{265} Inventor Adams, who never had an official role, was forced out.\textsuperscript{266}

The new leader quickly readied the system for deployment. On 17-19 December, the Marines tested the bat bombs at the Dugway Japanese and German villages. “The sterile towns stood several miles apart on the otherwise empty Utah plain, like abandoned movie sets picturing the aftermath of a devastating plague,” Couffer recalled. Due caution was employed. Released bats carried dummy bombs, now glued directly to the animals. Researchers then placed tiny napalm bombs by hand in similar locations. Results were positive, despite wet wood and cold temperatures. “The main advantage of the units would seem to be their placement (by the bats) within the enemy structures without the knowledge of the householder or fire watchers, thus allowing the fire to establish itself before being discovered,” concluded the chief incendiary officer at Dugway.\textsuperscript{267} Fieser also attended this second Utah experiment and concluded that napalm bombing by bat was about 3.7 times more efficient than gravity bombing.\textsuperscript{268}

Design and testing was complete by February, 1944. Manufacturers and bat collection teams stood by to fulfill an expected initial order for one million bats, incendiaries, and timers. Then, suddenly and without definitive explanation — a historical mystery that remains to be resolved — the project was cancelled after an expenditure of about $24 million in today’s dollars.\textsuperscript{269}

\textsuperscript{265} Couffer. \textit{Bat Bomb}. 146-47; cave locations, 126; bases and airplane, 150.

\textsuperscript{266} Couffer. \textit{Bat Bomb}. 203.

\textsuperscript{267} Major Evan A. Lewis. \textit{Report}. In Couffer. \textit{Bat Bomb}. 211.

\textsuperscript{268} Fieser. \textit{The Scientific Method}. 131.

tainties involved in the behavior of the animal,” N.D.R.C. chemist Harris M. Chadwell blandly wrote, created too many unknown variables.270

Napalm had to rely on more traditional vectors to reach its targets.


---

II. UNCONDITIONAL VICTORY, 1943-45

Napalm Close Up: Tokyo, 9 March 1945

B-29 bomber next to full load napalm cluster bombs. Each cluster weighed 500 pounds and contained 38 smaller M-69 bombs: 1,520 per bomber. Each bomb contained about 2.2 pounds of napalm: 3,344 pounds, or about 1.5 tons, of napalm per bomber. U.S. O.S.R.D. N.D.R.C. Summary Technical Report of Division II. Vol. 3. 14: Figure 5.

A windstorm ripped the skies over Tokyo on the night of 9 March 1945. Gusts of 60 miles per hour roared through narrow streets and over wooden houses that sheltered the city’s six million residents. Blasts rose to 80 miles per hour as midnight approached.¹

Far at sea, sentries on Japanese Navy ships heard the roar of hundreds of U.S. bombers as they flew north at low altitudes. Radar stations on the Bonin Islands, 600 miles south of Tokyo, also detected the attackers. Warnings flashed, but it was unclear exactly where the airplanes were going.

headed. It was not until just after midnight that sentries on tiny islands near the capital heard the thunder of thousands of propellers and radioed “Major air raid on Tokyo.”

Surprise. The first “pathfinder” bombers reached the city minutes later. They flew at about 5,000 feet: low enough to see individual buildings, parks and streets. Searchlights flared, anti-aircraft guns on ships in the harbor and land batteries boomed, and a few dozen fighters scrambled. Too late. The pathfinders dropped 100-pound M-47 bombs painted gray-blue and banded in purple to indicate their napalm payloads — twins of the shells tested at Harvard three years earlier — to light a flaming cross over a 25-kilometer-square area at the heart of the city. An average of 103,000 people lived in each square mile, according to information sheets distributed to the air crews — comparable to Manhattan at its peak density of 106,240 people per square mile in 1910. An estimated 135,000 people per square mile lived at the center of the area, probably the highest urban density in the world, and comparable to New York’s Lower East Side immigrant neighborhood in the early 20th century. As the first fires spread, the plane flown by commanding


3 XXI BC MR no. 40. 8, 32-33, 35 and “Aircraft Lost and Damaged Chart.” In Frank. Downfall. 66.


general Thomas Power rose to 10,000 feet and circled as a “Master of Ceremonies,” following a British technique developed in night attacks on German cities.

Bombers followed in a line that stretched hundreds of miles back over the sea. French journalist Robert Guillain, who witnessed the attack, wrote of the superfortresses, “Their long, glinting wings, sharp as blades, could be seen through the oblique columns of smoke rising from the city, suddenly reflecting the fire from the furnace below, black silhouettes gliding through the fiery sky to reappear further on, shining golden against the dark roof of heaven or glittering blue, like mete-

Aimable cluster of M-69 bombs. Each cluster held 38 hexagon-shaped bombs and weighed 500 pounds. It opened before impact and scattered the bombs over the area below. Standard Oil Development Company. In W. A. Noyes, ed. Chemistry: A History. 394-95: Fig. 13.

ors, in the searchlight beams spraying the vault from horizon to horizon.” As they passed, 500-pound clusters of Standard Oil’s six-pound M-69 bombs, each packed with napalm tumbled from

---


7 Guillain. I Saw Tokyo Burning. 182.
their bellies: around 250,000 “Molotov flower baskets,” as the Japanese called them. The clusters burst as they neared the ground and individual incendiaries smashed through roofs, spattered blazing napalm, and belched thick clouds of phosphorus smoke. “[C]ylinders scattered a kind if flaming dew that skittered along the roofs, setting fire to everything it splashed and spreading a wash of dancing flames everywhere,” Guillain recounted. About 690,000 pounds of the gel fell in less than an hour.

Tens of thousands of fires sprang up. The winds whipped and combined them. In less than 15 minutes, the flames began to coalesce in a rare event: a man-made fire hurricane, or firestorm. A super-natural open chimney of flames and smoke rose 18,000 feet over the city. Gale-force winds

---

8 Guillain. *I Saw Tokyo Burning*. 184 (He asserts 700,000 bombs fell on Tokyo on 9 March: 188).


11 The Army and Air Force explained the phenomenon as follows in 1969: “[D]ue to the tremendous heat generated and resulting vertical wind currents, each large fire creates a wind system of its own. This wind is called a ‘fire storm’ and sometimes will exceed a speed of 60 knots.” Departments of the Army and the Air Force. “Field Behavior of Chemical, Biological, and Radiological Agents.” Technical Manual TM 3-240. 15 April 1969: Departments of the Army and the Air Force. 40. The 1972 U.N. Group of Consultant Experts on Napalm and Other Incendiary Weapons wrote: “Fire-storms are considerably more destructive than other urban fires and cause a much greater loss of human life. They rarely, if ever, occur naturally, and even during massive incendiary air raids they have proved uncommon.” U.N. Group of Consultant Experts on Napalm and Other Incendiary Weapons. *Napalm and Other Incendiary Weapons and all Aspects of their Possible Use*. 25: 84.
surged at ground level as the flames and heat pulled oxygen up the column. Tokyo “caught fire like a forest of pine trees” wrote U.S. observers, perched high above.\(^{12}\) “The meager defenses of those thousands of amateur firemen — feeble jets of hand-pumped water, wet mats and sand to be thrown on the bombs when one could get close enough to their terrible heat — were completely inadequate. Roofs collapsed under the bombs’ impact and within minutes the frail houses of wood and paper were aﬂame, lighted from the inside like paper lanterns,” Guillain continued.\(^{13}\) “True there is no room for emotions in war,” Power recalled later, “[b]ut the destruction I witnessed that night over Tokyo was so overwhelming that it left a tremendous and lasting impression on me.”\(^{14}\)

Survivor reports collected later by journalist Edwin Hoyt offer a vivid record of the night. Sumiko Morikawa was a 24-year-old homemaker with a four-year-old son and twin eight-month-old girls. Her husband was posted somewhere in Japan. As the fires began, a neighbor helped them flee to a park. “Atsuko, Ryoko, have patience,’ she told the twins. ‘Kiichi, don’t hold onto Mother's hand. Mother will hold onto your hand and run,’” she said to her son. Houses and trees burned around them as they ran. In the park, they rushed to a pool. Sumiko ladled water onto the backs of the children. Others gathered. “It’s hot!’ shrieked her four-year-old. His jacket and cotton air raid hood were on fire. She doused them and huddled in the water with the kids. The inferno drew closer. Flames gushed from the windows of nearby buildings. People crammed into the pool, and filled the area around it as the fires and smoke grew closer, thicker, and hotter. A ball of flames hit Kiichi in the head. ‘Mother, it’s hot!’ he screamed. She ladled water frantically over the children.

\(^{12}\) Baxter. *Scientists Against Time*. 98.

\(^{13}\) Guillain. *I Saw Tokyo Burning*. 184.

'Mother, it’s hot!' Kiichi repeated, and closed his eyes. ‘Hang on, hang on. Don’t go to sleep. We can see Father very soon,’ she implored. She tapped him frantically on the cheek. But he only rolled his eyes, then slumped over. The twins were dead. ‘Kiichi, Kiichi, don’t leave me alone,’ she begged, and fainted. When she came to and looked around, the pool was dry. Kiichi was still breathing, but faintly. He shivered. She cradled him in her arms and walked to the side of the pool. Crying hysterically, she asked for forgiveness from her daughters, and covered them with her damp jacket. A friend’s house was clogged with refugees, but they found a quilt for her. She wrapped Kiichi in it. A girl gave her a cup of hot tea. Sumiko took some in her mouth, cooled it and then, like a bird, trickled it into his mouth. Kiichi opened his eyes a little and said ‘Mama,’ then slumped over, dead.\(^\text{15}\)


\(^{15}\) Hoyt, \textit{Inferno}. 15.
Toshiko Higashikawa was 12 and the oldest of five children. She had just returned to Tokyo to prepare for high school after eight months as an evacuee in the countryside. When the bombing began, her mother dressed the children in baggy trousers and air raid hoods and sent them to a shelter in the garden. These were usually shallow pits covered with bamboo rods and a thin layer of earth. As the napalm bombs fell and the buildings around them began to burn her father decided they should head to a nearby school in the hope that the building would provide shelter.

We hurried through the streets, joining the fleeing crowd. Buildings were burning everywhere. … It was very scary and the hot wind from the fires burned our faces. … We could see the bombs coming out of the planes; sometimes they exploded in the street in front of us. There was fire everywhere. I saw one person caught by the claws of the fire dragon …. Her clothes just went up in flames. Another two people were caught, and burned up. The bombers just kept coming. Father was carrying my little brother and had my sister by the hand. We came to the school. … In the school’s entryway waves of people, one after another, pushed and shoved. … No one could move, they were so tightly jammed in. Panic had developed. [I] could hear people shouting: ‘Gya. Help! It’s hot! Mama! Uwa!’ ‘Daddy! It hurts! Help!’ My hand fell off my father’s backpack … Father’s face got lost in the crowd. Utako and I were drowning in the wave of people. Up above the fire was so bad you couldn’t breathe. I don’t know how long this went on. I felt faint. … ‘Older sister. Ne chan.’ I heard Utako’s voice but I could not see her. ‘Here! Here!’ she said. ‘I can’t crawl out of here. I am resigned, my eyes are closing,’ I said. … I will try one more time to crawl out of here, I thought. Ah! I have escaped! … ‘Ne chan,’ Utako called from under the mountain of bodies. ‘I am over here!’ I reached Utako. I rescued her.

The two girls made their way through the burning city to an evacuation center. There, incredibly, they found their mother and third sister. “Mother and Sister Kazuyo were talking. Sister Kazuyo …
said, ‘[Baby] Katsubo is dead because of me. I am finished.’ She said, ‘Katsubo was screaming on my back when we were running away, but I couldn’t do anything for him.’” Their mother said, “Kazuyo, you didn’t kill Katsubo, don’t feel guilty. ... Katsubo, who was just one year and seven months old, was dead. He lived a very short life.” Their father and brother perished.17

No one was spared. Seizo Hashimoto was 13 years old. He saw a woman, dressed in a red kimono with gold and silver threads and a gold obi [sash], with a red lotus blossom in her hair, perhaps a geisha, seized by the firestorm, whipped and twisted in the air, and ignited: a human torch. A piece of her kimono swirled through the air and dropped at his feet.18 “In the dense smoke, where the wind was so hot it seared the lungs, people struggled, then burst into flames where they stood. The fiery air was blown down toward the ground and it was often the refugees’ feet that began burning first: the men’s puttees and the women’s trousers caught fire and ignited the rest of their clothing,” reporter Guillain chronicled. A neighbor of Chiyoko Sakamoto was in the last stages of pregnancy: “As they felt the fire the wife had gone into labor. Halfway through the birth process she began to die. She was terribly burned and crying out in a loud delirious voice before she died. The child was born filthy and burned in the face but alive; the father swept it up in an overcoat, clutched it to him, and saved it.”19

Jammed bridges became funeral pyres. Civil guard commander Kinosuke Wakabayashi and his daughter, shielded by a concrete warehouse, saw thousands, “streaming toward the Sumida River bridges, and leaping into the river, clothes and even their bodies aflame. Soon both banks of the
river were clogged with bodies. The bridges were so hot that anyone who touched a bit of iron or steel was seared like bacon on a grill.”

On the Kototoi bridge, another recalled, “The steel grew white-hot and people who touched the metal were seared like steaks on a barbeque.”

Water proved no friend. Rivers drowned refugees, or killed them from hypothermia. “As panic brought ever fresh waves of people pressing into the narrow strips of [open] land, those in front were pushed irresistibly toward the river; whole walls of screaming humanity toppled over and disappeared into the deep water,” Guillain reported. The fire sucked oxygen from the air and suffocated some refugees as they swam. Smaller pools and canals, as Morikawa’s experience in the park with her children illustrates, could not withstand the giant fire. “In some of the smaller canals the water was actually boiling from the intense heat,” concluded a U.S. government after-action report.

The historic night produced some of the first reports about napalm’s effects on the human body. Hoyt recorded the experience of air raid warden Masatake Obata: “Suddenly a cluster of six-pound incendiary bombs hit the ground ten feet away. … One incendiary bomb tore loose from the cluster and was flung at him, exploding in his face. The helmet that was supposed to protect him funneled the force of the explosion directly against his jaw. … He fell unconscious. He awoke, not knowing how long he had been out. His feet hurt, and he looked at them. His shoes had burned up and his toes had melted. His arms and hands hurt; they were burned black and he

---

20 Hoyt. *Inferno*. 31.
knew he had third-degree burns. His clothing was still burning in spots. He could not use his hands, and so he rolled over and over to put out the flames.”

Others were luckier. Neighborhood fire prevention officer Hiyoshi Inoue heard an airplane, then “felt something cold drop on his skin. It was not oil but it was oily.” He had been drenched by unignited napalm.

Bomber crews experienced their own terrors. The mission began on Guam in the late afternoon. Starting at 4:36 p.m. giant Superfortresses, three stories tall and almost 100 feet long with a wingspan of 141 feet, began to roll down the runway every 45 seconds. They kept taking off for almost an hour: 54 airplanes in total. The attackers met a second group of 121 from the U.S. base on Tinian as the skies darkened. Finally, both groups lined up with 162 B-29s from Saipan to create a silver chain hundreds of miles long that headed north toward the imperial capital 1,500 miles away. Flyers saw orange flashes from fighting on Iwo Jima as they passed the island, and tuned in to a Japanese station that broadcast western music as they approached Tokyo. “Smoke Gets in Your Eyes” followed by “My Old Flame” and “I Don’t Want to Set the World on Fire,” prompted nervous snickers from one crew.

Pilot Robert Morgan, one of the most experienced and celebrated commanders in the Air Force, described what happened when his B-29 arrived at the target:

Tokyo was already an inferno ... Great plumes of billowing smoke had climbed for miles into the night sky, but down at ground level the raging fires illuminated things, some of which you would rather not see. ... Most of the Japanese Zeroes and Ginga fighters still sat, some of them melted, on their airstrips. Of

---


He continued, “Other B-29s around us were outlines in orange from the great groundfires. Hundreds of searchlights swept madly across the skies, the beams mostly eaten up by smoke, like some hellish Hollywood premiere night down there. … Debris, great jagged shapes of burning things, floated upward toward us along with the smoke. The smoke must have reached five miles into the stratosphere before it thinned out.”  

Violent updrafts four miles from the center of the inferno and as high as two miles in the air flipped some of the giant airplanes, and bounced others up 2,000 feet — about one-third of a mile — in seconds. The updrafts brought with them a sickening odor, an odor that I will never be able to get completely out of my nostrils — the smell of roasting human flesh. I later learned that some pilots and crewmen gagged and vomited in reaction to this stench, and that a few had passed out,” Morgan wrote. Chest Marshall, another attack participant, recalled “[A]t 5,000 feet you could smell the flesh burning. I couldn’t eat anything for two or three days. You know it

28 Morgan with Powers. The Man Who Flew the Memphis Belle. 311-13

29 “One ‘lucky’ crew was caught in a thermal over Kawasaki [Greater Tokyo]. The plane did a complete loop with grew and gear on the ceiling, then righted itself 200 feet above Tokyo Bay, after diving almost 12,000 feet. They got away over the surface of the water before any Jap gunners figured out what a B-29 was doing down there.” Robert Nathans. “Making the Fires that Beat Japan.” Fire and the Air War: A compilation of expert observations on fires of the war set by incendiaries and the atomic bombs, wartime fire fighting, and the work of the fire protection engineers who helped plan the destruction of enemy cities and industrial plants. Horatio Bond, ed. 1946: National Fire Protection Association International. 145-46. HathiTrust.org. See Martin Sheridan. “GIANT TOKYO FIRES BLACKENED B-29’S; Correspondent in One Reports Soot and Smoke Reached Planes High in Skies.” 11 March 1945: The Boston Globe. NYTimes.com.

30 Morgan with Powers. The Man Who Flew the Memphis Belle. 311-13
was nauseating, really. We just said “What is that I smell?” And it's a kind of a sweet smell, and somebody said, “Well that's flesh burning, had to be.”

Morgan saw the same scenes on the bridges from above as Japanese described below. “On a bridge spanning the Kokotoi River, a mob fleeing in one direction collided with a mob headed toward them. … Seven tons of fresh firebombs incinerated the whole vast horde,” he wrote. “It was claimed, in later years, that screams could be heard aboard some of the B-29s trailing in at 7,000 feet,” the pilot continued. Paint blistered on airplane bomb bay doors. Light from the flames

---


32 Morgan with Powers. The Man Who Flew the Memphis Belle. 312.

was so bright it approached daylight, and pilots almost four miles in the air could read their watches. Tail gunners could see a red glow from the burning city 150 miles away on the flight home.\footnote{34}

![Image of Nihonbashi District after 9 March 1945 attack. “The area in this picture is within one mile of the area shown in the previous image. Concrete buildings are gutted. Traditional Japanese buildings are obliterated.” Life photograph. U.S. O.S.R.D. N.D.R.C. Summary Technical Report of Division 11. Vol. 3. 24: Figure 14.}

Aircraft returned just after dawn. Of 339 airplanes that participated in the raid, 279 made it to Tokyo and the U.S. lost 14 in total, most from equipment failures.\footnote{35}

\begin{itemize}
\item \footnote{34} Bruce Rae. “RECORD AIR ATTACK; B-29’s Pour Over 1,000 Tons of Incendiaries on Japanese Capital. BOMBS RAIN 1 1/2 HOURS; Tremendous Fires Leap Up in Thickly Populated Center of Big City. Enemy Is Surprised.” 10 March 1945: NYTimes.com. (Glow visible for 85 miles). Curtis E. LeMay with MacKinlay Kantor. Mission With LeMay: My Story. 1965: Doubleday & Company, Inc. 353 (Glow visible for 150 miles).
\item \footnote{35} Baxter. Scientists Against Time. 98. See Frank. Downfall. 66; Kleber and Birdsell. United States Army in World War II. 620.
\end{itemize}
Damage was apocalyptic. A total of 15 square miles of central Tokyo lay in ashes, an area almost four times larger than that destroyed later by the first atomic bomb. The firestorm killed 83,793 people according to official records, injured 40,918, left over one million people homeless in cold weather, wrecked 267,171 buildings, about one quarter of the giant city, and destroyed 18% of Tokyo’s industry. It took survivors 25 days to remove the dead from the rubble.\(^3\)

Dr. Shigenori Kubota, a professor of medicine at the Imperial Army School of Medicine and Director of Army Rescue Unit 1, responsible for all of Tokyo except the Imperial Palace, described his travels in freezing temperatures through the devastated area just before dawn on 10 March:

“There was no one to rescue. If you touched one of the roasted bodies, the flesh would crumble in your hand. Humanity was reduced to its chemical properties, turned into carbon.” At the Sumida river, he recalled, “Burned bodies and logs blackened the surface of the river as far as the eye could see. … The bodies were nude, their clothes having been burned away, so there was no way to tell men from women and even children.”\(^4\) As with the atomic attacks that followed, diseases that resulted from the bombs ravaged survivors. Pneumonia, in particular, afflicted those with lung injuries caused by inhalation of smoke and superheated air.\(^5\) Radio Tokyo called the raid “slaugh-

---


\(^4\) Hoyt. \textit{Inferno}. 41.

\(^5\) Hoyt. \textit{Inferno}. 43.
ter bombing” and compared Curtis LeMay, who commanded the bombers, to the Roman emperor Nero.\footnote{39 The destruction wrought on Tokyo was greater than Nero’s Roman conflagration of 64 A.D., when ten of 14 wards in a much smaller city burned. It was also much larger than any of the greatest peacetime urban fires: London 1666 (436 acres or .68 square miles, 13,200 buildings); Moscow 1812 (38,000 buildings); Chicago 1871 (21,188 buildings); and San Francisco, 1906 (4 square miles, 21,188 buildings). Cate and Olson. “Urban Area Attacks.” Craven and Cate, eds. “The Pacific.” 5 The Army Air Forces in World War II. 617. See Tacitus. The Annals. 56-c.117: 15:40.}

Complete devastation. In the morning, Guard commander Wakabayashi and his daughter walked home through ashes. When they got to the street where their house had stood, they saw only charred ruins. His daughter spotted her teddy bear lying face down, covered with charcoal, in a wasteland that had been her bedroom. She picked him up, and burst into tears: one paw was burned off.\footnote{40 Hoyt. \textit{Inferno}. 47.}

In Washington, General Arnold applauded. “Congratulations. This mission shows your crews have the guts for anything,” he cabled LeMay.\footnote{41 LeMay with Kantor. \textit{Mission with LeMay}. 353.} “Never before or since has so much destruction resulted from any single bombardment mission regardless of the number of airplanes involved or the type of bombs employed. This mission was not only important in the air war against Japan because of the tremendous damage achieved, but it was also important in that it pointed the way to revolutionary new tactics for the employment of bombardment aircraft,” concluded government historians.\footnote{42 Baxter. \textit{Scientists Against Time}. 98.} “We scorched and boiled and baked to death more people in Tokyo on that night of
March 9-10 than went up in vapor at Hiroshima and Nagasaki combined,” LeMay concurred, after the war.\(^{43}\) The power of napalm was established.

**The trouble with flamethrowers**

The devastation of Tokyo marked napalm’s shift from military to civilian targets — even whole cities. It was preceded, however, by 18 months of American combat experience with the new weapon. The first use of napalm in combat was in August 1943 by a flamethrower team in Sicily, then by bombers in Europe, and finally by airborne units and flamethrower teams in Asia.

American Army strategists initially had little interest in flamethrowers. Chemical Warfare Service officers concluded from World War I that poison gas was the ultimate weapon, and incendiaries relatively unimportant. Planners held flamethrowers, in particular, in low esteem because operators ran terrible risks and most of the fuel burned up before it could reach its target. “Taken all in all, the flame thrower was one of the greatest failures among the many promising devices tried out on a large scale in the war,” C.W.S. chief Major General Amos Fries wrote in 1921. “[I]t is easy to see how service in the [German] flaming gun regiments is apparently a form of punishment,” he added.\(^{44}\) Columbia University chemistry professor and C.W.S. reserve officer Enrique Zanetti, who served as U.S. liaison to the French chemical branch in 1918, was a prescient exception: he ar-

\(^{43}\) LeMay with Kantor. *Mission with LeMay*. 387.

gued repeatedly for incendiaries, but was largely ignored. In 1935, Zanetti mailed fragments of an Italian magnesium incendiary shell that a *New York Times* correspondent had recovered in Ethiopia and passed to him for analysis, to Edgewood Arsenal with commentary about its advanced characteristics. In 1936, he visited England, France, Germany and Italy for the C.W.S. and reported that the latter two countries had mounted flamethrowers on armored cars and light tanks. Nonetheless, in 1937, a comprehensive Army review characteristically concluded, “It is understood that the portable flame thrower will no longer be used in offensive operations, as it has been found that the casualties to flame thrower personnel have been excessive.”

Events prompted a change in policy. Portable flamethrowers played an important role in the stunning capture of the massive Belgian fort of Eben Emael by German paratroopers on 10 May

---

1940. “Those throwbacks to medieval war, the flamethrowers, opened up against the embrasures. The engineers moved forward, yelling, into their final assault,” the Army’s *Infantry Journal* reported.\(^46\) Intelligence analysts reported additional German flamethrower deployments in Poland and Holland.\(^47\) On 12 August, the Secretary of War asked the C.W.S. to develop a portable flamethrower. Research started from zero, since none of the World War I prototypes had been saved. The Kincaid Company of New York — ironically a manufacturer of fire extinguishers — was hired to design the weapon. After a few months, the company produced a 70-pound behemoth dubbed “E1,” for experimental, that resembled a large oil drum with a hose and nozzle. It was mounted awkwardly on a simple harness and wobbled from side to side, which forced soldiers to move at a dangerously slow walk.\(^48\)

Enter the N.D.R.C. In February, 1941 a team of M.I.T. engineers with expertise in liquid jets improved the E1’s nozzle. A separate C.W.S. group, advised by fire experts from the Associated Factory Mutual Fire Insurance Companies, made the weapon lighter and stronger. The “M1” production flamethrower was completed in the summer of 1941, and the Army ordered 1,000 just before Pearl Harbor.\(^49\) The device had, “two fuel tanks with a small cylinder of nitrogen fixed between them to provide projecting pressure. A hose from the tanks led to the barrel (or gun) which the operator held, and a small burst of flame released by a trigger ignited the fuel as it shot from

---


\(^{47}\) Kleber and Birdsell. *United States Army in World War II.* 535.


\(^{49}\) Mountcastle. *Flame On!* 43.
the nozzle,” the C.W.S. explained. Although it weighed about the same as its predecessor, it was easier to carry and significantly more reliable.

The use of flamethrowers by Japanese soldiers against U.S. troops in the Philippines early in 1942 further focused U.S. attention. In March, Vannevar Bush created an Ad Hoc Committee on Flamethrowers with representatives from the N.D.R.C., the C.W.S., the Corps of Engineers, and the Army, Navy and Marine Corps. In the same month, the N.D.R.C. contracted with S.O.D. and the Gilbert and Barker Manufacturing Company to develop large flamethrowers that could be mounted on tanks or other fighting vehicles.

The essential limiting factor of World War I that had prompted the scorn of Fries et al., however, remained: the flame filling. “The fuel at the time was plain gasoline, which burst from the weapon as a great billow or fire-ball of flame and smoke. This was not considered very efficient since a stream of flaming gasoline was largely burned up on its way to the target and at best had


53 Baxter. *Scientists Against Time*. 294. Major Harold Adams of the U.S. Corps of Engineers invented a steam-driven fire tank in World War I and a prototype was shipped to Chaumont, France for review by U.S. General Pershing. The officers were impressed until a C.W.S. representative demonstrated he could crawl on hands and knees, shielded from the view of the tank’s crew by the glare of the fire stream, to within six feet of the machine — a location from which the tank could be destroyed with relative ease. The device was discarded. Maj. Gen. (Ret.) Amos A. Fries to Maj. Gen. Wm. N. Porter, C.W.S., 12 September 1942. Records of the Chief, C.W.S., RG 175, Box 234. In Mountcastle. *Flame On!* 17.
only a limited range,” explained C.W.S. historians.\(^{54}\) The maximum effective range was as low as five yards for operations against bunkers, a post-war government review revealed.\(^{55}\)

**Sicilian fire dragon**

Then napalm wrought a revolution. Fieser passed one of the earliest samples of his gel to an N.D.R.C.-funded laboratory at neighboring M.I.T. that worked on jets of liquids. Institute engineers discovered that in addition to its other remarkable properties, napalm liquified at high pressure. Thus, it could be shot through a nozzle as a liquid, ignited, and then, like a science fiction monster, reform itself into a semi-solid as it traveled through the air.\(^{56}\) The result was “a phenomenal

---

\(^{54}\) Chemical Corps Association. *The Chemical Warfare Service in World War II*. 183. A U.S. team that attacked a Japanese position at Munda airfield on New Georgia island in the South Pacific at 1:00 a.m. on 26 July 1942 demonstrated the dangerous close combat tactics required for oil-filled flamethrowers. “With 60-pound fuel tanks on their backs, their faces blackened with dirt, and black tape covering all metal surfaces on the weapons which might reflect light spot them to the enemy, the seven men crawled 75 yards from the battalion command post to a position in front of the Japanese bunkers. … [S]upporting infantrymen moved up to within 20 yards of the bunkers, using small arms fire to keep the Japs bottled up while the seven men crawled five yards nearer. Two of the flame operators facing the middle bunker fired first, crisscrossing their fire so as to burn out the underbrush and leave the gun port exposed. Then the officer between them sent a stream of flame through the narrow gun port into the bunker. At the same moment the men covering the other two bunkers fired their flame throwers and enemy resistance was at an end.” Chemical Corps Association. *The Chemical Warfare Service in World War II*. 187. An equipment malfunction under such conditions was disastrous. In an incident on 6 December 1942 on New Guinea, a team of U.S. soldiers stood up directly in front of a Japanese pillbox. Riflemen provided covering fire while a flamethrower operator pulled the trigger on his E1 device. A pitiful 10-foot sputter of oil emerged. The Japanese killed most of the attackers (remarkably, the flame operator survived). Acting Division Chemical Officer to CG, 32nd Inf. Div. “Report of Activities of the 32d Division Chemical Section During the Papuan Campaign.” 18 February 1943: C.W.S. 314.7 File, HC-EA. In Kleber and Birdsell. *United States Army in World War II*. 545.


\(^{56}\) In more technical terms: “Napalm gel is a non-Newtonian material. This means that the viscosity of the gel varies with the rate of shear. … A napalm gel having jello-like consistency in a static state, has a viscosity almost comparable to that of lubricating oil when it is forced at high velocity through pipes or pumps.” Even better from the perspective of the offense, flaming gel traveled approximately twice as far through the air as unignited napalm, probably because of the updrafts it generated and, perhaps, because of jet effects from burning gases. Hollingsworth. “Use of thickened gasoline in warfare.” June 1951: 4 *Armed Forces Chemical Journal* 6: 28-30.
increase in range over ordinary fuels,” that tripled the range of portable flamethrowers to 50-75 yards, and increased the amount of burning jelly delivered onto a target almost ten-fold, from just ten to a full 90 percent of the material discharged. A spray of thickened oil was replaced by a rod of burning gel that shot half or more of the length of a football field, spattered onto whatever it hit, and stuck tight at over 2,000 degrees Fahrenheit. It was an application, “of which we had not even dreamed,” Fieser and his colleagues wrote later.57 “This ‘dud’ of World War I became one of the most potent weapons in the Pacific operations. … It was Napalm which did this,” averred Truman’s Secretary of War Robert Patterson.58 Within a month of this discovery, Standard Oil had adapted the M1 for napalm.59 It was standardized as the M1A1 in December 1942, ordered in bulk, and shipped to the landing teams for Operation Husky, the allied invasion of Sicily in July 1943.60


59 Baxter. Scientists Against Time. 295. Gasoline thickened with rubber and the alternative Du Pont incendiary gel did not have the same characteristic of near-liquification at high pressure. Fieser. The Scientific Method. 53.

60 A later version called the M2, completed in February 1944, weighed almost 70 pounds but could be operated by a single soldier. Chemical Corps Association. The Chemical Warfare Service in World War II. 183. Standard Oil also produced prototypes for a tank-mounted napalm flamethrower, inspired by a British design, in December 1942. After Navy tests of flame weapons against model Japanese fortifications built by the Corps of Engineers in Virginia and Florida, oil company engineers designed a prototype ship-mounted flamethrower in the summer of 1943: a self-contained armored unit designed to be installed in the cockpit of a landing craft or patrol boat. Byzantine Greek Fire had returned after half a millennium. A total of 20 “Mark I” units — housed in amphibious cargo tractors rather than on boats — saw action in the invasion of Peleliu. Baxter. Scientists Against Time. 295-96.
America’s vast industrial machine went into action. Manufacturers from New Jersey, Ohio, and California experimented with various ways to produce napalm, which was trickier than expected. “[C]ontractors almost invariably believed that the production of napalm would be a relatively simple matter, much like the manufacture of a commercial soap. In this they were mistaken … napalm had to have standard components and low moisture,” an official history explained. Government administrators helped obtain crude oil from Venezuela and Aruba, which was particularly rich in napthenic acid, and ensured that producers received a sufficient supply of copra (boiled and dried coconut): a source of coconut fatty acid, which became hard to find as the war progressed since it was also used for civilian products and many coconut plantations were in war zones. The United Wall Paper Company modified wallpaper conveyors to carry large quantities of napalm through

---

heated drying rooms. Researchers at Columbia and Stanford Universities, and private businesses including Eastman Kodak, helped the C.W.S. and N.D.R.C. solve last-minute production problems. In January 1943, only one production facility was in full operation, but by the end of the year nine factories produced napalm. Deliveries increased from 500,000 pounds of powder in 1943 to 8,000,000 in 1944 and 12,000,000 in 1945.

Napalm first saw combat in August 1943 in Sicily when U.S. soldiers, in an action reminiscent of Samson’s flaming foxes, used it to burn a wheat field believed to shelter Germans. Bombers armed with M-47s, some filled with napalm, attacked German industrial targets in occupied France at around the same time. In the Pacific, the first napalm flamethrowers reached troops in July. Troops deployed them for the first time on 15 December 1943 when they burned defenders

---


65 Kleber and Birdsell. United States Army in World War II. 593. Flamethrowers also saw action in Italy at the battles of Cassino and Anzio, among others, but was not widely used. “[T]he reputation of early models was not such as to commend the weapon to combat commanders … The rugged mountains encountered throughout most of Italy made it difficult, if not impossible, to man-carry the cumbersome weapon to the front line …. The cold, wet climate had almost the same deleterious effect as the heat and moisture of the tropics … doctrine and training were somewhat neglected,” wrote Kleber and Birdsell. Kleber and Birdsell. United States Army in World War II. 594-95.

out of a cave on Pilelo, a tiny island off the coast of present-day Papua New Guinea. Airmen mixed the powder with various combinations of oil and gasoline, wired white phosphorus incendiary grenades to barrels or auxiliary fuel tanks, and created so-called “firebombs” (distinct from mass produced “incendiary bombs”). The devices, “gave great promise of success,” recalled Rear Admiral Harry W. Hill. Standard Oil’s M-69 napalm bombs saw Pacific combat for the first time on 15 February 1944, two years and a day after napalm’s invention, when the Seventh Air Force attacked the lush town of Pohnpei, capital of the equatorial island of the same name that lies 2,500 miles southwest of Hawaii and 1,800 miles north of eastern Australia.

---


Demand for napalm exploded as commanders observed its effectiveness. In Europe, 13,000 M-47 napalm bombs, mixed with explosives, gutted a Focke-Wulf aircraft plant at Marienburg in East Prussia in October 1943; another napalm attack the same month critically damaged ball-bearing plants at Schweinfurt.\textsuperscript{71} Ultimately, more than 500,000 of the bombshells tested at Harvard, each bearing 40 pounds of napalm, fell on Germany: 20,000,000 pounds of incendiary gel.\textsuperscript{72} By December, incendiary bombs, including napalm, accounted for 40 percent of all U.S. bombs dropped in Europe.\textsuperscript{73} Firebombs, an improvised weapon made from disposable paper-based auxiliary aircraft gasoline tanks filled with napalm, proved to be “an excellent tactical weapon to use against supply dumps, troop concentrations, convoys and vehicles, according to an official history. So in-


\textsuperscript{73} “Statistical Summary of Eighth AF Operations, European Theater.” In Kleber and Birdsell. \textit{United States Army in World War II}. 157.
tense was demand that by the summer of 1944, officers routed supplies of powder directly from the U.S. to airfields to save time. Special “expediters” stationed at crucial points on the supply line ensured that napalm kept moving to the front. Air chemical officers who sought supplies for the American Eighth Air Force in western Europe canvassed the Ninth Air Force in north Africa, and the Twelfth Air Force in the Mediterranean — only to discover that the former was already trying to get napalm from the latter. Demand outstripped supply until the beginning of 1945 when expanded U.S. deliveries, combined with distribution of additional field mixing units, largely resolved the issue.74

Napalm strikes assisted the July breakout from the Normandy beaches, repeatedly hit German troops trapped at Falaise in early August, and spattered the headquarters of Field Marshall Günther von Kluge at the end of the month at Verzey, among many other attacks.75 In August 1944, the Chemical Warfare Service delivered 20,000 gallons mixed at a British factory to the Eighth Air

74 Kleber and Birdsell. United States Army in World War II. 159-63.

Force. In September, commanders asked for 600,000 gallons. In November, they petitioned for 1,000,000 gallons. U.S. planes dropped 157,000 gallons of napalm in Normandy between June and August 1944 and another 199,000 gallons over the next 10 weeks on the Siegfried Line and other targets; 460,000 gallons later fell on the Gironde estuary.


76 Kleber and Birdsell. United States Army in World War II. 159.

77 Kleber and Birdsell. United States Army in World War II. 161-62.

“The weapon … was almost invincible.”

The reception by commanders in the Pacific was equally aggressive. On 17 July, a Navy officer visited recently conquered Saipan and showed a film of firebombs to troops about to invade nearby Tinian. “Enthusiasm for this new weapon was instantaneous,” reported an official chronicler. Senior officers radioed an immediate request for almost four tons of napalm to Admiral Chester Nimitz, the commander in chief of all American forces in the central Pacific. A few days later, a second Navy officer arrived with some sample powder — but the wrong recipe. The simplicity of Fieser’s invention stood the troops in good stead. “We tried using Jap aviation gasoline, but that gave too much fire effect. Then we tried Jap motor gas and oil, with the napalm powder, and it was quite successful,” wrote a squadron commander. Ultimately, the men produced enough to fill 91 tank bombs. The results were unambiguous on Tinian. “The first morning they put it down, I went up to the front line and those planes came in over our heads it seemed to me like about a hundred feet in the air . . . [They] let go their napalm bombs right over our heads … maybe two or three hundred yards in front of us. It was a very devastating thing and particularly to the morale of the Japanese,” recalled an invasion commander.

By 1945, thousands of napalm bombs had exploded millions of gallons of the gel on Japanese troops from the South Pacific to the Philippines and Okinawa. In an assault on the strategic Ipo

---


dam outside Manila in May, 1945, for example, hundreds of airplanes placed 50,000 gallons on
defenders on one day, then returned the next with 62,500 gallons more. An observer described the
attack: “200 to 250 5th AF fighters came in low, wave after wave, four to eight abreast ... with
each successive wave dropping its bombs on the near side of the bursts from the wave that pre-
ceded it. The fighter-bombers followed each other at 10- to 15-second intervals. A-20's then came
in, showering the area with parafrags and winding up with a thorough strafing.”

Flamethrowers were particularly valued by U.S. troops for use against Japanese opponents on
isolated islands, who often holed up in near-impregnable caves, and refused to surrender. “No
weapon proved so effective against this type of target as the flamethrower,” reported the Chief En-
gineer of the Army’s Maryland chemical center. The number of portable flamethrowers allocated
to each army division in the Pacific increased from 141 in June 1944, to 243 in February 1945.
European use of the devices — limited, in contrast to Pacific islands, by terrain that favored a war
of movement and defenders who often withdrew when pressed — was sparing in comparison.
Warm tropical climates, which made napalm relatively easier to ignite than in Europe, may have


helped their relative popularity.\(^{85}\) Army administrators ultimately sent 4,769 portable flamethrowers to the Pacific — which shot over one million gallons of napalm — and 3,100 to Europe.\(^{86}\)

Napalm flame tanks proved a particularly devastating implementation of the munition. Development of the weapons, later nicknamed “Satan” by U.S. forces, started late in the war, as awareness of napalm’s qualities spread through the armed services, and the success of portable devices proved the utility of flamethrowers. In Europe, U.S. troops relied on British and Canadian machines, developed before the war, that shot a variety of fuels.\(^{87}\) These could be highly effective. In one spectacular assault reminiscent, indeed, of a mythical battle assault on a castle by fire-breathing dragons, a U.S. battalion led by a pair of Sherman tanks fitted with British “crocodile” flame throwers, and dragging trailers of extra fuel, captured a 16\(^{th}\) century citadel at Julich, Germany during the advance to the Rhine. The attackers advanced to the moat of the castle, spouted flame over the walls, and forced the defenders underground. High explosives smashed the main gate, which was made of steel, and allowed the tanks to pour fire into the courtyard inside. The last

---

\(^{85}\) The Chief Engineer of the Munitions Division of the Technical Command at the Army Chemical Center in Maryland wrote in 1951: “[D]uring cold weather, ignition may become a serious problem since the rate of vapor release from a rod of cold fuel of rather high consistency may not be sufficient to maintain ignition of the [napalm] rod.” Hollingsworth. “Use of thickened gasoline in warfare.” June 1951: 4 Armed Forces Chemical Journal 6: 30. On the other hand, high humidity experienced in various South Pacific combat environments caused numerous problems for early ignition systems, and ultimately forced a full redesign of the lighting mechanism.

\(^{86}\) The Army built special flamethrower training centers on Oahu in Hawaii, at Oro Bay on New Guinea and, later, at Manila after experience on Guadalcanal demonstrated the importance of proper training with the equipment. Chemical Corps Association. The Chemical Warfare Service in World War II. 182, 190. A U.S. division in World War II generally contained 10-15,000 men.

\(^{87}\) “The Seventh Army in its march across France and attack on the fortifications of the west wall made repeated and effective use of large mechanized flame throwers borrowed from the British,” wrote the Office of Scientific Research and Development. Baxter. Scientists Against Time. 296.
defenders fled as U.S. troops crossed the moat and entered the burning citadel. A fortified house that guarded a roadblock and was filled with German soldiers was no more fortunate. “Turning off the road, the flame tank rumbled across the field and drew up close to the house. Here the gunner pointed the nozzle of his flame tank into the windows of the ground floor and sent in cloud after cloud of fire. That was all that was needed,” related a Chemical Corps history.

In the Pacific theater, the Army, Navy, and Marine Corps on Hawaii modified dozens of tanks, based on a Canadian flame gun design, to shoot napalm. The first such machine was demonstrated on 15 April 1944. It was “unanimously adopted,” according to a colonel who helped supervise development, and rushed to combat troops. A total of 24 were part of the invasion of Saipan in June and July; many dozens more saw action on Iwo Jima and Okinawa. Flame-throwing tanks

---


89 Chemical Corps Association. The Chemical Warfare Service in World War II. 186.

90 The Flame Thrower Group on Hawaii produced 354 tank-mounted flame throwers and 226,343 gallons of flame thrower fuel during the war, but it is not clear exactly how much of this production was used in combat. Unmacht, George F. “Flame Throwing Seabees.” April 1948: United States Naval Institute Proceedings rpt. July 1948: Armed Forces Chemical Journal. 50.
were “the most important single weapon available to this Division,” wrote the commander of the Fifth Marine Division, which sustained the highest casualty rate among U.S. forces on Iwo Jima.91

There was no defense once this mythical terror came within range. “Though the laboratories at Edgewood Arsenal tried to develop some kind of defense against flame attack, none was found. A hood-type mask was built, capable of withstanding 1,000 degrees Fahrenheit for one minute; a steel sliding door was designed for pillbox apertures; fireproof clothing and water fog and spray extinguishers were tried in the attempt to block the fiery liquid of the flame thrower. These measures, however, could reduce by only a small degree the effectiveness of the flame thrower. The weapon, once it reached its target, was almost invincible,” the C.W.S. concluded.92 “The only truly effective defense against flamethrowers is to prevent them from getting within range,” concluded

91 George F. Unmacht. “Flame Throwing Seabees.” 50. “In my view it was the flame tank more than any other supporting arm that won this battle,” said Frank C. Caldwell, a company commander in the 26th Marines on Iwo Jima. Joseph H. Alexander. Closing In: Marines in the Seizure of Iwo Jima. 1994 transcribed and reformatted Emily Brickhouse: Marine Corps Historical Center. 37. IBiblio.org. See Chris Bishop, ed. The Encyclopedia of Weapons of World War II: The Comprehensive Guide to Over 1,500 Weapons Systems, Including Tanks, Small Arms, Warplanes, Artillery, Ships and Submarines. 2002: Metrobooks. 269. Books.Google.com. The Army ordered 620 fire tanks from domestic manufacturers in 1944, but the war ended before they could be deployed. Baxter. Scientists Against Time. 296. Ship-mounted flamethrowers were less popular than either portable or mechanized devices because the range of the weapons was short relative to the distance to shore: only a few dozen were produced; 20, mounted in amphibious cargo tractors, saw action in the battle of Peleliu from September to November 1944. See Mountcastle. Flame On! 97-100. For a general discussion of U.S. flame weapon use in Europe compared to Asia see Kleber and Birdsell. United States Army in World War II. 612-13. In 1944, British engineers persuaded U.S. designers to build an airplane that could shoot napalm. “The unit finally developed had a capacity of 200 gallons which was discharged in one shot through a nozzle projecting from beneath the plane. The load of fuel was discharged in a few seconds by the pressure produced by burning powder,” C.W.S. engineer Hollingsworth recounted. “The effect was spectacular to say the least. During the discharge the rear of the plane appeared to be in flames. Although a considerable portion of the fuel reached the ground before being burned, the whole idea was quickly dropped in favor of the firebomb.” E.W. Hollingsworth. “Use of thickened gasoline in warfare.” June 1951: 4 Armed Forces Chemical Journal 6: 32.

one of the men who designed them. Japanese troops, who largely lacked tanks, heavy artillery and airplanes, were vulnerable in a way German soldiers often were not.

This grim reality, combined with the appalling consequence of being burned alive, produced terror. “The Japanese on Tinian, after experiencing several fire bomb attacks, broke from their positions upon the approach of fighter planes with belly tanks and ran in a direction that was at right angles to the flight of the planes,” noted an official history. “When the fires exploded near Japanese positions, the usually stoic occupants seemingly lost all caution and fled into the open, easy targets for other forms of attack,” observed an Army account of the Ipo Dam battle. After the napalm attacks, another wrote, “Positions in the area which had withstood infantry attacks for almost a week, were taken after only feeble resistance and minimal casualties.”

Flamethrowers had a similar effect. Infantry who assaulted a pillbox on Leyte Island in the Philippines with napalm and a bazooka found that “badly burned and demoralized Japanese offered

---


94 Kleber and Birdsell. United States Army in World War II. 633.


little resistance.” The weapon was, “a very important factor in overcoming the enemy’s inherent will to resist,” troops reported of Japanese opponents. An anecdote from the 1944 campaign against the Siegfried Line in Germany, a heavily fortified defensive system, echoed these findings: “The fight over, Private Hansen casually sprayed the embrasures of the pillbox again in order to empty his flame thrower and reduce its weight. Smoke began to seep from the embrasures, and small arms ammunition to explode inside the pillbox. A moment later ten Germans pushed open the door to surrender.”

The brutality of flame warfare, which was the flip side of its effectiveness, elicited frequent comment. Robert Sherer, a veteran of the U.S. campaign on Okinawa, described one 1945 engagement: “The tank moved up to shoot streams of napalm into the cave …. Japanese soldiers who ran from the furnace were squirted with napalm — which, however, failed to ignite. One of the tankers saw to that with a tracer bullet, turning a fleeing man into a torch — which prompted a throaty cheer from the platoon. …. [W]e cheered that incredibly horrible sight, the burning of another human. Whatever the justification, we’d become savages too.”

In total in World War II, U.S. forces dropped around 37,000 of the improvised fuel tank firebombs, which carried about 28 million pounds of napalm. Of these, about two thirds fell in the Pacific and the rest in Europe — an enormous preponderance for the eastern theatre given its vastly

---


smaller scale than the war in Europe (Allied planes dropped 656,400 tons of bombs in the Pacific
war, compared to 2.7 million tons of bombs in Europe).\textsuperscript{101}

All of which was just a prelude, from the perspective of napalm’s history, for the attacks on Ja-
pan that began in earnest at Tokyo late on the night of 9 March 1945.

\textit{“She carries a bundle in her arms.”}

The U.S. followed a strategy it called “precision bombing,” which it justified on tactical, moral,
legal, and political grounds, for most of World War II. Airplanes attacked in daylight, to improve
accuracy, from high altitude, to avoid defenders, and used an advanced autopilot bombsight sys-
tem so secret flyers vowed to protect it with their lives.\textsuperscript{102} Roosevelt made a case for this approach
on 1 September 1939, when Germany invaded Poland and the Second World War began: “The
ruthless bombing from the air of civilians in unfortified centres of population during the course of
the hostilities which have raged in various quarters of the earth in the past few years, which have
resulted in the maiming and death of thousands of defenseless women and children, has pro-
foundly shocked the conscience of humanity.” He continued, “If resort is had to this sort of inhu-
man barbarism during the period of tragic conflagration with which the world is now confronted,
hundreds of thousands of innocent human beings, who have no responsibility for, and who are not
even remotely participating in, the hostilities which have broken out, now will lose their lives.”

\textsuperscript{101} Kleber and Birdsell. \textit{United States Army in World War II}. 635. Brophy et al. put the total number of “fire-
bombs” deployed at 12,000 in Europe and “twice that” in the Pacific. Brophy, Miles and Cochrane. “The
Chemical Warfare Service: From Laboratory to Field.” \textit{2 United States Army in World War II: The Technical
Services}. 183. Of the 656,400 tons of bombs dropped by the allies during the Pacific war, 160,800 tons, or
about one quarter, fell on the home islands of Japan. In Europe, the allies dropped 2.7 million tons of bombs,
of which 1.36 million tons, roughly half, fell on Germany. United States Strategic Bombing Survey. \textit{Summary
Report (Pacific War)}. 16. \texttt{I\texttt{B}iblio.org}.

272-73.
America’s President concluded, “I am therefore addressing this urgent appeal to every Government, which may be engaged in hostilities, publicly to affirm its determination that its armed forces shall in no event and under no circumstances undertake bombardment from the air of civilian populations or unfortified cities, upon the understanding that the same rules of warfare will be scrupulously observed by all their opponents.”

Army Air Force commanders focused on practical justifications for the doctrine. “The nationwide reaction to the stunning discovery that the sources of the country’s power to resist and sustain itself, are being relentlessly destroyed, can hardly fail to be decisive,” air tactics and strategy director Muir Fairchild wrote in a 1939 strategic review. “It is generally accepted that bombing attacks on civil populace are uneconomical and unwise,” and should be considered tactical errors, senior commanders Hap Arnold and Ira Eaker wrote in 1941. “The most economical way of reducing a large city to the point of surrender, of breaking its will to resistance,” they added, “is not to drop bombs in its streets, but to destroy the power plants which supply light, the water supply, the sewer lines…. Human beings are not priority targets except in certain special situations.”


105 Arnold, Acting Deputy Chief of Staff for Air when these comments were published, was later promoted to command the entire air force during World War II. Henry H. Arnold and Ira C. Eaker. Winged Warfare. 1941: Harper & Brothers. 133-34. See Sherry. The Rise of American Air Power. 93.
practice, events demonstrated that U.S. bombing was precise only relative to even more indiscriminate forms of attack. Hitler’s personal Reich Chancellory headquarters — site of his private apartments and the underground *Führerbunker* where he committed suicide — for just one example, remained standing until the end of the war despite dozens of Allied bombing attacks against Berlin (Soviet ground forces gutted it when they conquered the city in 1945).¹⁰⁶

Japanese, German, and British air forces, by contrast, launched indiscriminate “area” attacks against urban centers with explosives and incendiaries, usually at night, from Shanghai to London to Cologne.¹⁰⁷ British attackers in over 700 airplanes used magnesium incendiary bombs in “Operation Gomorrah” to incinerate eight square miles of Germany’s second largest city, Hamburg, in a few hours on the night of 27 July 1943. A man-made fire hurricane, the world’s first “firestorm,” created a “blizzard of red snowflakes” that raised temperatures to 1,500 degrees Fahrenheit; melted asphalt streets; generated winds of up to 150 miles per hour that blew out doors, smashed windows, and threw people to the ground; and killed an estimated 44,600 people. “One man was observed to fall. He was about to pull himself up with his hands when flames were seen to en-


velop his back and he was burned within five minutes without changing his position,” reported a German doctor. Of shelters examined after the attack, he wrote, “Bodies were frequently found lying in a thick, greasy black mass, which was without a doubt melted fat tissue. … All were shrunken so that clothes appeared to be too large. These bodies were (‘incendiary-bomb-shrunken bodies’) Bombenbrandschrumpfleichen. … Many basements contained only bits of ashes and in these cases the number of casualties could only be estimated.”

Approximately 68 U.S. B-17s contributed daylight strikes over two days against the city’s huge shipyards, and a power plant.

---

108 Graeff, consulting pathologist to Wehrkreis X military defense area. In Horatio Bond. “Fire Casualties of the German Attacks.” Bond, ed. Fire and the Air War. 119. British bombing commander Arthur Harris wrote in his memoir: “No air raid ever known before had been so terrible as that which Hamburg had endured; the second largest city in Germany, with a population of nearly 2,000,000, had been wiped out in three nights.” He added, “It is not surprising that the disaster of Hamburg terrified the German war leaders.” Harris reported that German armaments minister Albert Speer said in his July 1945 post-war interrogation: “We were of the opinion that a rapid repetition of this type of attack upon another six German towns would inevitably cripple the will to sustain armament manufacture and war production. It was I who first verbally reported to the Fuehrer at that time that a continuation of these attacks might bring about a rapid end to the war.” Arthur Harris. Bomber Offensive. 1947: Collins. 176. “Consider Boston and the 40-off cities and towns in the Boston metropolitan area,” Horatio Bond, Chief Engineer of the U.S. National Fire Protection Association, based in Boston, wrote in 1946, “A 51 per cent level of destruction in Metropolitan Boston would just about be achieved if every single building in the corporate limits of Boston Proper had been destroyed. Take all of the City of Boston Proper away, and you get a pretty good idea of what Hamburg looked like after the Royal Air Forces got through with it in the summer of 1943.” Horatio Bond. “The Fire Damage Caused by Air Attacks.” Bond, ed. Fire and the Air War. 5.

109 Schaffer. Wings of Judgment. 64.
Royal Air Force magnesium bombs produced a similar inferno in Dresden on Valentine's Day 1945 — Ash Wednesday, as it happened.\(^{110}\) The city, Germany's seventh-largest, was an important rail center, with thousands of workers at militarily significant factories, generally located in suburban areas around the city. It was also a metropolis of extraordinary beauty and global cultural significance filled with civilian refugees from Germany's collapsing eastern front.\(^{111}\) “Tally-ho!” the

---

\(^{110}\) British bombers attacked at night on 13-14 February 1945, which created the firestorm that destroyed the city. U.S. airplanes bombed during the day on the 14\(^{th}\) and 15\(^{th}\).

\(^{111}\) “According to the 1944 handbook of the German Army High Command's Weapon Office, the city of Dresden contained 127 factories that had been assigned their own three-letter manufacturing codes .... Dresden was ranked high among the Reich's wartime industrial centers.” Frederick Taylor. *Dresden: Tuesday, February 13, 1945*. 2004: HarperCollins. 148. (See also 416-17, and generally Chapter 13, “A City of No Military or Industrial Importance?” 148-65.)
first British pilot called into his radio as he started the attack. A firestorm leveled 13 square miles of the densely populated and historic central city targeted by the British, and killed an estimated 25,000 people. Survivor Margaret Freyer recalled, “To my left I suddenly see a woman. I can see her to this day and shall never forget it. She carries a bundle in her arms. It is a baby. She runs, she falls, and the child flies in an arc into the fire.” Rescuers confronted a grim scene. “From some of the debris poked arms, heads, legs and shattered skulls. The static water-tanks were filled up to the top with dead human beings,” Freyer continued. Refugees who jumped into a firefighting reservoir near the city center discovered too late it had no exit ladder: hundreds clawed at each other until they suffocated or drowned, ringed by fire. U.S. bombers targeted the central city, railroad

112 Taylor. Dresden. 245.


yards, and industrial targets with explosives and incendiaries in two daylight attacks; the second a "blind" drop through thick clouds guided by rudimentary radar.116

Dresden’s destruction, late in the war when the outcome seemed clear, prompted criticism of area incendiary bombing not heard at the time of Hamburg’s incineration. “It seems to me that the moment has come when the question of bombing of German cities simply for the sake of increasing the terror, though under other pretexts, should be reviewed. … I am of the opinion that military objectives must henceforward be more strictly studied,” Prime Minister Winston Churchill wrote in

a secret staff memo a month later, as criticism of the attack roiled the press and Parliament.\textsuperscript{117} “I do not personally regard the whole of the remaining cities of Germany as worth the bones of one British Grenadier,” responded Air Chief Marshal Arthur Harris, head of the British Bomber Command.\textsuperscript{118} Churchill withdrew his comments two days later. In a reformulated note dated 1 April he concluded: “We must see to it that our attacks do no more harm to ourselves in the long run than they do to the enemy’s war effort.” The British continued “area” attacks on Dresden for two more months.\textsuperscript{119}

Its “precision” strategy protected the U.S. from similar recriminations. In practice, however, bad weather, inaccurate radar systems, and vague targeting directives often made the policy more theoretical than real. “[R]adar bombing was was better than no bombing,” an official history told

\begin{footnotesize}
\textsuperscript{117} Winston Churchill. “Bombing Policy in North-West Europe.” 28 March 1945: Public Records Office. London. CAB 121/3. In Taylor. Dresden. 375-76. The Prime Minister’s position appears to have changed from the previous summer when, in response to German V-1 rocket attacks on London after D-Day he expressed a desire to “drench the cities of the Ruhr and many other cities in Germany [with poison gas] in such a way that most of the population would be requiring constant medical attention.” In a memo to his military staff he added, “It is absurd to consider morality on this topic when everybody used it in the last war without a word of complaint from the moralists or the Church. On the other hand, in the last war the bombing of open cities was regarded as forbidden. Now everybody does it as a matter of course. It is simply a question of fashion changing as she does between long and short skirts for women.” Gas was appropriate, Churchill wrote, if “it [is] life or death for us, or [if] it would shorten the war by a year.” He concluded, “I want a cold-blooded calculation made as to how it would pay us to use poison gas. … I want the matter studied in cold blood by sensible people and not by that particular set of psalm-singing uniformed defeatists which one runs across now here now there.” After the review concluded that British gas attacks would divert aircraft from more valuable attacks against industrial targets and invite retaliation, he wrote, “Clearly I cannot make head against the parsons and the warriors at the same time.” Barton J. Bernstein. “Why We Didn’t Use Poison Gas in World War II.” August-September 1985: AmericanHeritage.com. See Barton J. Bernstein. “Churchill’s Secret Biological Weapons.” Jan/Feb 1987: Bulletin of the Atomic Scientists. 49. Books.Google.com.

\textsuperscript{118} Harris echoed a comment ascribed to the former German chancellor Otto von Bismarck: “The whole of the Balkans is not worth the bones of a single Pomeranian grenadier.” Taylor. Dresden. 377-78.

\end{footnotesize}
ingly stated. “When cloud cover over Germany made precision bombing impossible (nearly half the time) the USAAF conducted area bombing rather than no bombing,” as historian Thomas Searle explained events. “Approximately 80 percent of all Eighth Air Force and 70 percent of Fifteenth Air Force missions during the last quarter of 1944 were characterized by some employment of blind-bombing devices,” the official history continued. Only a bit more than one-third of all bombs dropped during this period fell within 1,000 feet of their target.

Nevertheless, American commanders pugnaciously rejected any equivalence between “area” and “precision” bombing. In August 1944, for example, generals pushed back when the British

\[\text{Fagg, “Autumn Assault on Germany.” Craven and Cate, eds. “Europe.” Vol. 3: The Army Air Forces in World War II. 668.}\]


\[\text{“For the last three months of 1944 the percentage of Eighth Air Force bombs that fell within 1,000 feet of the target was 38, 25 and 25, respectively; in the same months the Fifteenth Air Force score was 40, 36, and 36. …” Stat. Sum. of 8th AF. 31. History. 15th AF. Graph 3. In Fagg. “Autumn Assault on Germany.” Craven and Cate, eds. “Europe.” Vol. 3: The Army Air Forces in World War II. 667. U.S. assertions about the accuracy of its daylight high-altitude strategy compared to the night missions of the British may have been misplaced. “Examination of the data reveals that, when [British] Bomber Command and the USAAF [U.S. Army Air Force] were mature, full-strength forces, and when Bomber Command could be enticed away from its area offensive, the difference in their bombing accuracy was not as great as generally has been held to have been the case,” W. Hays Parks wrote in a comprehensive assessment. W. Hays Parks. “‘Precision’ and ‘Area’ Bombing: Who Did Which, and When?” March 1995: 18 Journal of Strategic Studies 1. 145-74. 168. Parks, who served as a Marine Corps Colonel, was a member of U.S. C.C.W. conference delegations; Special Assistant for Law of War Matters in the Office of The Judge Advocate General of the Army from 1979 to 2003; and later the Senior Associate Deputy General Counsel, International Affairs Division, in the Office of General Counsel for the U.S. Department of Defense. He held the Charles H. Stockton Chair in International Law at the U.S. Naval War College from 1984-85, and was an adjunct faculty member at the George Washington School of Law from 1988 to 1997 and subsequently at the Washington College of Law at American University.}\]
invited them to join a giant area assault on Berlin that could produce 275,000 casualties.¹²⁴ Such “baby killing schemes” wrote Charles Cabell, a brigadier general and top advisor to Arnold, “would be a blot on the history of the Air Force and of the U.S. We should strongly resist being sucked in to any such venture. It gives full reign to the baser elements of our people .... [N]o man alive ... can calculate or recognize a crumbling morale.”¹²⁵ Carl Spaatz, commander of U.S. air forces in Europe, agreed: “[T]here is no doubt in my mind that the R.A.F. want very much to have the U.S. Air Forces tarred with the morale bombing aftermath which we feel will be terrific,” he wrote to Arnold.¹²⁶ R.A.F. leaders postponed the proposed THUNDERCLAP mission.

This argument grew harder to sustain as the war progressed. On 28 January 1945, Spaatz and British generals announced new target priorities. Oil installations came first; “attack of Berlin, Leipzig, Dresden and associated cities where heavy attack will cause great confusion in civil population from the East” ranked second.¹²⁷ On 3 February, in an attack aimed at “increasing existing pandemonium resulting from Soviet advances,” according to Arnold’s top assistant Laurence Kuter, envisioned by Spaatz as a “blind” radar-guided attack, more than 900 bombers attacked Berlin. An


estimated 25,000 civilians died. On 22 February, operation CLARION dispatched thousands of airplanes from the Eighth, Ninth, and Fifteenth Air Forces, and the R.A.F., to bomb and strafe transportation objectives and “targets of opportunity” across Germany, Austria and Italy, including such small cities as Heidelberg, Göttingen and Baden-Baden. “This is the same old baby killing plan of the get-rich quick psychological boys, dressed up in a new Kimono,” Cabell wrote on his copy of the mission plan.

American commanders strove to justify their policies to the public as if nothing had changed. When Associated Press journalist Howard Cowan, for example, reported after Dresden on 18 February that, according to an R.A.F. briefing officer, “Allied air bosses have made the long-awaited decision to adopt deliberate terror bombing of the great German population centers as a ruthless expedient to hasten Hitler’s doom,” American officers denied the assertion. An internal headquarters memorandum issued the day the story appeared, signed by Spaatz on behalf of Army Air Force commanding general Hap Arnold, advised staffers: “(A) there had been no change in policy; (B) the United States Strategic Air Forces had always directed their attacks against military objectives and would continue to do so, and (C) the censor had passed the story erroneously.”

---


131 Anderson (signed Spaatz) to Arnold. UA 64484. 18 February 1945. CM-INS. Jan-Feb. 1945 TS. RG 165. NA. In Schaffer. Wings of Judgment. 99.
cial care should be taken” Spaatz ordered his chiefs on 21 February with respect to CLARION, “against giving any impression that this operation is aimed, repeat aimed, at civilian populations or intended to terrorize them.”

Secretary of War Stimson told reporters on 22 February: “our policy never has been to inflict terror bombing on civilian populations.”

“We’ll fight mercilessly”

Stimson’s claim initially was as true in the Pacific as in Europe. Over time, however, frustrated by the inability of “precision” bombing to achieve results in the face of prolonged cloud cover and continuous jet stream winds over Japan; able to attack with increasing ease as Nippon’s air defenses crumbled and gasoline shortages grounded its fighters; and fearful of the cost of an invasion, U.S. commanders followed the “area” strategy used by the British and Germans. Napalm was their means to this end.

American commanders were well aware of Japan’s vulnerability to fire attack. “These towns are built largely of wood and paper to resist the devastations of earthquakes and form the greatest aerial targets the world has ever seen. … Incendiary projectiles would burn the cities to the ground in short order,” Billy Mitchell, sometimes considered the founding inspiration of the Army Air Corps, asserted in 1931. In the event of war, Army Chief of Staff George Marshall told reporters in a secret briefing on 15 November 1941, “we’ll fight mercilessly. Flying Fortresses will be dispatched

---


immediately to set the paper cities of Japan on fire. … There won’t be any hesitation about bombing civilians.”

In fact, despite Marshall’s prophecy the U.S. initially used so-called “precision” tactics against Japan. Bombing began in June 1944 from bases in China and expanded in November when facilities on Saipan, Tinian and Guam became operational. The initial aim of the strikes, according to the authoritative official United States Strategic Bombing Survey was, “aircraft factories, arsenals, electronics plants, oil refineries, and finished military goods, destruction of which could be expected to weaken the capabilities of the Japanese armed forces to resist at the Kyushu beachheads in November 1945.” The first attack against Tokyo by massive B-29 SuperFortress bombers, on 24 November, targeted the Musashino aircraft plant as its primary objective.

Japanese defenders attempted to resist but were completely overwhelmed as the war continued. Anti-aircraft batteries protected major cities but proved less effective than comparable defenses in Germany. Fighters swarmed early in the conflict, but lack of jet fuel grounded many as

---


136 “1945” is written. *United States Strategic Bombing Survey. Summary Report (Pacific War)*. 16. IBiblio.org. The Survey, established by the Secretary of War pursuant to a directive from President Roosevelt and inspired by a similar review of the bombing campaign against Germany, was conducted by 300 civilians, 350 officers and 500 enlisted men. This team reviewed the principal surviving Japanese records and interrogated top Army and Navy officers, government officials, industrialists, political leaders, and many hundreds of their subordinates throughout Japan to produce a definitive accounting. Its top officials included Paul H. Nitze, later a prominent government arms control negotiator and John Kenneth Galbraith, an economist and later ambassador to India and presidential advisor. United States Strategic Bombing Survey. *Summary Report (Pacific War)*. iii. IBiblio.org.

the conflict continued. As early as March 1945, pilots attempted the desperate expedient of kami-kaze ramming, but even this was unable to turn the tide of battle.\footnote{[A] lone, laggard B-29 was dived on by a swarm of fighters. Suddenly, there was an explosion: a fighter had rammed the giant bomber’s left wing head-on. The small plane, linked to its victim by a ribbon of white smoke, zigzagged down and crashed in the city; the big, flaming American bird lost altitude, made a few desperate tries to rise again, then suddenly heeled over and went down, probably in Tokyo Bay,” French journalist Guillain reported. Guillain. \textit{I Saw Tokyo Burning}. 178-79.}

Wind and clouds were a far greater problem. “Over in [Europe] we hadn’t known anything about jet streams, but now for the first time we ran into that ferocious jet stream of the Pacific. High winds, sometimes at two hundred m.p.h. You could go on forever, trying to get up to a target in such a wind. And if you went cross-wind, your bombsight wouldn’t take care of the drift you had. If you came in downwind, you didn’t have time to get a proper run on the target. This was really a tough proposition to lick,” wrote Pacific air force commander LeMay.\footnote{LeMay with Kantor. \textit{Mission With LeMay}. 343.} The jet stream, “scattered our bombs like confetti over the terrain,” said the lead pilot of the 24 November attack. The raid was a failure.

Worse than the wind, dense clouds shrouded the home islands three-quarters of the time. “When I spoke of seven days a month for bombing visually in Japan, that was a complete max. The average might have been three or four days a month,” LeMay continued.

The new B-29s, deployed only against Japan, proved temperamental, especially under the strain of near-continuous high-altitude operations conducted over great distances. “B-29s had as many bugs as the entomological department of the Smithsonian Institution. Fast as they got the bugs licked, new ones crawled out from under the cowling,” LeMay wrote. “There are something
like 55,000 parts in a B-29; and frequently it seemed that maybe 50,000 of them were all going wrong at once,” he elaborated.  

“If you don’t get results, you’ll be fired.”

Napalm offered a solution. In the summer of 1944, the joint chiefs reconvened an “Incendiary Subcommittee” of fire experts, technologists, intelligence analysts and service representatives to review the prospects for area incendiary bombing. In September, and later, the group reiterated previous conclusions: Japan’s cities were enormously vulnerable to fire.  

The effectiveness of napalm was by then well known. Its ability to incinerate a large city, however, had not been tested. At the end of 1944, Claire Chennault of ‘Flying Tigers’ fame convinced U.S. commander for China Albert Wedemeyer to act against Hankow, modern Wuhan, a river port in the east-central part of the country. On 18 December LeMay, who at the time was responsible for all air operations in India and China, sent 94 B-29s to attack the docks during the day with 511 tons of napalm. Fire, in contrast to explosives, made imprecision unimportant. “Everything was fouled up there … people dropped in the wrong sequence, smoke obscured the primary areas, and so on. But that was an incendiary attack, and everything which was hit burned like crazy. And I

---

140 LeMay with Kantor. Mission With LeMay. 321, 343. “Off the Japanese coast towering fronts, sometimes solid with clouds from 1,500 to 30,000 feet, stood between the designated assembly points and the targets. Since the B-29s might collide if they entered these clouds in large formations, they had to pass through one at a time, then assemble over land, well within the range of Japanese interceptors. Winds at bombing altitude sometime blew at over 200 knots, forcing the big planes to drift as much as forty-five degrees, though their bombsights could only correct for a thirty-five degree drift, and even fifteen degrees reduced their accuracy,” explained historian Ronald Schaffer. Schaffer. Wings of Judgment. 124.

think there was a vast similarity to the type of construction in Japan,” he later observed. The at-
tack was a success: Hankow burned despite the haphazard targeting. America had found an an-
swer to the wind and clouds of Japan. Lauris Norstad, deputy chief of Air Staff at Army Air Force
Headquarters in Washington, and chief of staff for the 20th Air Force, a special unit under Arnold’s
direct command established to manage B-29 attacks on Japan, suggested a 100-bomber area flame
assault on the key industrial port city of Nagoya as an “urgent requirement” for future planning.

Haywood Hansell, commander of the XXI Bomber Command, the main operational unit of the
20th Air Force, however, remained committed to “precision” bombing. He had, “with great diffi-
culty implanted the principle that our mission is the destruction of primary targets by sustained and
determined attacks using precision bombing methods both visual and radar,” he protested to Ar-
old. The policy was “beginning to get results” he continued, and he did not want to diverge from
it. B-29s continued to deliver “precision” high explosive and incendiary bombs through dense
clouds and high winds. On 22 December, Hansell ordered an incendiary attack on Nagoya — but
targeted a specific Mitsubishi aircraft plant. Results disappointed. Losses mounted.

Finally, on 3 January 1945 Hansell accepted Norstad’s “area” proposal. Napalm was the tool
he chose for the job: the weapon’s first large-scale use against Japan. Crews loaded 97 B-29s with
237 tons of M-69 clusters and bombarded Nagoya again during the daytime from high altitudes,

142 LeMay with Kantor. *Mission With LeMay*. 351. Tonnage: Frank. *Downfall*. 51. LeMay’s command also at-
tacked Nanking with incendiary weapons, and napalm “firebombs” — barrel bombs filled in the field —
were used against several other Chinese cities, and in Burma. See Carter and Mueller. *Combat Chronology,

143 TC-S-18-2. 18 December 1944: Norstad to Hansell, personal. In James Leo Cate and James C. Olson.
“Precision Bombardment Campaign.” Craven and Cate, eds. “The Pacific.” 5 *The Army Air Forces in World
War II*. 564.

144 TC-FN-19-7. 19 December 1944: Hansell to Arnold, personal. In Cate and Olson. “Precision Bombard-
without a specific target. Determined firefighters limited the blaze that resulted to an inconsequential three acres.\(145\) Hansell returned to “precision” attacks focused on aircraft factories.\(146\)

In addition to its strategic implications, lack of bombing results had potentially dire bureaucratic consequences. “The Navy, never a fan of the B-29 program or the Army Air Forces in general, was finally on the verge of pouncing. Wasn’t it time, the Admirals were saying, to face reality and turn the B-29s over to the Fleet as a tactical support arm?” Robert Morgan wrote.\(147\)

On 7 January, Norstad met LeMay in Guam and informed him that he was to relieve Hansell as head of the XXI Bomber Command.\(148\) His message, according to LeMay: “You go ahead and get results with the B-29. If you don’t get results, you’ll be fired. If you don’t get results, also, there’ll never be any Strategic Air Forces of the Pacific. … If you don’t get results, it will mean eventually a mass amphibious invasion of Japan.” On the 9th, 72 B-29s armed with explosives failed for a fifth time to destroy the Musashino plant in Tokyo. The U.S. lost six airplanes; the Japanese, one

---


\(148\) In Cate and Olson, “Precision Bombardment Campaign.” Craven and Cate, eds. “The Pacific.” 5 *The Army Air Forces in World War II*. 567.
warehouses. LeMay assumed command of air bombardment operations against Japan on 19 January.

A practical man

The man who took the United States into a new era of war intimidated even those on his own side. “With his jowly, scowling face, his thick dark hair, and smoldering gaze, he gave many the impression that running a bombing campaign wasn’t quite stimulating enough for him, that he wouldn’t mind taking apart a few Quonset huts with his bare hands. His speaking style — barely audible sentence fragments murmured through clenched teeth — reinforced his aura as a borderline sociopath,” Morgan recalled.

The new air commander in the Pacific was practical. His upbringing, like his bombing, drew a line between friends and adversaries, and while it acknowledged sympathy in the abstract allowed it no operational role. Curtis Emerson LeMay, oldest of seven children, was born in 1906 in a cottage in Columbus, Ohio — seven years after Louis Fieser was delivered in the same city. His father worked odd jobs — railroad worker in Ohio, manager of a Montana fish hatchery, cannery worker in Emeryville, California — and moved the family frequently. “Usually we had enough to eat,” LeMay wrote in his memoir. The lesson of his early childhood: “It doesn’t do any good to fake a thing, to fake an ill or a benefit. We have to face the facts the way they are, not the way we wish

---


151 Morgan with Powers. The Man Who Flew the Memphis Belle. 298.

152 LeMay with Kantor. Mission with LeMay. 16.
they were. … A clear concise awareness of the exact condition, the exact problem which faces an individual, is his best weapon for coping with it.”¹⁵³ In 1917, at age eight, he visited the Panama-Pacific Exhibition International Exposition in San Francisco and watched the famous stunt pilot Lincoln Beachy. The course of his life, he said, was set: from that moment forward, he wanted to fly.¹⁵⁴

In the meantime, however, the serious, industrious first son hunted sparrows with a BB gun to feed the cat of an elderly neighbor, who paid a nickel per bird; purchased newspapers in bulk and resold them to paper boys; and bought a bicycle with money he saved to work as a messenger and deliver Western Union telegrams. He tinkered with sports equipment and guns in his spare time, loaded his own ammunition, and, when he got older, worked as an ironworker during summer vacations. His mother did housework when the family’s money got short.¹⁵⁵

Ohio State offered a college education. LeMay worked nights, on occasion until 3:00 a.m., at the Buckeye Steel Casting Company to pay his tuition. When he learned about the R.O.T.C., he joined it right away — and, after that, the National Guard — to finance his studies and gain an edge for a pilot’s commission. “With me it was flying first and being in the Service second,” he wrote. In 1928, he was approved as a flying cadet for the still-nascent Army Air Corps.¹⁵⁶

¹⁵³ LeMay with Kantor. Mission with LeMay. 19.

¹⁵⁴ Beachy gained fame for circling the capital in an airplane, doing a roll over Niagara Falls, flying while dressed as a woman, and bombing the University of California at Berkeley stadium with a football while dressed in Stanford cardinal. LeMay with Kantor. Mission with LeMay. 23.

¹⁵⁵ LeMay with Kantor. Mission with LeMay. 27-33.

¹⁵⁶ LeMay with Kantor. Mission with LeMay. 35-60.
World War II offered opportunities for leadership and advancement, and Major LeMay threw himself into the task. He commanded a squadron of B-17 bombers over Germany, which made him familiar with every element of aerial attack from maintenance to defensive armaments and bomb bay operations. In March 1944, at age 37, he became the youngest major general in the United States Army. In August, he was given command of the XXth Bomber Command, that flew supplies from India over the Himalayas to China for attacks on Japanese targets there and in the southernmost part of Japan.

Conditions in India were difficult. In China, wracked by invasion and a barely-suppressed civil war and at the end of the longest supply line in history, they were even worse. LeMay rose to the challenge. Army crews had obtained 102 operational hours per bomber per month in the U.S., and 81 hours per bomber overseas. In China, the young general achieved 92 operational hours per month on average for his Superfortresses.157

The end of “precision” bombing

LeMay, however, did no better than Hansell with “precision” strikes on Japan. On 23 January, he sent 73 B-29s to attack the same Mitsubishi plant at Nagoya his predecessor had failed to destroy. Only 28 airplanes could find the target because of heavy clouds, and it was hit by no more than four bombs and a few incendiaries. Damage was slight.158 A strike on Tokyo four days later

---


drew fierce resistance. Morgan remembered, “The Zeros [Japanese fighters] hit us like a rain of meteors. There must have been hundreds of them, swooping in wave after wave for close-encounter attacks. Our losses were the worst of the Pacific campaign to date — nine Superfortresses shot down and many more damaged. The Zeros followed us after we’d left the coast, staying on our tails fifty or sixty miles out over the ocean.”

By the third week of February, “U.S. pilots had flown more than 2,000 missions over Japan, with no decisive damage to any target,” the pilot reported. The Pacific islands, acquired at the cost of so many lives, appeared practically useless as bomber bases.

Headquarters analysts concluded that the 3 January incendiary attack against Nagoya had failed because the bombs were not concentrated enough and had not been aimed at the most flammable area of the city. On 3 February, 69 bombers attempted to focus almost 160 tons of incendiaries, plus several more tons of fragmentation bombs to deter firefighters, on the most combustible part of Japan’s sixth-largest city, Kobe: its residential district. Subsequent photos showed severe damage to both the target area and an adjacent industrial zone. On 25 February, 172 B-29s dropped more than 453 tons of napalm and explosives on snow-covered Tokyo. “Three to five seconds after the big firecrackers hit, they go off. An explosive charge violently ejects a sackful of gel which burns intensely,” the Air Force reported in a confidential history.

---

159 Morgan with Powers. The Man Who Flew the Memphis Belle. 298.


started that burned one square mile of the city and destroyed almost 28,000 buildings. Snowflakes fell black with ash.\textsuperscript{162}

An approach that worked was at hand. The hour for urban incendiary bombing, a form of warfare that has defined modernity — most recently through ICBMs and “mutually assured destruction” — had arrived for the United States: LeMay and his staff resolved upon a massive napalm area attack against the enemy capital.\textsuperscript{163}


\textsuperscript{163} “This is apparently the first time our B-29’s have attempted area bombing with the new and devastating cluster-incendiaries,” the \textit{New York Times} later editorialized of the attack. The \textit{New York Times}. “Tokyo in Flames.” 12 March 1945: \texttt{NYTimes.com}. On Mutually Assured Destruction (M.A.D.) see Jimmy Carter. “Presidential Directive/NSC-59, Nuclear Weapons Employment Policy.” 25 July 1980: \texttt{FAS.org}. (“To continue to deter in an era of strategic nuclear equivalence, it is necessary to have nuclear (as well as conventional) forces such that in considering aggression against our interests any adversary would recognize that no plausible outcome would represent a victory or any plausible definition of victory.”) On armageddon and modernity see: Jonathan Schell. \textit{The Fate of the Earth}. 1982: Knopf.
To maximize his impact, LeMay decided to attack at night at low altitude; strip defensive weapons and crews, except for a single tailgunner, from the SuperFortresses to allow them to carry more bombs; and eliminate formations.\(^{164}\) The general gambled that Japan’s relatively inexperienced pilots — often poorly trained, late in the war, because of a shortage of gasoline — couldn’t fight effectively at night and, further, might be caught on the ground by a surprise attack. He also suspected that anti-aircraft guns calibrated for high altitudes couldn’t target low level airplanes.\(^{165}\) An added benefit of an attack at 5,000 rather than 25,000 feet was that it saved fuel because less climbing was required, reduced engine strain because the air was thicker, and improved radar...

---

\(^{164}\) 20th Air Force historian Kenn Rust attributes the initial conception of the low-level night attacks without defensive armaments to Thomas Power. “Following the 25th February strike at Tokyo, Brig. Gen. Power … wondered what results would have been obtained if there had been more B-29s and they had flown the entire mission at lower altitudes where they would use less fuel and thus be able to carry a considerably greater load of incendiary bombs.” Rust. *Twentieth Air Force Story*. 30.

\(^{165}\) Pilots: “Average flying experience fell off throughout the war, and was just over 100 hours, as contrasted to 600 hours for United States pilots, at the time of surrender.” United States Strategic Bombing Survey. *Summary Report (Pacific War)*. 9. [IBiblio.org](http://www.ibiblio.org).
The modifications increased payloads by one-third and allowed the 346 B-29s scheduled for the attack to carry more bombs than 1,000 of the B-17s used against Germany.\textsuperscript{167}

The risks of the new strategy were real.\textsuperscript{168} “The prospect gave me a feeling of dread. I remembered the low-level missions that had been tried out in Europe, and the results — whole squadrons of B-17s blown out of the sky,” wrote veteran pilot Morgan.\textsuperscript{169} LeMay recalled: “I talked to a very few of the boys about this, and studied their reactions. Some of them thought it would be O.K. to revolutionize our whole process and go over Japanese targets at low altitudes. Others said, ‘God. That would be slaughter,’ and they were fully convinced that it would be.” He imagined letters from the mothers of dead pilots. “The mother writes you a letter, and she says: ‘Dear General. This is the anniversary of my son Nicky being killed over Tokyo. You killed him, General. I just want to remind you of it. I’m going to send you a letter each year on the same date, the anniversary of his death, to remind you.’”\textsuperscript{170}

\textbf{The American Century}

“The implications of this kind of weapon were such that even LeMay’s most war-hardened subordinates found themselves aghast at the prospect,” Morgan wrote. “The epicenter of this area

\begin{footnotesize}
\begin{enumerate}
\item Morgan with Powers. \textit{The Man Who Flew the Memphis Belle}. 317.
\item LeMay with Kantor. Mission With LeMay. 346, 348.
\end{enumerate}
\end{footnotesize}
was ... an 11.8-square-mile melange of factories, houses, and shops,” he continued.171 “If we succeeded, the devastation would beggar anything that had gone before. In human terms, the prospects were nearly unthinkable. Civilians were going to die on this run, die by the tens of thousands. Worse, they were going to be roasted en masse,” he predicted.172 As R.A.F. Air Chief Marshal Arthur Harris, commander in chief of British bombers from 1942-45, later observed, “[A]lthough they had rigidly adhered to the theory, if not always to the practice, of precision bombing of factories in Europe, they used against Japan exactly the same method of devastating large industrial cities by incendiary bombs as was used in Europe by Bomber Command.”173 War orders explicitly envisioned civilian casualties: “Employment at scores of war plants throughout Tokyo and environs would be directly affected by casualties, movement of workers out of the area, use of manpower in reconstruction, and probably lowered worker morale,” stated the official “target in-

171 Target information sheets prepared by LeMay’s Intelligence Section observed, “[W]ithin this target area of approximately 10 square miles, the average population density is 103,000 people per square mile, an average probably not exceeded in any other modern industrial city in the world” (and, presumably, any “non-industrial” city either). Narrative History of the Twentieth Air Force. Target Information Sheets. Binder VII. Document 75. Decimal File Number 760.01. 1 July - 2 September 1945. Volume 8. HRA. In Searle. “‘It Made a Lot of Sense to Kill Skilled Workers:’ The Firebombing of Tokyo in March 1945.” January 2002: 66 The Journal of Military History 1. 121.


173 Arthur Harris. Bomber Offensive. 1947: Collins. 264. Harris, who implemented Britain’s strategy of area bombardments and was one of its most vigorous proponents, was one of a very few senior British leaders not elevated to the peerage, the highest ranks of the U.K.’s nobility, after the war, perhaps because of post-war discomfort with the policy. In 1953, he was made the 1st Baronet of Chipping Wycombe, a lesser hereditary title, and was formally known as “Sir Arthur Harris GCB, OBE, AFC.” Jonathon Falconer. The Bomber Command Handbook 1939-1945. 2003: Sutton Publishing Ltd. RAF.mod.uk. 1st Baronet: C. Peter Chen. 27 June 2010: World War II Database. WWIIB.com
formation sheet” distributed to bomber crews.\textsuperscript{174} Japan’s general mobilization to resist the expected U.S. invasion, which included women and children, and a theory that the enemy’s industrial system relied on widely dispersed home manufacturing operations (judged incorrect by the post-war Strategic Bombing Survey) soothed some.\textsuperscript{175}

LeMay welcomed the arrival of a more absolutist form of combat. “The whole purpose of strategic warfare is to destroy the enemy’s potential to wage war. … If we didn’t obliterate it, we would dwell subservient to it,” he wrote. “I think now of that elderly wheeze about the stupid man who was not basically cruel — he was just well-meaning. The guy who cut off the dog’s tail an inch at a time so that it wouldn’t hurt so much,” he joked. Less theoretically, he endorsed Harris’ unforgiving assessment of the relative value of lives across battle lines: “[T]o worry about the morality of what we were doing — Nuts. A soldier has to fight. We fought. If we accomplished the job in any given


\textsuperscript{175} “In Japan they were set up like this: they’d have a factory; and then the families, in their homes throughout the area, would manufacture small parts,” LeMay asserted. “All you had to do was visit one of those targets after we’d roasted it, and see the ruins of a multitude of tiny houses, with a drill press sticking up through the wreckage of every home” he explained. LeMay with Kantor. Mission with LeMay. 384. The Strategic Bombing Survey concluded differently on the basis of its extensive post-war investigations in Japan: “By 1944 the Japanese had almost eliminated home industry in their war economy.” United States Strategic Bombing Survey. Summary Report (Pacific War). 24. IBiblio.org.

Mobilizations grew more all-encompassing as the war continued. On 19 March 1945, ten days after the Tokyo attack, the Japanese cabinet ordered all schools closed and all students over age six conscripted into a “students’ corps to participate actively in the production of foodstuffs, the production of munitions, air defense, important research works and other undertakings that are immediately and directly concerned with the prosecution of the war.” New York Times. “Japan to Shut Schools for a Year; All Over 6 Will Be Put in War Work.” 19 March 1945: NYTimes.com. On 22 May, Domei, the Japanese news agency, reported that the country had mobilized 20 million students to be trained for “active combat duties,” and formed a separate “agrarian militia” of farmers aged 14 and above. Associated Press. “JAPAN'S STUDENTS TO MEET INVASION; 20,000,000 Are Mobilized — Farmers Also Ordered to Prepare to Fight.” 21 May 1945: NYTimes.com.
battle without exterminating too many of own folks, we considered that we’d had a pretty good
day.”

Organizational politics, however, was an area that did admit nuance. LeMay did not seek Ar-
nold’s advance approval for the radical shift in strategy. The reason, he said, was to protect his
commander in case the mission failed. “[I]f I didn’t tell him, and it’s all a failure, and I don’t pro-
duce any results, then he can fire me,” he explained. “I made the decision. I weighed the odds. I
knew the odds were in my favor. But still, it was something new. I could have lost a lot of people,
appeared to be an idiot,” he wrote. Nonetheless, the attack was hardly a secret: deputy chief of
Army Air Staff Norstad was on Guam when the bombers took off.

The result was historic. Arnold left nothing to the imagination in a subsequent message to Le-
May that expanded on his congratulatory telegram: “A study of the Tokyo attack of March 10 and
the knowledge of the fact that by July 1 you will have nearly a thousand B-29s under your control,
leads one to conclusions which are impressive even to old hands at bombardment operations. Un-
der reasonably favorable conditions you should then have the ability to destroy whole industrial
cities should that be required,” wrote the supreme air force commander.

176 “Actually, I think it’s more immoral to use less force than necessary, than it is to use more. If you use less
force, you kill off more of humanity in the long run, because you are merely protracting the struggle,” he
wrote. LeMay with Kantor. Mission with LeMay. 382-84.

177 LeMay with Kantor. Mission with LeMay. 342. See Kerr. Flames over Tokyo. 156-66. See also Morgan with


179 Lauris Norstad to Twentieth Air Force Headquarters. “Forthcoming Operation March 9, 1945.” MR
A7731. AFHO. In Kerr. Flames over Tokyo. 165-66.

180 LeMay with Kantor. Mission with LeMay. 353.
Newspapers initially reported only about property damage. “More than 1,000 tons of incendiary bombs fell on the city’s center in this all-out incendiary attack, and these rushed down on a section where the density of population is 100,000 to the square mile and where heavy industrial sections, residential neighborhoods, and wholesale and retail districts adjoin, the *New York Times* reported of the Tokyo attack on 10 March. “CITY’S HEART GONE; Not a Building Is Left Intact in 15 Square Miles. Photos Photos Show A MILLION HOMELESS,” headlines proclaimed the next day. “Imagine Manhattan from Washington Square northward to Sixtieth Street plus the Borough Hall, Bay Ridge, Greenpoint, Williamsburg and Fulton Street sections of Brooklyn, add Long Island City and Astoria and Staten Island burned out so not a rooftop is visible and the picture becomes clearer of the area laid waste by the American bombers yesterday morning,” wrote reporter Warren Moscow.181 Imperial headquarters was equally reticent about casualties. Japan’s government simply reported that all fires were out by 8:00 a.m.182

It took until 30 May for napalm’s true power to be revealed to the U.S. and the world. On 16 March, Japanese radio admitted that thousands of people had been burned to death in Tokyo, Nagoya and Osaka.183 A week later, the empire reported immense damage to residential areas. “Do-

---

181 Warren Moscow. “CITY’S HEART GONE; Not a Building Is Left Intact in 15 Square Miles, Photos Show A MILLION HOMELESS. LeMay Says Purpose Is Won if B-29’s Shortened War by One Day.” 11 March 1945: [NYTimes.com](http://NYTimes.com).

182 Bruce Rae. “RECORD AIR ATTACK; B-29’s Pour Over 1,000 Tons of Incendiaries on Japanese Capital. BOMBS RAIN 1 1/2 HOURS; Tremendous Fires Leap Up in Thickly Populated Center of Big City. Enemy Is Surprised.” 10 March 1943: [NYTimes.com](http://NYTimes.com), 16 March 1945: [NYTimes.com](http://NYTimes.com).

mestic Broadcasts Reveal Refugees in Millions,” read U.S. headlines. Finally, at a press briefing, LeMay declared victory and offered photographic proof: 51 square miles of Tokyo lay in ashes.

“[A]proximately 4,500,000 of Tokyo’s 7,000,000 people,” once lived in the area, explained New York Times reporter Moscow. “None of them could be living in that area now if the pictures tell the story. … [I]t is possible that 1,000,000, or maybe even twice that number of the Emperor’s subjects, perished,” he concluded. The U.S. had lost 51 planes: one per square mile burned.

Brave new world

After Tokyo, American bombers attacked Japan’s largest cities with napalm for 10 days, until supplies ran out on 19 March 1945. After a three week pause to restock, napalm bombardments started again on 13 April, and continued until the end of the war. “It would be possible, I thought, to knock out all of Japan’s major industrial cities during the next ten nights,” LeMay wrote after the 9 March Tokyo firestorm: “I told my wing commanders that I hoped they’d be able to start for Nagoya on the evening of March 10th.” On 12 March, napalm bombs burned out two square miles in the center of Nagoya. Incendiary gel reduced eight square miles of Osaka to smoking rub-

---


185 Warren Moscow. “51 Square Miles Burned Out In Six B-29 Attacks on Tokyo; LeMay Backs Figures With Photos of Havoc — 1,000,000 Japanese Are Believed to Have Perished in Fires.” 30 May 1945: NYTimes.com.

186 “We put down every M-47 [napalm] and M-69 [napalm] and M-76 [other incendiary] we had left. Exactly eighteen hundred and fifty-eight tons of scalding chemicals. We couldn’t mount another incendiary attack for almost four weeks.” LeMay with Kantor. Mission with LeMay. 368-69. See Cate and Olson. “Urban Area Attacks.” Craven and Cate, eds. “The Pacific.” 5 The Army Air Forces in World War II. 614-27 (especially “First Phase” and “Second Phase” Tables, 624-25; and “Table 1: Incendiary Missions Against Secondary Cities,” 674-75.)

187 LeMay with Kantor. Mission with LeMay. 353.
ble two days later. In the 10 days from 9 March, 1,595 B-29 sorties dropped 18.7 million pounds of napalm and explosives, and made cinders of 31 square miles in Japan’s four largest cities.\textsuperscript{188} The achievement was “nothing short of wonderful,” Norstad wrote to LeMay on 3 April.\textsuperscript{189} It was probably the greatest damage ever “inflicted upon any people in a single eight-day period,” the proponent of area incendiary bombing told the Washington press corps.\textsuperscript{190} When new supplies arrived, ordnance officers rushed napalm directly from supply ships to bombers, just as their counterparts had done in Europe.\textsuperscript{191} In total, during the next five months, until the end of the war, over 33 million pounds of napalm in about 13 million M-69 bombs, laid waste to 106 square miles in

\begin{flushend}

\textsuperscript{189} Norstad to LeMay. 3 April 1945: LeMay Papers. Box 133. In Schaffer. Wings of Judgment. 138.


\textsuperscript{191} LeMay with Kantor. Mission with LeMay. 370. Several subsequent attacks exceeded the tonnage of the 9 March raid on Tokyo, but none surpassed its carnage. On May 26, 464 airplanes dropped 3,262 tons of incendiaries and explosives on Tokyo, nearly double the 9 March total, and burned 20 square miles of the city including the imperial palace: more than double the eight square miles incinerated on the 9th. In an attack on 24 May that burned 5.3 square miles of the capital, 62 captured U.S. aviators, many former B-29 crews, perished in a Tokyo military prison. The commander was convicted of war crimes when the U.S. learned all 400 Japanese inmates survived. Kerr. Flames over Tokyo. 250-51.
Japan’s six largest cities, and destroyed or damaged 169 square miles in 60 of its largest conurbations.\footnote{The U.S. dropped over 40,000 tons of M-69 bombs on Japan, each of which weighed 6.2 pounds and contained 2.6 pounds of napalm. U.S. O.S.R.D. N.D.R.C. \textit{Summary Technical Report of Division 11}. Vol. 3. 1. (40,000 tons, or 80 million pounds, of 6.2 pound M-69 bombs equals 12.9 million individual bombs, each of which carried 2.6 pounds of napalm, or 33.5 million pounds, 16,774 tons, of napalm). The 1972 U.N. Group of Consultant Experts on Napalm and Other Incendiary Weapons calculated the totals using a simpler methodology: “Around 100,000 tons of bombs were dropped on 60 Japanese towns and cities, practically all of them incendiaries. Eighty percent by weight of the incendiaries were napalm bombs, the remainder magnesium or thermate. The air raids killed 260,000 people and injured another 412,000. Nearly two and a quarter million homes were destroyed, and 9.2 million people left homeless. In Germany, 1.35 million tons of bombs were dropped on population centers, 49 towns and cities being singled out for large-scale attack. Although less than a quarter of the bombs were incendiaries, more than three quarters of the resultant civilian casualties were due to fire. There are estimated to have been 1.4 million civilian air-raid casualties in Germany, of whom 600,000 died. Civilian air-raid casualties in the United Kingdom amounted to 147,000, including 61,000 dead.” U.N. Group of Consultant Experts on Napalm and Other Incendiary Weapons. \textit{Napalm and Other Incendiary Weapons and all Aspects of their Possible Use}. 44-45: 154.}

“[T]he present stage of development of the air war against Japan presents the AAF for the first time with the opportunity of proving the power of the strategic air arm. … [F]or the first time strategic air bombardment faces a situation in which its strength is proportionate to the magnitude of its task,” LeMay wrote to Norstad on 25 April.\footnote{LeMay to Norstad. 25 April 1945. In Cate and Olson. “Urban Area Attacks.” \textit{The Army Air Forces in World War II}. Craven and Cate, eds. “The Pacific.” 5 \textit{The Army Air Forces in World War II}. 626.}

As each city burned, Hollywood special effects engineers who produced pilot training films substituted miniature ruins for tiny buildings. “Our film then would always look exactly the way the target would appear to the crews going in on the next run,” recalled voice-over narrator Ronald Reagan.\footnote{Ronald Reagan with Richard G. Hubler. \textit{Where’s the Rest of Me?} 1965: Duell, Sloan and Pearce. 119.} Atom bombs, by comparison, incinerated 4.7 square miles in Hiroshima and 1.45 miles in Nagasaki, the equivalent of damage from...
2,100 and 1,200 tons of napalm and explosives respectively, according to the Strategic Bombing Survey.\textsuperscript{195}


By the time the war ended, around 42 percent of Japan’s urban industrial area had been burned and 330,000 civilians killed, the Survey summarized. Burns were the leading cause of death for civilians.\textsuperscript{196} Japan’s 66 largest cities save Kyoto, spared for political reasons, ceased to


exist as military objectives. About one-quarter of Japan’s urban population, an estimated 8.5 million people, encouraged by air-dropped leaflets that listed cities to be destroyed (and suggested the weakness of air defenses) fled their homes after the napalm attacks began. Tokyo shrank from over five million residents on 1 January 1945 to about 2.3 million on 1 August.

---


Also important, from the perspective of U.S. war planners: from June 1944 to 9 March 1945, the United States had lost about 100 B-29s with little to show for the casualties. After Tokyo, the immense damage inflicted by the napalm raids through 19 March cost the U.S. just 24 Superfortresses. About half of the bombs dropped in July and August were M-69 shells filled with napalm. The balance were other incendiaries, high explosives, and fragmentation bombs.

---

200 Frank. *Downfall*. 69. “We lost exactly 0.9 percent of all those who participated in the March fire attacks,” LeMay wrote. LeMay with Kantor. *Mission with LeMay*. 367. Craven and Cate put the total lost in 17 “maximum-effort incendiary attacks” at 136, an average of 1.9 percent of all sorties. Cate and Olson. “Urban Area Attacks.” Craven and Cate, eds. “The Pacific.” 5 *The Army Air Forces in World War II*. 644. Japanese captors often executed B-29 crews shot down over the country. “Captured B-29 airmen were shot, bayonetted, decapitated, burned alive, or killed as boiling water was poured over them. Other aircrew members were beaten to death by civilians and shot with bows and arrows and then decapitated,” reported historian Richard Frank. Medical professors at Kyushu Imperial University dissected eight living crewmen. Gavan Daws. *Prisoners of the Japanese*. 1994: William Morrow. 212. In Frank. *Downfall*. 396.

Civil defense counter-measures such as the construction of fire lanes and emergency water reservoirs, and distribution of firefighting equipment to the general population, were overwhelmed.  

On the last day of the war, in response to a call by Arnold for “as big a finale as possible,” 1,014 aircraft — 828 B-29s and 186 fighter escorts — pulverized Tokyo with napalm and explosives without a loss. Truman announced Japan’s unconditional surrender the next day, while some airplanes were still in the air on their way back to the Marianas.

---

202 The raids produced stories similar to those recounted above from Tokyo. In Osaka, for example, 13-year-old Takako Oshima remembered the following: She got up and thought she had stepped on a log, but knew there shouldn’t have been a log there. Her feet were so very hot; when she looked down at her right foot, it was burning. In fact, almost her whole body was on fire. ... So she jumped into the water cistern .... That put out the fire. She noticed that the skin of her right hand was hanging down in shreds, so she stuffed her hand back together. She began shouting and crying, ‘Mama, Mama, Mama.’” She found her seven-year-old brother. “Saburo was so badly burned all over his body that Takako did not recognize him. He looked like a little pig that had been cooked. ‘Aren’t you Saburo?’ she asked him. He had changed so much.” The boy was burned over 90 percent of his body, and died three days later. Hoyt. Inferno. 80-1.

“Fundamentally the thing that brought about the determination to make peace was the prolonged bombing by the B-29s,” said former Japanese Prime Minister Prince Fumimaro Konoye. “I myself, on the basis of the B-29 raids, felt that the case was hopeless,” said Admiral Kantaro Suzuki, who served as Prime Minister of Japan from 7 April to 17 August 1945, negotiated the surrender, and survived a last-minute assassination attempt by fanatical military officers.204 “A great many writers recalled that they had thought war was somewhat beautiful and heroic. After the sav-

“Age air raids, their ideas about war had changed,” the Japanese newspaper *Nihon Dokusho Shim-bun* reported on a 1956 reader survey about recollections of the war.\(^{205}\) “Japan would have surrendered even if the atomic bombs had not been dropped, even if Russia had not entered the war, and even if no invasion has been planned,” wrote the authors of the U.S. Strategic Bombing Survey.\(^{206}\) “Indeed if the supply of incendiaries at the bases in the Marianas had not run short the 21st Bomber Command might possibly have brought Japan to surrender before the August raids on Hiroshima and Nagasaki,” concluded the official history of the Office of Scientific Research and Development.\(^{207}\)

---


\(^{206}\) United States Strategic Bombing Survey. *Summary Report (Pacific War)*. 26. [IBiblio.org](http://www.ibiblio.org). Although note that some have criticized the USSB’s conclusions.

\(^{207}\) Baxter. *Scientists Against Time*. 98.
U.S. factories produced about 80 million pounds of napalm by the end of the war. With the exception of the atomic bomb, flame was the most effective weapon employed in Pacific warfare,” wrote the chief chemical officer on Douglas MacArthur’s staff. “Filled with jellied gasoline, the AN-M69 incendiary was credited with the highest efficiency of any bomb against Japanese facto-

---


ries and dwellings,” Bush and Conant concluded in a post-war summation. Most dramatically, Harvard’s “Anonymous Research Project No. 4” development project, at $5.2 million, was over 5,000 times less costly than the $27 billion bill for the Manhattan Project’s two bombs. Measured in terms of development costs alone per Japanese city incinerated — excluding bomb delivery costs — napalm produced comparable results for just $83,000 per obliterated metropolis, compared with $13.5 billion per atomic cataclysm.

---

210 “The M-47 incendiary weighing 70 pounds was twelve times as effective, bomb for bomb, as the 500-pound HE [High Explosive] bomb against targets classified as readily inflammable, and one and a half times as effective against targets classified as fire-resistant. Vannevar Bush and J. B. Conant. “NDRC Forward.” U.S. O.S.R.D. N.D.R.C. Summary Technical Report of Division 11. Vol. 3. v. See Baxter. Scientists Against Time. 289. In Germany, “The photo studies of damage indicated that, ton for ton, incendiaries were 4.8 times as effective as high explosive bombs on residence areas and against the smaller industrial and mercantile properties,” Horatio Bond wrote in 1946. Horatio Bond. “The Fire Attacks on German Cities.” Bond, ed. Fire and the Air War. 80. “[I]n Japan it was found that incendiaries had been twelve times as destructive as high-explosive bombs against readily-combustible targets, and 1.5 times as effective against fire-resistant targets,” the 1972 U.N. Group of Consultant Experts on Napalm and Other Incendiary Weapons observed. U.N. Group of Consultant Experts on Napalm and Other Incendiary Weapons Napalm and Other Incendiary Weapons and all Aspects of their Possible Use. 45: 155. See Table “Efforts and Results.” U.S. Strategic Bombing Survey. “The Effects of Atomic Bombs on Hiroshima and Nagasaki: the Official Report.” Bond, ed. Fire and the Air War. 233.

Bush may have felt some measure of personal responsibility for napalm. His friend, scientist and war researcher Merle Tuve, wrote “For years after the war Van Bush would wake up screaming in the night because … he burned Tokyo. … The proximity fuze didn’t bother him badly. Even the atomic bomb didn’t bother him as much as jellied gasoline. Oh, yes, we all suffer scars you know, and I don’t know how we’d help it.” M. Tuve OH. May 1967: American Institute of Physics. 39. In G. Pascal Zachary. Endless Frontier: Vannevar Bush, Engineer of the American Century. 1997: The Free Press. 342.


On 8 June 1967, Day Four of the Six Day War between Israel and surrounding Arab states, the 
U.S.S. Liberty sailed slowly in international waters about 29 miles off the Sinai peninsula in the 
eastern Mediterranean. The Navy research ship, packed with electronic equipment, eavesdropped 
on radio conversations that streamed from battlefields a few miles away, and relayed the informa-
tion to the National Security Agency in Washington, D.C. A U.S. flag flew at the stern of the ship.
and an official identification number was painted in white on its bow. Israeli air force pilots recon-noitered the craft eight times between 6:00 a.m. and 12:45 p.m., in one case at masthead height. Off duty Americans sunbathed on deck.

The voices of Menachem, the chief controller at Israeli Air Control South, near the Sinai border, Robert, his counterpart at Air Control Central, 25 miles south of Tel Aviv, and Chief Air Force controller Lieutenant Colonel Shmuel Kislev, based at the Kirya, the Israeli equivalent of the Pentagon, near Tel Aviv, tell the story of events after 2:00 p.m. Royal is the code name for two French-made Dassault Super Mystère jets diverted from a mission against tanks and infantry in the Sinai. The conversations are translated from recordings released by the Israeli Air Force.

1401 Menachem: We’re sending in Royal
1401:52 Kislev: Menachem, if Royal has napalm, it will make things easier. …
1402 Royal: Homeland from Royal. Is it permitted to go in? …
Kursa [Israeli Mirage jet]: Affirmative, you have permission Royal. …
1402:11 Robert: Okay, you may attack.
Kislev: You may attack
1402:32 Royal: Sausages, in the middle and up … in one pass. Two together. We’ll come in from the rear. Watch out for the masts. Don’t hit the masts, careful of the masts. I’ll come in from her left, you come behind me. … [jets fly over ship then loop back with the sun behind them]

Robert: Authorized to sink. …
Kislev: Menachem, is he blasting her?
Menachem: He’s going low with napalm. …
1404 Royal Wing: You’ve missed by an undershot. …
1407 Unknown: I don’t know. Number Two [Royal Wing] hit … and now he’s strafing.1

---

“The formation executed two attack runs with napalm, and one napalm bomb struck the ship,” concluded an Israeli Defense Force history. This is the only known instance of a napalm bomb attack against U.S. military forces by another country.

The napalm hit, and the rocket attacks and strafing by the Mirage fighter-bombers code-named *Kursa* that preceded it, concentrated on the ship’s bridge. “The jellied slop burst into furious flame on impact, coating everything, then surged through the fresh rocket holes to burn frantically among the men inside,” remembered Officer of the Deck James Ennes, who lay injured near a doorway. “I watched Captain McGonagle standing alone on the starboard wing of the bridge as the whole world suddenly caught fire. The deck below him, stanchions around him, even the overhead above him burned. The entire superstructure of the ship burst into a wall of flame from the main deck to the open bridge four levels above. All burned with the peculiar fury of warfare while Old Shep [McGonagle], seemingly impervious to man-made flame and looking strangely like Satan himself, stepped calmly through the fire to order: ‘Fire, fire, starboard side, oh-three level. Sound the fire alarm.’”

“The pilothouse became a hopeless sea of wounded men, swollen fire hoses and discarded equipment. … In front of the helmsman a football-sized glob of napalm burned angrily, adding to the smoke and confusion. Smaller napalm globs burned in other parts of the room, refusing to be extinguished,” Ennes observed. “My bare chest glowed with a hundred tiny fires as burning rocket

---


4 Ennes. *Assault on the Liberty*. 68.
fragments and napalm-coated particles fell on me like angry wasps. Desperately I brushed them away. As the tiny flames died, the hot metal continued to sear my chest. ... Through the fresh rocket holes I could see a tremendous fire raging on deck outside and I could hear the crackle of flames. The motor whaleboat burned furiously from a direct napalm hit while other fires engulfed the weather decks and bulkheads nearby,” he added.5 Paint on interior bulkheads blistered from the intense heat of the jellied gasoline.6

Bullets and rockets left 821 holes in the Liberty. Israeli torpedo boats followed and blasted a gash 39 feet wide and 24 feet tall in the side of the ship. The vessel did not sink, however, and eventually managed to sail away. A total of 34 sailors died and 171 were injured: the deadliest at-


tack on a U.S. warship since World War II.7 Israel admitted that a mistake had been made within hours, apologized two days later, and ultimately paid reparations to the U.S. government and the families of those it had killed and wounded.8 America condemned the assault as “an act of military recklessness reflecting wanton disregard for human life.”9

Napalm had turned upon its creator for the first time.10

---


Made in America to take on the world

Militaries around the world embraced the weapon that burned out 64 of Japan’s largest cities and drove a quarter of its urban population from their homes in six months.\textsuperscript{11} Fieser’s devastatingly simple chemistry was so obvious, once demonstrated, that the U.S. didn’t even try to keep it secret. In 1946, the professor and his colleagues published a thorough discussion of their discovery in the journal \textit{Industrial and Engineering Chemistry}.\textsuperscript{12} In 1952, as Julius and Ethel Rosenberg sat on death row for disclosing secrets of the atomic bomb, which killed far fewer people, the U.S. Patent Office issued certificate 2,606,107 for “Incendiary Gels” and made napalm’s precise formula available worldwide.\textsuperscript{13}

Countries with control of the air — generally larger and richer states — rushed to exploit the scientific marvel.\textsuperscript{14} America and its Cold War clients were the greatest initial consumers of the weapon. European imperial powers — also U.S. allies — formed a second large group of users. Big nonaligned states made up the third major group.

\begin{flushleft}
\footnotesize
\textsuperscript{11} U.S. forces destroyed Japan’s 66 largest cities, except for Kyoto. Napalm bombs burned 64 and nuclear weapons incinerated two.

\textsuperscript{12} Fieser et al. “Napalm.” 38 Industrial & Engineering Chemistry. 772-73. ACS.org.

\textsuperscript{13} Fieser assigned his rights to the Secretary of War. Louis D. Fieser, assignor to the United States of America as represented by the Secretary of War. Incendiary Gels. United States Patent Office No. 2,606,107. 5 August 1952: USPTO.gov.

\textsuperscript{14} As the U.N. Group of Consultant Experts on Napalm and Other Incendiary Weapons observed in 1972 of the more exceptional case of massive incendiary raids against cities, “The use of incendiary weapons on the scale of the major incendiary air raids of the Second World War is, in economic terms, an extremely costly undertaking. … The poorer nations of the world are therefore more likely to be the recipients of such attacks than the executors, and may suffer irremediable economic hardship from their consequences.” U.N. Group of Consultant Experts on Napalm and Other Incendiary Weapons. \textit{Napalm and Other Incendiary Weapons and all Aspects of their Possible Use}. 51: 178.
\end{flushleft}
Greeks bearing gifts

Greece was the first country to deploy napalm after World War II. On 20 June 1948, the Royal Hellenic Air Force used napalm provided by the U.S. against communist positions in the Grammos mountains to inflict the first serious losses of the civil war on their opponents. Dwight Griswold, the U.S. mission chief in Athens, was sensitive to potential criticisms. “We must expect propaganda agencies of Communist countries to … charge that the use of [the] fire bomb is unethical. … [The] principal propaganda broadside will be directed against the United States, stressing that [the] fire bomb was made in America and used in Greece according to [the] plans of [the] American Army,” he wrote. Not so sensitive, however, as to be deterred from providing the incendiary. In any event, there was little criticism. The U.S. provided additional stocks and in August 1949 “Greek warplanes flew 826 sorties in six days, employing an estimated 250 tons of bombs, rockets, and napalm,” against rebels concentrations at two redoubts in the mountains, the Marine Corps Gazette reported. “American observers … believed that loss of life and great damage was caused in the rebel installations by the 500-pound bombs and charges of napalm incendiaries,” the New York Times advised. After heavy losses, thousands of soldiers, the remnants of a force once esti-

---


mated at about 5,000 fighters, surrendered or retreated north to Albania and other Balkan states, where authorities disarmed them. Napalm had helped to win an early Cold War struggle.

**“Cooking oil”**

The Korean War, which started the following year, saw a similarly unflinching, although vastly more extensive, deployment of the new weapon. In 1950, the first year of the war, U.S. airplanes delivered about 21,000 gallons of napalm per day. Bombing runs more than tripled the next year to around 70,000 gallons per day. In total, 32,557 tons of napalm was dropped on Korean targets over three years, about twice as much as was used against Japan.

The initial use of napalm was tactical. Air Force fighters dropped fuel tank firebombs on 28 June 1950, three days after the North Korean invasion, to support retreating South Korean troops.

---


18 A cease fire was declared on October 16. Truman reported victory to Congress in November. U.S. Department of State. Eighth Report to Congress on Assistance to Greece and Turkey. 1-8. In Wittner, American Intervention in Greece. 251.

American ground forces arrived two days later and, when they too were forced to retreat, received similar support. “[P]lanes are taking off as opportunities permit to carry bombs, rockets and tanks of jellied gasoline (napalm) to throw at North Korean armored columns pressing southward against weary United States infantry detachments which have now been hammered by superior invading forces for five straight days,” the Boston Herald reported on 9 July 1950. Napalm was extensively used against tanks for the first time. “The planes dive and release belly tanks filled with jellied gasoline both ahead and behind advancing armored vehicles, establishing a pattern not unlike the jig saw puzzle of depth charges which a surface vessel uses to surround a submarine. A direct hit, of course, permanently eliminates a tank. Even a near-miss, if close enough, generates enough heat from the jellied gas to fire a tank’s fuel,” the Herald continued. A pair of 110-gallon napalm tanks, Army researchers found, created a 15,000 square foot blanket of fire with a particularly intense 50-yard-square area at the center. Marines nicknamed the jelly “cooking oil.”

20 Futrell. The United States Air Force in Korea. 30.


After this early start, napalm remained a favorite United Nations weapon. A Marine combat historian described a December 1950 engagement: “Navy and Marine air squadrons blanketed both flanks with napalm, blossoming fires the full length of our six-mile column. That continuous air support finally so demoralized the enemy troops that they just wandered along our flanks in thinly scattered groups, seemingly more concerned with staying clear of the next napalm drop than with massing for an attack.”

B.B.C. correspondent René Cutforth, a few months later, recounted a typical attack: “[T]he Corsair, with the air of someone who has now finally lost all patience, came screaming in again, circled, slowed … and ‘tossed,’ as it were, negligently, a long, yellow, banana-shaped object over the knife-edge of the ridge. It fell slowly, turning over and over, and where it landed a dark red flame grew and spread outwards in waves until it covered a great area, Black

"You came in on what we called a nape scrape which is where you came in so low you were almost flying into the target that you were going to put napalm on.”


After this early start, napalm remained a favorite United Nations weapon. A Marine combat historian described a December 1950 engagement: “Navy and Marine air squadrons blanketed both flanks with napalm, blossoming fires the full length of our six-mile column. That continuous air support finally so demoralized the enemy troops that they just wandered along our flanks in thinly scattered groups, seemingly more concerned with staying clear of the next napalm drop than with massing for an attack.”

B.B.C. correspondent René Cutforth, a few months later, recounted a typical attack: “[T]he Corsair, with the air of someone who has now finally lost all patience, came screaming in again, circled, slowed … and ‘tossed,’ as it were, negligently, a long, yellow, banana-shaped object over the knife-edge of the ridge. It fell slowly, turning over and over, and where it landed a dark red flame grew and spread outwards in waves until it covered a great area, Black

smoke went up. The sound which came to us later was a sort of lax explosion. ‘Floomf,’ it said.

‘That’s napalm,’ said the Colonel next to me, ‘jellied petrol. It reaches a temperature of more than 1,000 degrees Centigrade in a few seconds. Horrible stuff.’”

On Valentine’s Day 1951, Paul Freeman watched strikes called in to defend his encircled infantry position. “The entire side or top of a hill would erupt in a big roiling ball of orange flames and thick black smoke,” he reported. Later, he walked the perimeter. “I went down a little draw, and I’ll never forget the sight. There were hundreds of burned bodies in it. The snow was burned off the ground and Chinese bodies were lying in heaps, all scorched and burned from our napalm, their legs and arms frozen in grotesque angles. … But what I saw in that draw was only the beginning. We found hundreds and hundreds more, caught in draws and ravines where they’d been trying to hide,” he said. Napalm was nine years old.

---


American generals implemented the urban area napalm bombing strategy used against Japan as soon as practicable. Emmett “Rosie” O’Donnell, who assumed command of U.S. Far East bomber forces shortly after the war started, testified to Congress in 1951: “It was my intention and hope … [to] go to work on burning five major cities in North Korea to the ground, and to destroy
completely every one of about 18 major strategic targets.” Seoul, which changed hands several times during the conflict, was an early target. “Planes dropped a fresh rain of napalm fire bombs on districts already consumed by yesterday’s dropping of bombs,” the New York Herald Tribune reported in September 1950. Flamethrowers played a supporting role. “American flame-throwing tanks stabbed flimsy Korean houses, igniting whole blocks,” another journalist wrote on the 27th. On 3 and 5 January 1951, following orders from commander Matthew Ridgway to attack the northern capital Pyongyang “with the goal of burning the city to the ground with incendiary bombs,” B-29s bearing napalm incinerated about one-third of the metropolis. The city “burned like a furnace for two days,” according to North Korean state radio. As in Japan, the Air Force used an advance pathfinder airplane to mark targets, followed by bombers that arrived at five-

27 The air force was not permitted to accomplish this objective initially because of a desire on the part of the U.S. Joint Chiefs to avoid civilian casualties, O’Donnell continued, but “we did it all later anyhow. … [T]he entire peninsula is just a terrible mess. Everything is destroyed. There is nothing standing worthy of the name. … Just before the Chinese came in [October 1950] we were grounded. There were no more targets in Korea.” Major General Emmet O’Donnell, Jr. “Testimony to U.S. Senate Committee on Armed Services and Committee on Foreign Relations.” Eighty-second Congress, First Session. Hearings to Conduct an Inquiry into the Military Situation in the Far East and the Facts Surrounding the Relief of General of the Army Douglas MacArthur from his Assignments in that Area. 1951: U.S. Government Printing Office. 3063-114. In Lumsden. Incendiary Weapons. 45. See Futrell. The United States Air Force in Korea. 42.


minute intervals to drop napalm from around 4,000 feet. “Once the fire got going, each bomber added to the conflagration,” an official history explained. Ultimately, LeMay, who went on to head the Strategic Air Command and became the youngest U.S. four-star general since Ulysses Grant, wrote, “We burned down just about every city in North Korea and South Korea both ... we killed off over a million civilian Koreans and drove several million more from their homes, with the inevitable additional tragedies bound to ensue.”32 “Fry ‘em out, burn ‘em out, cook ‘em,” intoned narrator John Ireland as flamethrowers, also deployed extensively, scoured a mountainside in John Ford’s 1951 Navy documentary This is Korea.33 Napalm’s efficacy, once again, was unsurpassed.34

---

31 History of the Third Bombing Wing July-December 1952. 5-9. In Futrell. The United States Air Force in Korea. 518. Attacks in Korea were significantly smaller than in Japan. A May 1951 attack on the city of Sinuiju with 312 Allied planes, for example, was one of the largest of the war. George Barrett. “Biggest U. N. Korea Air Blow Wipes Out Foe’s Supply Base; Allied Fighter-Bombers’ All-Day Blasting of Suan, Near North’s Capital of Pyongyang, Seen Also as ‘Warning’ to Communists.” 9 May 1952: NYTimes.com.

32 LeMay with Kantor. Mission with LeMay. 382.

33 John Ford, Dir. This is Korea! 10 August 1951: United States Navy, Republic Pictures.PublicResourceOrg. 4 June 2009: YouTube.com, 28'57". (See also: carrier crews loading napalm belly tank bombs. 35’00". Close support strikes. 39’00”-40’52”, 45’00”-45’55”) See John Halliday and Bruce Cumings. Korea: The Unknown War. 1988: Viking. 166.

34 Local mixing stations produced the gel on site in Korea. A U.S. Air Force film shot list, for example, included the following: “[CU] mixer vat for Napalm mixture. 4) CU dry Napalm mix being mixed with 72 octane gas. 5) MS high angle looking down on mixing machine showing the tanks of gas with tubes running from same to mixing vat. Good coverage of the Napalm mixing area showing the old and new methods of mixing Napalm. 6) CU enlisted men working at various duties in the area, some pouring the dry mixtures, others pouring gas, others using air hose to mix the composition.” Department of Defense. Department of the Air Force. “The Napalm Comb Story.” 21 April 1951: Archives.gov.
“A curious figure was standing a little crouched”

Observers noted the harsh effects of the new weapon. Cutforth described his arrival in a town 20 minutes after its capture by the U.N. in early 1951. “All around them stretched the still smoldering acres of ashes … [A] corpse, bolt upright by some trick of contraction set up by the napalm which had killed him, sat hideously grinning, and smoldering all over,” he wrote. A few days later, a doctor at a British field hospital summoned him to complain about new injuries caused by napalm. “In front of us a curious figure was standing a little crouched, legs straddled, arms held out from his sides. He had no eyes, and the whole of his body, nearly all of which was visible through the tatters of burned rags, was covered with a hard black crust speckled by yellow pus. … He had to stand because he was no longer covered with a skin, but with a crust-like crackling which broke easily,” Cutforth wrote.”35 Pilots vomited at the effects of the munition. “Allied aviators reluctantly

learned the nauseating lesson of indiscriminate slaughter. … [W]e killed civilians, friendly civilians, and bombed their homes; fired whole villages with the occupants — women and children and 10 times as many hidden communist soldiers — under showers of napalm, and the pilots came back to their ships stinking of the vomit twisted from their vitals by the shock of what they had to do,” recounted a history drawn from official sources.36


People who survived napalm attacks bore horrified witness. On 1 December 1950, a Marine pilot accidentally dropped his bomb in the middle of about one dozen U.S. soldiers surrounded by Chinese troops. James Ransone Jr. reported the results: “Men I knew, marched and fought with, begged me to shoot them. It was terrible. Where the napalm had burned the skin to a crisp, it would be peeled back from the face, arms, legs … like fried potato chips. Men begged to be shot. I

A few weeks later, on 20 January 1951, U.S. planes dropped napalm at the mouth of a cave in an area civilians had been told to evacuate. The cavern, as it happened, sheltered hundreds of refugees, including 15-year-old Eom Han-won. “When the napalm hit the entrance, the blast and smoke knocked out kerosene and castor-oil lamps we had in the cave … It was a pitch-black chaos — people shouting for each other, stampeding, choking. Some said we should crawl in deeper, covering our faces with wet cloth. Some said we should rush out through the blaze. Those who were not burned to death suffocated,” Eom recalled. The youth escaped through machine gun strafing from the airplanes. In February, New York Times correspondent George Barrett described the fate of a small village south of Seoul:

A napalm raid hit the village three or four days ago when Chinese were holding up the advance, and nowhere in the village have they buried the dead because there is nobody left to do so. This correspondent came across one old woman, the only one who seemed to be left alive, dazedly hanging up some clothes in a blackened courtyard filled with the bodies of four members of her family. The inhabitants throughout the village and in the fields were caught and killed and kept the exact postures they held when the napalm struck — a man about to get on his bicycle, fifty boys and girls playing in an orphanage, a housewife strangely unmarked, holding in her hand a page torn from a Sears-Roebuck catalogue crayoned at Mail Order No. 3,811,294 for a $2.98 “bewitching bed jacket — coral.” There must be almost two hundred dead in the tiny hamlet.

---


Such reports sparked criticism. In Britain, where memories of incendiary attacks by Germany during the Blitz were fresh, members of Parliament repeatedly protested civilian casualties from napalm in the spring of 1952. The gel, opponents argued, was indiscriminate and cruel. The government should not use napalm in “areas which are predominantly civilian,” one M.P. argued. “It

---

40 Barrett’s observations were published on 9 February 1951. Cutforth’s description appeared in his memoir published in 1952.

is a weapon which inflicts terrible and indiscriminate loss and suffering,” said the Archbishop of York, who demanded that it be outlawed. Cold War antagonists joined in, driven by principle, politics, or a combination of both. Napalm “is a monstrous soul-destroying device that puts its user beyond the pale of human society,” charged the Far East correspondent for the London Daily Worker, a publication associated with the U.S.S.R.

Washington responded immediately, even though there was no comparable domestic outcry. Pentagon officials denied that the Air Force targeted civilians, asserted it gave warnings before area attacks, claimed napalm burns were no different from any others, and maintained that similar weapons had been used since 360 B.C. In private Omar Bradley, General of the Army and Chairman of the Joint Chiefs of Staff, told the British that their objections “would harm Anglo-American relations” if they continued. He requested permission to issue a statement that confirmed U.K. support for U.S. napalm attacks. Prime Minister Winston Churchill expressed misgivings, but did not stand in the way of agreement by Britain’s commanders. He recorded his meditations, if not his actions, in a 22 August 1952 file memorandum:

I do not like this napalm bombing at all. A fearful lot of people must be burned, not by ordinary fire, but by the contents of the bomb. We should make a great mistake to commit ourselves to approval of a very cruel form of warfare affecting the civilian populations. Napalm in the war was devised by and used by fighting men in action against tanks and against heavily defended structures. No one ever thought of splashing it about all over the civilian population. I will take no responsibility for

---


it. It is one thing to use napalm in close battle, or from the air in immediate aid of ground troops. It is quite another to torture great masses of people with it.46

In the event, Bradley never issued the statement.47

British airpower theorist and law of war expert J. M. Spaight, O.B.E., C.B.E., C.B., former Principal Assistant Secretary of the Air Ministry, redoubtable at age 76, made a case for napalm in February 1953 in the establishment Royal United Services Institute for Defence Studies Journal. First, he asserted, in direct opposition to the Archbishop’s claims, napalm was precise rather than indiscriminate, and most useful against objects. “The bomb, it is evident, is not a weapon for strategic use,” he wrote, “napalm was dropped with extraordinary precision, sometimes only 50 yards ahead of the American troops; it was also dropped on the sides of a hill while marines were all along the road directly beneath.” Moreover, he continued, “It is a particularly effective one against matériel; it is not primarily a weapon for use against personnel.”48 These observations, he argued, reflected recent battlefield revelations. “Napalm was one of the ‘discoveries’ of the Korean War. It had been used in the fighting in the Pacific in the 1939-45 War, but it was in Korea that its effectiveness as a stopping weapon was fully demonstrated,” he asserted.49 Second, its effectiveness had to be considered. “If it is used to stop an enemy tank which is advancing and perhaps scrunching


its way through the helpless wounded lying in its path, the sum of evil involved in its use is not all on one side of the account. … But for it the United Nations forces might have been bundled neck and crop out of Korea in 1950-51. That would have been an immeasurable calamity for humanity.”

Finally, he maintained, regulation was impractical: “The ingredients of napalm — jellied petrol — are common and universally available substances which could not possibly be controlled in the same way as uranium.” Only better weapons, he concluded, would end napalm’s reign — as only the long bow ended the utility of armored knights. “New weapons, horrible weapons maybe, will kill the new armour in due season,” he concluded. Strikingly, Spaight did not discuss contemporaneous napalm bombardments of Korean cities, or consider instances in which precision napalm attacks proved impossible to achieve.

Fighting slowed in Korea in mid-1953, and ended on 27 July with the Panmunjom armistice. Napalm, and the points of debate it inspired, then disappeared almost entirely, for a time, from public discourse.

Cold War heat

America’s Cold War clients in Latin America, the Middle East, and Asia used napalm frequently between the Korean conflict and the end of the Vietnam War. U.S. advisors often supplied the gel directly. There do not appear to have been any significant objections. In Latin America, the first and most extensive use of napalm was in Cuba, where the U.S. hoped it could help Fulgencio Batista

82. InformaWorld.com.

84. InformaWorld.com.

defeat Fidel Castro. On 24 May 1958 Batista, bolstered by U.S.-made napalm bombs, launched Operation Verano, the only major offensive of the war. It failed. Batista’s pilots dropped flaming gel on their own troops, as well as rebels, in the desperate retreat that concluded the operation.\textsuperscript{53} In 1961, the Central Intelligence Agency ordered napalm strikes to support the landing of its counter-revolutionary émigré army at Playa Girón in the Bay of Pigs on 17 April. Individual B-26 bombers dispatched with machine guns and firebombs on the 17\textsuperscript{th} and 18\textsuperscript{th} failed to have much impact, according to invasion historian Howard Jones. The Agency then “stretched the rules of engagement by sending a half-dozen B-26s, two of them piloted by Americans and all under cover of U.S. Navy Combat Air Patrol planes … [T]hey spotted a seven-mile-long convoy of tanks, trucks and militiamen … Two of the planes peeled off in an attack, one hitting the lead vehicle with a rocket and the other destroying the last truck at the end of the line. The convoy immobilized, all six B-26s repeatedly battered the chaotic mass with bombs, rockets, machine guns and napalm, destroying seven tanks and twenty troop-filled trucks while inflicting eighteen hundred casualties and leaving two miles of smoke and fire churning upward.”\textsuperscript{54} Nevertheless, the invasion collapsed on the afternoon of the 19\textsuperscript{th}.\textsuperscript{55}


Washington supported at least two napalm strikes in Peru and Bolivia. On 19 September 1965 the Peruvian air force, assisted by U.S. special forces, firebombed a suspected communist guerrilla concentration near the Inca ruins of Machu Picchu.66 Similarly, on 31 March 1967, the Bolivian air force attacked mountain guerrilla retreats with napalm in a campaign that ended with the capture, amputation of the hands, and execution of the Argentine physician and revolutionary leader Ernesto “Che” Guevara.57

In the Middle East, Israel frequently found uses for napalm. In 1956, the new state used the gel against Egyptian forces; in 1964, against Syria; in 1967, again against Syria, and against the U.S.;
in 1969, against Lebanon and Egypt, then known as the United Arab Republic; in 1972, again against Lebanon; and in 1973, against Egypt and Syria during the Yom Kippur War.\textsuperscript{58}

Turkey also occasionally used napalm, dropping gel bombs on Cypriot forces backed by N.A.T.O. ally Greece in 1964, and again in 1974. “The planes fired rockets, cannon, incendiary bombs and napalm — jellied gasoline” Clyde Farnsworth reported for the \textit{New York Times} in August 1964.\textsuperscript{59} “Hundreds of non-combatants have been killed in attacks on innocent people. The villages of Pomos and Pyrgos have been reduced to burning ruins, and a mass of humanity is aflame by the use of napalm bombs,” asserted Zenon Rossides, the Cyprus representative to the United Nations.\textsuperscript{60} In a particularly awkward moment for the U.S., a 750-pound napalm bomb manufactured by the American Stove Company and marked “Property of U.S. Air Force” was re-

---


\textsuperscript{59} Clyde H. Farnsworth. “64 Planes in Raid; Greek Cypriotes Put Casualties at 300 — Warn of Reprisal. Jets Continue Attacks on Cyprus as Nicosia Reports Landings by Turkish Troops. Bombers Batter Greek Positions. Planes Seek to Blunt Drives on a Turkish Stronghold in Island’s Northwest.” 10 August 1964: \texttt{NYTimes.com}.

\textsuperscript{60} Zenon Rossides. “Excerpts from Speeches in the U.N. Security Council Debate on the Cyprus Crisis.” 10 August 1964: \texttt{NYTimes.com}.
covered by Greek Cypriots. A photograph of the device was published in a 1966 pamphlet produced by the Union of Journalists of the Athens Daily Newspapers titled “Satan Storms Cyprus.”\textsuperscript{61} In 1974, a Turkish airplane dropped a napalm bomb on three Austrian U.N. peacekeeping soldiers while they were driving in their car, and burned the men alive.\textsuperscript{62}

**Bombes spécial de l’empire**

European armies relied extensively on napalm in the fighting that accompanied the end of colonialism. The French led the way. On 16 January 1951, the first napalm bombs fell in Vietnam when L. M. Chassin, commander of the French Air Force in Indochina, used what he called “bombes spécial” ("special bombs") for a last-ditch defense of the town of Vinh-Yeh outside Hanoi.\textsuperscript{63} The largest aerial assault of the war to date had a devastating effect. A Viet Minh officer offered a vivid account:

\begin{quote}
[A]ll of a sudden, hell opens in front of my eyes. Hell comes in the form of large, egg-shaped containers, dropping from the first plane, followed by other eggs from the second and third plane[s]. Immense sheets of flames, extending over hundreds of meters, it seems, strike terror in the ranks of my soldiers. This is napalm, the fire which falls from the skies. ... The bomb falls closely behind us and I feel its fiery breath touching my whole body. The men are now fleeing in all directions and I cannot hold them back. There is no way of holding out under this torrent of fire which flows in all directions and burns everything on its passage.
\end{quote}


\textsuperscript{63} Chassin, L. M. *Aviation Indochine*. 1954: Amiot-Dumont. 97.
One of the officer’s soldiers ran up to him: “His eyes were wide with terror. ‘What is this? The atomic bomb?’ ‘No, it is napalm.’” The new weapon broke the advance and won the battle for the French. Chassin reported that the enemy subsequently changed its tactics and hid from the bombers under the jungle canopy. He recommended, therefore, that the gel be used to burn crops and forest cover rather than cities and the people in them.

French forces also used napalm in northern Africa. On 22 July 1961, their planes used the incendiary gel to help relieve a besieged military base in Bizerte, Tunisia. “Numerous victims died a terrible death by being burned alive by napalm bombs, despite the denial of the French delegation. My delegation has … photos showing the victims of napalm bombs,” the Tunisian representative to the United Nations told the body. Chassin’s colleagues evidently heeded the commander’s advice with respect to the most effective use of napalm. “Two-thirds of the French-planted forests that existed in eastern Algeria in 1954 were burned by French forces during the [1954-62] guerrilla war for Algerian independence, because wooded land provided shelter for nationalist guerrillas. About one-half of the area was destroyed by napalm, according to [French engineer Jean Carbonare],” The New York Times reported in November 1962. In some cases, however, commanders

---


65 Chassin. Aviation Indochine. 239.


had been obliged to “clear villages by air,” in the words of one observer. The U.S., the Times noted, was helping Algerians replant their burned forests.

British and Portuguese armies found the weapon equally useful in Africa. “Napalm bombs were used to rout the terrorists,” journalist Robert Conley explained of British tactics that ended the 1952-60 Mau-Mau rebellion in Kenya. Portugal used the gel to burn crops and attack concentrations of guerrillas in Angola in 1961 and 1962.

The napalm of national liberation

Independence allowed former colonies to follow the example of their past masters. Egypt dispatched napalm bombs to support Royalist allies in the Yemeni civil war that started in 1962. The bombardments were so extensive that they forced villagers in contested areas to abandon their homes and live in caves. On 24 September 1965, and again in 1971, India used napalm against


71 Robert Conley. “‘Gray Men’ Leave Kenya’s Jungles; Ex-Mau Mau Bands Taking Advantage of Amnesty; Official Explains Pardon; Britain Sent Troops.” 2 December 1963: NYTimes.com. The British tested napalm bombs in Malaya, but decided chemical herbicides were more effective at destroying vegetation, and the dispersed small guerrilla units they faced precluded battlefield deployment.


Pakistani troops. A reporter described charred vehicles that marked the Kashmir truce line. In 1969 and 1974, Kurdish residents of northern Iraq protested napalm bombardments by the Baghdad government. In Brazil, the military junta used napalm against Maoist rebels who tried to create a “liberated zone” in a remote part of the southeastern Amazon during the 1970-74 Araguaian war.

These widely dispersed conflicts drew extensive scrutiny from political leaders, lawyers, journalists, academics, and other commentators. Napalm specifically, however, was mentioned only in passing during this period, except for the scattered British objections in 1952. The British critics did introduce words like “civilians,” “cruel,” “indiscriminate,” and “illegal,” into the discussion about incendiary bombardments — terms with significant legal relevance in later years — but their campaign largely ended with the Korean armistice. For much of the world in the years after World War II, napalm was fundamentally an innovation of awesome power: an authority that could not be questioned. Vietnam changed that.

---


76 Reuters. “Napalm Used on Brazilian Rebel Hideouts.” 20 April 1970: Los Angeles Times. 21. ProQuest.UMI.edu. See Larry Rohter. “Long After Guerrilla War, Survivors Demand Justice From Brazil’s Government.” 28 March 2004: NYTimes.com. (“To this day, those villagers remain uncompensated and barred from returning to their small farms, which the military summarily expropriated or bombed with napalm three decades ago.”)
Trang Bang village in South Vietnam, 30 miles northwest of Saigon, shook with the thud of artillery shells on the morning of 8 June 1972. It was the third day of a fierce battle between infiltrators from the Viet Cong and North Vietnamese Army, who had occupied the town, and South Vietnamese Army units that had surrounded them. Helicopter rotors thumped. Airplane propellers roared. Machine gun fire echoed in the streets. Acrid smoke filled the air. Phan Thị Kim Phúc, nine years old, huddled with her mother and father, aunts, young brothers and cousins, and neighbors, about 30 civilians in all, in two outbuildings of a temple complex on the eastern edge of town. A few guerrilla fighters, driven from the center of town, sheltered among them. Pieces of masonry from nearby buildings rattled on the roofs of their shelters and across the courtyard. On several occasions, napalm bombs filled the air outside with flames and turned the light inside the build-
ings red. “Fire is falling from heaven!” villagers lamented. Route 1, the main national highway between Saigon and Cambodia passed just to the south of the temple. A checkpoint marked with barbed wire a few hundred yards down the roadway had produced a long line of stopped cars. Journalists watched the fighting from behind the wire. A small boy sold ice cones.  

Kim’s family had fled to the temple three nights earlier when Viet Cong soldiers took over their home and began to dig tunnels under their living room. Further movement was impossible. She pulled her favorite cousin, a chubby three-year-old named Danh, close to her. A light rain began to fall at lunch time.

At around 1:00 p.m. the rain cleared and a spotter airplane that had been circling the village dropped low and shot two white phosphorus rockets into an area behind the temple. White smoke rose in a thick plume to mark a suspected Viet Cong position. South Vietnamese troops near the front gate of the complex ran into the compound and tossed colored smoke grenades to indicate their own position. About 150 yards separated the two areas.

Fighters in the civilian shelters misinterpreted the signals, and concluded the entire complex was about to be bombed. “Get out! Everybody get out! They are going to destroy everything!” they screamed. Kim’s father and mother prepared the children for a dash to the roadblock. Oldest and smallest — the slowest — set out first: Kim’s grandmother, her aunt and nine month old baby, and her aunt’s two other children, including Danh. Middle children ran next: Kim and two of her brothers. Finally, the oldest siblings. “Run! Run fast, or you will die!” yelled the guerrillas, who

---

were also in motion. A woman grabbed a small girl frozen with fear. Sprinters made a rough line from the outbuildings, across the temple courtyard, through the main gate, and onto Route 1.²

A slow-moving propeller-driven Skyraider airplane appeared. It was badly off course and far from the white smoke. Nonetheless, it released its bombs. They were duds. A second plane appeared, even more off-course. It too dropped its bombs. A quartet of silver canisters filled with napalm jelly tumbled in silence toward the ground, then hit with unbelievable suddenness and a fierce “pop.” Huge welts of flame speckled with the brilliant flares of white phosphorus, and wreaths of thick white and black smoke, covered the stretch of highway between the roadblock and temple. A brutal wave of heat that felt like a giant had opened a furnace door swept over the journalists. A few seconds later, small figures began to appear from the smoke.³

Kim was knocked face first onto the ground. Biographer Denise Chong described what happened next: “Her first memory of the engulfing fires was the sight of flames licking her left arm, where there was an ugly brownish-black glob. She tried to brush it off, only to scream out at the pain of the burn that had now spread to the inside of her other hand. … She had taken a hit of napalm to her left side, on the upper part of her body. It incinerated her ponytail, burned her neck, almost all of her back and her left arm. … [A] tremendous fatigue and weariness overtook her, and as an intense heat seemed to eat her from the inside out, she felt desperately thirsty.” She screamed into the smoke: “Oh, Ma, it’s too hot, too hot!”⁴

---


Associated Press photographer Huynh Cong “Nick” Ut clicked off frame after frame as burned and terrified children ran to the barbed wire. He then ran to help. Kim’s clothes had burned away. Chong wrote, “Her body radiated heat, and chunks of pink and black flesh were peeling off.” Indeed, her skin was still burning in places. Soldiers and journalists dressed in combat fatigues gave her water to drink and poured more on her burns. Tragically, this reacted with the napalm and phosphorus and injured her further. Ching continued, “Phuc sustained burns to the severity of third degree or worse to 30 to 35 percent of her body surface. Those burned areas covered almost her entire back, reaching around on her left side to her chest, the back of her neck and into her hairline, and her entire left arm. Lesser burns resulted from burning napalm that splashed from her clothes onto her right arm, buttocks and stomach. The inside of her right hand was also burned from where it touched napalm on her other arm.” Ut loaded Kim and her aunt, also badly burned, into his van and drove them to a hospital in the nearby town of Cu Chi. “Please, help them,” he said to the nurse, then continued to Saigon to deliver his film. Kim’s picture was on the front page.


6 Chong. The Girl in the Picture. 90.

of newspapers around the world the next day, won a Pulitzer Prize for best news photograph, and has passed into legend as an iconic war image.\(^8\)

Danh’s small legs proved too slow to escape the fire. A South Vietnamese soldier scooped him up as he ran through the temple gate, but was himself incinerated by a direct hit from napalm. The little boy’s grandmother, who avoided the worst of the flames, collected his charred body and arrived at the checkpoint a few moments after Kim. Sheaths of skin dangled from Danh’s feet and flapped with his grandmother’s steps. He died within the hour.\(^9\)

Kim’s parents began a desperate search after the battle. First they looked in Cu Chi. When that proved fruitless the couple, who depended on the income from a roadside noodle stand run by Kim’s mother and were far from affluent, walked to Saigon. They searched the capital’s hospitals for three days and slept in the open each night. Clerks at the last institution they visited, Saigon’s First Children’s Hospital, denied any child matching Kim’s description had been admitted. Her parents checked every bed in the eight-story institution. Then, overwhelmed with exhaustion, they slumped together in the lobby. A cleaner passed with his mop, and Kim’s father approached him. “Excuse me, did you see a young girl brought here who was burned very badly? It would have been three days ago … Maybe she did not survive?” he asked. The cleaner led them outside and pointed to a small building with peeling clapboards and large windows covered by shutters. “That


\(^9\) Danh’s nine month old brother died six weeks later from his injuries. These were the only civilian fatalities from the napalm strike. Chong. The Girl in the Picture. 75, 83. See ITN. “Vietnam Napalm.” [YouTube.com](https://www.youtube.com). 1’14”.
room is for children who will die,” he said. When her parents arrived, Chung wrote, “Their daughter lay on a cot in a fetal position. A gray-brown gob matted her burnt hair, her face was badly swollen, and the bandages on her wounds were fetid with infection and stuck with charred and dead skin.” In 20 minutes, an ambulance chartered by her parents arrived to take her to the National Center for Plastic and Reconstructive Surgery, a special clinic founded in 1968 by U.S. surgeon Arthur Barsky and lawyer Thomas Miller: one of just a handful of burns hospitals in South Vietnam.  


10 Chong. The Girl in the Picture. 78-79.

11 Chong. The Girl in the Picture. 84.
Treatment for burn injuries can create exceptional pain. A doctor at the National Center in Vietnam compared the experience to being flayed alive: suffering so severe it constituted a “wound to the soul.” Each morning, after an examination, nurses took Kim to a special bathtub filled with surgical soap and warm water. They removed her dressings, then used a hand-held shower, and scissors if necessary, to peel away dead and infected skin without anesthetic in a process called debridement. When her sister came to visit, she fainted at Kim’s screams.\(^\text{12}\)

Skin grafts began once the infections had been healed and Kim’s strength had somewhat returned. Doctors used a special knife called a dermatome to shave swathes of skin from healthy areas of the girl’s body and affix them to her deepest wounds. Injury to the donor sites was itself comparable to a serious burn, and required careful treatment.\(^\text{13}\) Finally, to ensure that her new skin grew back without fusing to itself, Kim was sealed in a body cast and placed in traction. She began physiotherapy, which introduced new odysseys of suffering, when the cast was removed. In November 1972, after almost six months at the clinic, the longest stay in the history of the facility, the


\(^{13}\) Chong. *The Girl in the Picture*. 104.
little girl was discharged. "Napalm is the most terrible pain you can imagine," she said later to an interviewer.

Talons of the eagle

The first use of U.S. napalm in Vietnam was portentous: on 27 February 1962, two South Vietnamese Air Force pilots trained by American advisors attacked the Presidential Palace of U.S. ally Ngo Dinh Diem in Saigon in an attempted coup. "The planes made repeated passes over the Presidential Palace at low altitude, dropping napalm (jellied gasoline), firing rockets, strafing," the Associated Press reported. In a premonitory decision, U.S. authorities initially tried to hide the incendiary's use. The Secretary of State for Civic Action “denied that the pilots had used napalm,” at a press conference, according to New York Times reporter Homer Bigart. “There is some sensitivity here on the subject of napalm, which was used against Vietnam by the French,” Bigart

---

14 Chong. The Girl in the Picture. 105.

15 Elizabeth Omara-Otunnu. “Napalm Survivor Tells of Healing After Vietnam War.” University of Connecticut Advance. 8 November 2004: Advance.UConn.edu, Kim’s family was devastated by the deaths and injuries they suffered in the 8 June attack. Their home was damaged (later destroyed), their domestic animals killed, and their primary source of livelihood — the noodle stall managed by Kim’s mother — severely disrupted. See New York Times. “Misfortune Revisits a Vietnamese Girl.” 12 November 1972: NYTimes.com. They endured extreme poverty after the war, and Kim was required to tell her story to foreign journalists on numerous occasions by the government. She eventually defected to Canada with her husband. They now live near Toronto with their two sons. Kim has established a foundation, the Kim Phuc Foundation, to aid child victims of warfare. Kim Foudation. “History.” 9 May 2009: KimFoundation.com.

explained. Napalm, however, proved hard to hide. “A check on the attack yesterday showed that the napalm bomb had engulfed the roof of the palace in a sea of flame,” the journalist continued.

The effectiveness of gelled hydrocarbons was apparent to any observer. On 11 May 1963, as U.S. military engagement escalated, Secretary of Defense Robert McNamara observed Vietnamese Air Force planes drop napalm in an exercise. Just 48 hours later, reporters filed the first combat reports of napalm drops by South Vietnamese forces. Americans used the incendiary for the first time on 9 February 1963 — against a South Vietnamese village. “A continuous sheet of flames a half mile wide was visible moving across one field,” the Associated Press newswire reported. By the end of the year, napalm was routine. “On clear days patrons lunching in the ninth-floor restau-


In March 1964, the publication in London of a photograph of a baby burned by napalm gave some pause, but did not produce nearly the reaction of later pictures. Washington issued an official statement of concern but denied its instructors had dropped the bomb that caused the injury.

On 9 March 1965, President Lyndon Johnson expanded the use of napalm to include targets in North Vietnam. Gel bombs fell there 11 days later. “Napalm bombs are considered ‘conventional ordnance,’” the *Times* explained to its readers.

Pentagon planners integrated napalm into America’s military bureaucracy as its use expanded. In December 1963, the Army and Air Force cataloged its martial advantages in *Technical Manual 3-215.* Thickened fuel “increases the range of flamethrowers, imparts slower burning properties, gives clinging qualities, and causes flame to rebound off walls or other surfaces and to go around

---


In late 1963, some U.S. troops began to mix charcoal into their napalm to extend the range of the burning gel. Soldiers called the result a “Madame Nhu cocktail” in honor of the wife of South Vietnamese President Ngo Dinh Diem. Jerry Shank. “A Captain’s Last Letters from Vietnam.” 4 May 1964: U.S. News & World Report.

In Seymour Melman, Dir. of Research, Clergy and Laymen Concerned About Vietnam. *In the Name of America: The conduct of the war in Vietnam by the armed forces of the United States as shown by published reports Compared with the Laws of War binding on the United States Government and on its citizens.* January 1968: The Turnpike Press. 269.


corners.”26 There were three kinds of napalm, the document explained: “M1” followed Fieser’s recipe of 50% coconut oil, 25% napthenic acids, and 25% oleic acid; “M2” added silica to increase stability, and so on.27 U.S. equipment included bombs up to 750 pounds in size, napalm land mines, and smaller canisters filled with the incendiary.28 Hershberg’s white phosphorus burster design, tested on the Harvard College soccer field, was the incendiary ignition system of choice.29

Some observers applauded the ferocious effectiveness of the weapon in terms reminiscent of World War II and the Korean War. Nobel laureate John Steinbeck was a particular enthusiast. On 14 January 1966, he proposed the “Steinbeck super ball” in a letter to President Johnson’s special assistant Jack Valenti, who forwarded it to Secretary of Defense Robert McNamara:

I think the most terrifying modern weapon is the napalm bomb. People who will charge rifle fire won’t go through flames. ... What I suggest is a napalm grenade, packed in a heavy plastic sphere almost the exact size and weight of a baseball. The detonator could be of very low power — just enough to break the plastic shell and ignite the inflammable. If the napalm is packed under pressure, it will spread itself when the shell breaks. The detonator (a contact cap) should be carried separately and inserted or screwed in just before throwing. This would allow a man to carry a sack full of balls without danger to himself. Now we probably have devel-


28 Seymour M. Hersh. Chemical and Biological Warfare: America’s Hidden Arsenal. 1968: The Bobbs-Merrill Company. 64.

oped some fine riflemen, sharp shooters, etc. but there isn't an American boy over 13 who can't peg a baseball from infield to home plate with accuracy. And a grown man with sandlot experience can do much better. It is a natural weapon for the Americans. Six men could ring an area with either napalm or white phosphorus faster than you could throw a magazine into an automatic or a machine gun. And an enemy with a bit of flame on his clothes or even in front of him is out of combat. The weapon would also be valuable for cleaning out tunnels and foxholes where the grenade has to make contact. Mounted as a rifle grenade, the Steinbeck super ball would also be valuable for burning off cover of extra ambush country or of tree borne sniper fire.  

There was no recorded response.

“People have this thing about being burned to death”

By 1966, napalm was an integral part of the U.S. war effort in Vietnam. Fighter-bombers dropped about 1,500 tons per month: five to ten percent of the total weight of munitions delivered by air. The following year, as the war intensified and production increased, the total grew more than tenfold to about 25,000 tons per month — more every 60 days than was dropped in World War II or the Korean War. America sustained this level of bombardment throughout the rest of the


32 Seymour M. Hersh. Chemical and Biological Warfare: America’s Hidden Arsenal. 1968: The Bobbs-Merrill Company. 64. Chemical and Engineering News. “Napalm-B to Use Huge Amount of Polystyrene.” 1966 March 14: Chemical and Engineering News. Indian journal Economic and Political Weekly reported different totals, without specific attribution, in 1970: “In 1968 the Defence Department revealed the quantity of napalm used in Vietnam: 1963: 2,181 tons; 1964: 1,777 tons; 1965: 17,000 tons; 1966: 54,000 tons; and in 1968, it was estimated that the Air Force alone dropped more than 100,000 tonnes. (This does not include figures for Laos and Cambodia).” Navroz Mody “Chemical Warfare in Vietnam.” 13 June 1970: 5 Economic and Political Weekly 24. 948-49. JSTOR.org.
conflict. Why was the weapon so valuable? “People have this thing about being burned to death,” a pilot said.\textsuperscript{33}

New pilots often trained at Dixie Station, an area of the South China sea off the coast of South Vietnam that hosted a permanent contingent of aircraft carriers. Here, according to military aviation specialist Frank Harvey, “He learns how it feels to drop bombs on human beings and watch huts go up in a boil of orange flame when his aluminum napalm tanks tumble into them.”\textsuperscript{34} Tacticians considered napalm especially useful for close combat support. Pilots learned to drop 120 gallon tanks, which weighed 800 pounds and were 10 feet long by three feet thick, from 50 feet in the air to within 100 feet of targets. The thin tanks tumbled erratically as they fell, and blanketed an area about 150 feet long and 50 feet wide in flames.\textsuperscript{35} “Anyone who survives a napalm attack is apt to be dreadfully burned and, without first rate medical care, is condemned to a lingering, painful death or, at best, permanent disfigurement,” the \textit{New York Times} reported.\textsuperscript{36}

Viet Cong troops, who had no access to combat airplanes, occasionally used napalm in hand-carried flamethrowers. “Spraying fire about in great whooshing arcs, the Viet Cong set everything afire … Charred children were locked in ghastly embrace, infants welded to their mothers’


\textsuperscript{35} \textit{New York Times}. “Napalm — A Useful but Not a Pretty Weapon.” 10 December 1967: NYTimes.com. “The firebomb is a cigar-shaped, thin-casing tank filled with thickened gasoline. Fighter, fighter-bomber, and other aircraft may carry from two to eleven bombs under the wings. On impact, the bomb produces a fireball and spreads thickened fuel over an elliptical area that varies with the speed of delivery and size of the bomb. The fireball is usually of short duration, about 5 seconds, with intense heat; the fuel may burn about five minutes, depending upon the type of impact, with reduced intensity,” Army Field Manual FM 20-33 explained in more detail. Department of the Army Headquarters. “Combat Flame Operations.” \textit{Field Manual FM} 20-33. July 1970: Department of the Army. 7-1.

breasts,” *Time* reported of a 1967 massacre.\(^{37}\) It was not, however, a significant part of their arsenal.

As the Pentagon’s familiarity with napalm increased, so did its bureaucratic punctiliousness. The Army’s revised *Combat Flame Operations Field Manual*, issued in 1970, codified a distinction between “firebombs” and “incendiary bombs:” “Firebombs are used primarily by elements of the tactical air force to support ground operations. Incendiary bombs are generally used by the strategic air force to attack strategic or deep targets …”\(^{38}\) Both kinds of incendiaries were to be used against combatants. Incendiary bombs, however, were also to be used against “Facilities that support enemy operations” which “include … urban areas.”\(^{39}\) Here, the *Field Manual* continued, notwithstanding J. M. Spaight’s precision theories, area bombing was required. “To be effective as antipersonnel weapons, incendiary bombs must be used in sufficient quantities to overcome existing fire defense measures. Therefore, the object is to surround the personnel with a ‘wall of fire’ to create intense heat and to exhaust oxygen supplies in enclosed spaces. Area bombing must be used to accomplish this,” Army strategists wrote.\(^{40}\) Dreams of precision urban incendiary bombing died.


\(^{38}\) Department of the Army Headquarters. “Combat Flame Operations.” *Field Manual FM 20-33*. 7-1. “An incendiary bomb is a cluster of small bomblets that contain incendiary material. The cluster opens at a predetermined altitude to spread the bomblets over the target area to start a number of individual fires,” the Manual continued. *Army Field Manual FM 20-33*. 1-7.


Vietnam added an innovation to the tactics of aerial napalm delivery: barrel drops from helicopters, ignited by incendiary grenades. Commander Bob Parker explained how it was done:

A ‘Napalm Drop’ was usually from a CH-47 Chinook cargo copter. [We] hung twenty or so fifty-five-gallon drums in cargo nets under the bird. ... The pilot would dive on the target until it lined up with the bolts in the rudder pedals, and then release the hook. As the drums cascaded downward, a four-man crew would snatch the nets in through the floor and then stow them away. ... I would lean out the right side and drop a white phosphorus or thermite grenade to try to land with the napalm and ignite it. This sounds really simple, except that a normal drop was at max airspeed and less than 400 feet above the ground. ... In some cases, when we were close to friendlies, we had to come to a hover to be sure the nape was on target. In most cases a scout ship would mark the target for us and ignite the nape with tracers if my grenade did not. A single drop could cover an area the length of a football field and one-half the width.41

Parker described the results of one such a strike: “The firing stopped and [a lieutenant] reported that several VC had decided to surrender. They came bursting out of their positions covered in jellied gasoline and ran into the arms of the American troops screaming ‘Choi Hoi!’ (in effect, ‘I surrender!’). The others stayed in their bunkers and cooked in place.42

Even a massive commitment of this fearful weapon, however, was not enough for victory. In April 1972, the U.S. deployed napalm in the largest quantities ever seen in history to block a massive North Vietnamese assault. Time described the frenzied effort. “When a flight of four Phantoms lands on the twin 10,000-ft. runways, the planes quickly taxi to rows of protective concrete revet-


ments. Once a plane is safely parked, the pilot climbs out and is handed a cold can of Budweiser. While he sips the brew, a yellow forklift truck trundles up with armaments, and the ground crew hurriedly rearms the Phantom with an awesome array of weaponry — iron bombs, rockets and napalm canisters. Normally, the entire operation takes only 20 minutes. The beer never gets warm before the pilot climbs back into his Phantom to take off on another sortie.”

But the bombardments merely delayed defeat. In 1973, the U.S. withdrew its troops. South Vietnam surrendered on 30 April 1975. Napalm, and with it America, had lost its first war.

“The most transparent Communist propaganda”

U.S. civilians responded to the use of napalm during the first years of the Vietnam War much as they had during the Korean War: it was not much discussed, and when it was, observers generally explained napalm’s dire effects as an inevitable, if perhaps regrettable, element of war. As America’s involvement expanded in 1965 and 1966, however, debate increased.

British commenters, as during the Korean War, voiced the first objections to the American incendiary bombs. Graham Greene, in his 1955 novel The Quiet American, had one of his characters observe: “‘What I detest is napalm bombing. From 3,000 feet, in safety.’ He made a hopeless gesture. ‘You see the forest catching fire. God knows what you would see from the ground. The poor devils are burnt alive, the flames go over them like water. They are wet through with fire.’”

This was perhaps the first literary criticism of napalm in English. Robert Davis, then chairman of the English Department at Smith College, dismissed the novel as fatuous in a review for the New York Times: “[Greene’s] caricatures of American types are often as crude and trite as those of Jean-


Paul Sartre. … a civilization composed exclusively of chewing gum, napalm bombs, deodorants, Congressional witch-hunts, celery wrapped in cellophane, and a naïve belief in one’s own superior virtue.”

Silence descended on napalm in Vietnam for almost a decade. Then, on 8 April 1963, as the U.S. expanded its use of the gel, Nobel laureate Bertrand Russell delivered a blistering critique in a letter to The New York Times. “[T]he war which is being conducted is an atrocity. Napalm jelly gasoline is being used against whole villages, without warning,” he wrote.

Editors offered a sharp rebuttal: “Napalm has been used by the South Vietnamese air force against real or imagined havens of Vietcong guerrillas. Its use has certainly killed innocent people — as other weapons have done in all wars. American advisors have opposed its employment, on both moral and practical grounds, against all except clearly identified military targets.” Complaints of this nature about napalm, the editors concluded, reflected “An unfortunate and — despite his eminence as a philosopher — an unthinking receptivity to the most transparent Communist propaganda.

Journalists struggled. To some, war fought with napalm was an enigma. “Tactical air support is used extensively, but if often is difficult to ascertain whether the people killed by napalm or frag-


mentation bombs were guerrillas or merely farmers,” an Associated Press reporter wrote on 8 July 1962.\textsuperscript{48} To others, the gel was counter-productive. French journalist Georges Penchenier, kidnapped and held near Saigon for 16 days in 1964 by the Vietcong, gave one of the earliest assessments of napalm’s effectiveness, and its costs, in guerrilla warfare: “The destructive effects of American planes dropping napalm bombs — the Vietcong are terrified of them — are very great, and the insurgents have no answer to them. Every day, B-26’s strafe the jungle, bombarding anything that looks suspicious and setting fire to what are presumed to be Vietcong crops.” However, he continued, “Whenever a skirmish occurs, the Saigon air force intervenes and whole villages are burned down. How can one expect the countryside not to rally to the insurgents in such circumstances?”\textsuperscript{49} Local priest Augustine Nguyen Lac Hoa reached a similar conclusion. “How can we explain to a mother when her child is burned by napalm?” he asked the same year, when he accepted the Ramon Magsaysay Award for outstanding service to Asia.\textsuperscript{50} Impartiality, indeed, was difficult given the grievous injuries inflicted by the gel. “One distraught woman appeared at the field medical station holding a child whose legs had been horribly burned by napalm. The child is not expected to live,” Neil Sheehan reported for \textit{The New York Times} in February 1966.\textsuperscript{51}

Pentagon officials, however, had no doubts about the weapon’s utility. They labelled critics naive. “Restrictions on talk about the use of napalm came after the Vietcong gave particularly effec-

\textsuperscript{48} Associated Press. “U.S. Combat Instructors Learn As They Teach in South Vietnam.” 8 July 1962: \textsc{NYTimes.com}.

\textsuperscript{49} Georges Penchenier. “Close-up of the Vietcong in Their Jungle; A French reporter held captive by guerrillas in South Vietnam here reports on what he saw of the Vietcong — the men, their morale, their methods.” 13 September 1964: \textsc{NYTimes.com}.

\textsuperscript{50} United Press International. “Saigon’s Tactics Scored by Priest; Fighter Against Reds Says Cruelty Costs Popularity.” 1 September 1964.

\textsuperscript{51} Neil Sheehan. “Vietnam Peasants Are Victims of War.” 15 February 1966: \textsc{NYTimes.com}. 
tive propaganda distribution to the photograph of a villager and his child after a raid. But the fire-
bombs have been too valuable in penetrating caves and trenches to give up,” an unidentified “sen-
seems to have an aversion to napalm,” the source continued, “because people think it’s kinder to
blast a man’s head off than to fry him to death.” The next day, 3,500 Marines landed to defend a
U.S. air base at Da Nang. By the end of the year, almost 200,000 U.S. troops were in the country.

Objections and praise alternated as American commitments increased. “I do not remember a
single instance of a German military official (not even of an SS or Gestapo official) speaking as
openly, callously and shamelessly of the German war crimes as your ‘senior officer’ speaks of the
frying to death of women, children, helpless peasants, and other noncombatants in South Viet-
nam,” World War II survivor Emily Rosdolsky of Detroit wrote to the editors of the New York Times
on 16 March, in response to the piece by Sheehan cited above. British Parliamentarians com-
pared napalm to poison gas weapons. On the other hand, 33-year-old U.S. Army Captain Joseph
House of Birmingham observed of one battle, “If it hadn’t been for the air strikes … there was a
good chance we would have been overrun on our left flank.” When helicopters and fighter-
bombers began “pouring napalm over the Vietcong installations,” a reporter recalled, the enemy
broke and ran. House concurred: “[I]t was like shooting fish in a barrel” after that, he said.

54 Clyde H. Farnsworth. “War-Gas Debate Stirs Commons; Wilson Parries Criticism — Many Nations
were killed?” a reporter asked one pilot. “Who the hell knows?” he answered. Charles Mohr. “Air Strikes Hit
“A small group of thoughtful, committed citizens”

This was the context when the Stanford Committee for Peace in Vietnam, a group of about two dozen Stanford University students and faculty, bolstered by a few residents from nearby towns, began to meet. Committee members were “each more or less fitfully active against the war” recalled participant H. Bruce Franklin, later a Rutgers University professor. “It included a few people who called themselves pacifists, two who called themselves Marxists, and most who no longer knew what to call themselves,” Franklin wrote. This small group organized the first protests against the manufacture of napalm which, in turn, inspired a national movement against the Dow Chemical Corporation, the largest manufacturer of the gel.

An insider struck the spark that set the movement ablaze. In late 1965, the Stanford Committee organized a leafletting campaign against a factory that manufactured portable napalm field mixing machines. The United Technology Center (U.T.C.), owned by the United Aircraft Corporation (now called United Technologies), was located in the town of Coyote, 15 miles south of San Jose. These circulars had little effect. In January 1966, however, a worker at U.T.C.’s headquarters in Sunnyvale, secretly told the group that the firm had won a massive new contract to produce napalm itself.

---


58 Prokosch. The Technology of Killing. 127.
“Napalm B,” developed in 1964 by scientists at Eglin Air Force base in Florida, burned hotter, stuck tighter, and ignited more reliably than earlier formulations.\(^5^9\) It was made with 50 percent polystyrene, a synthetic substance manufactured by Dow and 16 other U.S. firms (Dow trademarked one variety as “Styrofoam”), 25 percent benzene, and 25 percent gasoline.\(^6^0\) In mid-1965, the Pentagon asked for production bids from the 17 domestic firms that made polystyrene. A quintet stepped forward.\(^6^1\) Officers announced the winners in July, 1965: an $11 million order for 100 million pounds to U.T.C.; contracts of up to $5 million for at least 25 million pounds each to runners up Dow and Witco Chemical. Dow constructed a mixing line staffed by 10 employees at its plant in Torrance, California, near Los Angeles.\(^6^2\)

The activists were intrigued. “[W]e thought we could at last do something concrete: stop local production. And practically all of us saw a great potential for some kind of mass campaign that would swiftly educate people about the ‘immoral’ nature of the war and the illusions of our government,” Franklin wrote.\(^6^3\) Committee members decided to redouble their efforts in Coyote, ex-


\(^{61}\) E. N. Brandt. *Growth Company: Dow Chemical's First Century*. 1997: Michigan State University Press. 356. (Brandt worked in public relations for Dow for many years and rose to be director of public relations for the company.)


\(^{63}\) Franklin. *Vietnam and Other Fantasies*. 74-76.
pand the flyer campaign to the U.T.C.’s headquarters in Sunnyvale, and lobby corporate executives. “We leafletted the workers, as if a leaflet could persuade them to quit their ‘immoral’ jobs, and we sat down with the top management to convince them that they should cease being war profiteers,” Franklin explained.  

The summit took place on 25 January 1966. A trio of former military officers employed by the U.T.C. — two retired generals, and a retired admiral — flanked the Center’s president as he entered the conference room. The executives, Franklin wrote, invoked economic necessity, humanity, and patriotism to defend the company’s work: “Even if we didn’t want to work on napalm, we would have to just to stay in business. … Napalm will help shorten the war. … Besides, whatever our government asks us to do is right,” the academic paraphrased their arguments. Committee representatives argued that international law prohibited war crimes, and claimed there was a close historical connection between Dow and Nazi chemical producers. The parley adjourned without any resolution. 

Protesters pushed on with the leafleting campaign, but with diminishing success. “That first day, most of them [plant workers] stopped to take the leaflet. Some went out of their way to be friendly. A few, though, tried to run us down. On the second day, the company posted plainclothes security guards and a photographer at the gate. Almost every worker driving through now pretended that we didn’t exist, except for a few who again tried to run us down,” Franklin recalled. A few workers stopped their cars a few miles down the road where it met the main U.S. highway and spoke with the demonstrators. They said plainclothes security guards had been hired to watch

---

64 Franklin. *Vietnam and Other Fantasies*. 77.  
65 Franklin. *Vietnam and Other Fantasies*. 78.
them, and that they feared being fired if they showed any anti-war sympathies. A few employees
did quit and, according to Franklin, were promptly blacklisted from employment in the area.  

The stakes rose in March, 1966, when the trade journal *Chemical and Engineering News* broke
the news of the U.T.C. contract. Not only had the firm agreed to produce napalm, it transpired, it
had also agreed to deliver it in bombshells. U.T.C. announced it would sublease two “ugly,
marshy” acres of a Standard Oil of California (today’s Chevron) storage facility for its bomb

—  

”Mother and Child: Between January and February 1966, 250,000 copies of this
image, contained in a leaflet, were thrown from airplanes over Los Angeles, Disneyland, troopships in San Diego harbor, San Francisco, and Oakland” (emphasis added). Officials arrested the Stanford law student who organized the operation, and three of the six pilots involved, and charged them with the felony crime of conspiracy to litter. Franklin. *Vietnam and Other American Fantasies*. 73.


The stakes rose in March, 1966, when the trade journal *Chemical and Engineering News* broke
the news of the U.T.C. contract. Not only had the firm agreed to produce napalm, it transpired, it
had also agreed to deliver it in bombshells. U.T.C. announced it would sublease two “ugly,
marshy” acres of a Standard Oil of California (today’s Chevron) storage facility for its bomb


67 Dow boosted its polystyrene prices 10 percent after the contracts were announced: national production in 1965 was about 60 million pounds per month, so the military demand represented a significant expansion of the market. Chemical and Engineering News. “Napalm-B to Use Huge Amount of Polystyrene.” 14 March 1966: *Chemical and Engineering News*. See Prokosch. *The Technology of Killing*. 127.
factory.\textsuperscript{68} The site, at the end of a causeway that jutted two miles into San Francisco Bay, was part of the port of the town of Redwood City, a municipality of 56,300 located just north of Palo Alto. U.T.C. was to make lease payments directly to the city. Because public land was involved, the arrangement required approval by the Redwood City Port Commission.\textsuperscript{69}

Commissioners met to discuss the matter on the afternoon of 21 March at the port manager’s office in an old frame building amid unused oil storage tanks. It was immediately apparent this would not be a routine convocation: a dozen protestors jammed the manager’s office and left barely enough space for the officials to meet. About 70 more filled a reception room, and overflowed onto a porch. The activists, some of whom had brought their children, had been organized primarily by the Stanford Committee, a Palo Alto peace organization called Concerned Citizens, and a Redwood City Unitarian congregation.

A clerk asked for public comments. Napalm’s public relations disaster began. “If you could actually see the bodies of men, women and children burned by this weapon, you would act to prevent Redwood City from becoming a name to go down in history with Buchenwald,” declared one activist. “Redwood City will become known as a place where flaming death is manufactured,” expostulated another. Dozens stood in line. Board members decided to reconvene that afternoon at the larger country office building in downtown Redwood City.\textsuperscript{70}

More than twice as many people, about 200, filled the larger hall when the hearing resumed at 5.00 p.m. Debate grew even more heated. Olive Mayer, a local engineer who had inspected the

\textsuperscript{68} Rent was $327 per month. James F. Colaianni. “Napalm: Made in U.S.A., A Smalltown Diary.” August 1966: \textit{Ramparts.} 47.

\textsuperscript{69} Franklin. \textit{Vietnam and Other Fantasies}. 82.

\textsuperscript{70} Franklin. \textit{Vietnam and Other Fantasies}. 82.
 OVENS AT THE BELSEN CONCENTRATION CAMP ASSERTED THAT “LOCAL GOVERNMENT AND PROFESSIONAL PEOPLE HAD TO BE INVOLVED IN PROVIDING LOCATIONS FOR THE MANUFACTURE OF THOSE OVENS, JUST AS YOU COMMISSIONERS ARE NOW CALLED UPON TO MAKE A DECISION CONCERNING A NAPALM FACTORY.”71 ANOTHER RESIDENT, ELENA GREENE, BERATED THE COMMISSIONERS: “YOU ARE COMMITTING THOUSANDS OF PEOPLE TO DEATH. I DON’T KNOW HOW YOU SLEEP AT NIGHT.”72 FRANKLIN GAVE A SPEECH ABOUT NAPALM’S EFFECTS ON CIVILIANS THAT CAUSED THE CHAIRMAN TO CRACK HIS GAVEL. “GET THAT MAN OUT OF HERE,” HE SHOUTED. A PAIR OF POLICEMEN DRAGGED THE STANFORD TEACHER OUT OF THE ROOM, PROMPTING HIS SEVEN-YEAR-OLD DAUGHTER TO BURST INTO TEARS.73 IN THE ENSUING CHAOS, THE BOARD HASTILY VOTED TO APPROVE THE SUBLEASE, AND ADJOURNED.74 PRODUCTION WAS SCHEDULED TO BEGIN ON 1 MAY AND TO LAST FOR EIGHT MONTHS.75 REDWOOD CITY HAD EXPERIENCED ITS FIRST ANTI-WAR PROTEST.76

71 Franklin. Vietnam and Other Fantasies. 83.
73 Franklin. Vietnam and Other Fantasies. 83
74 Franklin. Vietnam and Other Fantasies. 83.

Adding some credence to those who charged that anti-napalm activists were communist sympathizers U.S.S.R. General Secretary Leonid Brezhnev condemned the U.S. use of napalm in Vietnam in a speech on 30 March at the opening session of the Soviet Party Congress. “More than 200,000 United States troops, aircraft carriers, huge bombers, poison gases and napalm are being used against the heroic patriots of Vietnam,” he thundered. Excerpts From Brezhnev Speech at Opening Session of Soviet Party Congress. 30 March 1966: NYTimes.com.
City regulations required a referendum on any vote by the port’s board if requested within 30 days by 10 percent of registered voters. Activists formed the Redwood City Committee Against Napalm, 60 members strong, and launched a petition drive. Leafletting redoubled at the U.T.C.

Journalists were captivated. “This is the first time since the start of the Vietnam War that the people will have an opportunity to express themselves at the ballot box on a specific issue connected to the war,” Committee Against Napalm chairman James F. Colaianni, an attorney and Managing Editor of the strident five-year-old San Francisco political and literary journal *Ramparts* magazine, told the *New York Times* on 17 April. Some local newspapers supported the campaigners. One reported that the Technology Center had harassed protestors, and published a transcript of a call to a local business: “This is United Technology Center calling. We wondered if you knew where your employee __________, was yesterday. Did he tell you he was taking time off to picket our plant?” Others opposed the drive. “While there may be some question about the use of napalm in warfare, it is not a question to be decided by the voters of Redwood City or any other municipality. ... It is easy to see what would happen if every city were to be allowed to make its own decisions as to what war material is acceptable to its own citizens,” editorialized the *Palo Alto Times*. NBC and CBS gave the debate national prominence when they ran stories about it on

---


79 Hersh. *Chemical and Biological Warfare*. 258.

80 Franklin. *Vietnam and Other Fantasies*. 84.
their national news broadcasts.\footnote{Franklin. \textit{Vietnam and Other Fantasies}. 85.} Letters, most favorable, streamed in to the Committee from across the country.\footnote{Colaianni. “Napalm: Made in U.S.A., A Smalltown Diary.” \textit{Ramparts}. 48.}

Passions ran high. “It will put us on the map,” a port commissioner said of the planned factory. A councilman spoke of an “economic boom” that might follow.\footnote{Colaianni. “Napalm: Made in U.S.A., A Smalltown Diary.” \textit{Ramparts}. 47.} Others disagreed. “The good name of Redwood City with its old slogan ‘Climate Best by Government Test’ appeals far more to me than ‘Napalm City by the Dead bay’!” one resident wrote in a letter to the editor of the \textit{Redwood City News}.\footnote{Prokosch. \textit{The Technology of Killing}. 128.} Stanford Committee members produced an “Emergency Report on the Manufacture and Use of Napalm” that laid out the history of the weapon, alleged that the U.S. had caused 300-400,000 civilian casualties to date in Vietnam and concluded, “Those killed by napalm are literally roasted alive.”\footnote{Of the 30 religious congregations in Redwood City, eight Protestant ministers made public statements in support of the Committee Against Napalm. Colaianni. “Napalm: Made in U.S.A., A Smalltown Diary.” \textit{Ramparts}. 47.}

On 20 April 1966, the Committee Against Napalm submitted a petition signed by 3,761 voters — well over the 2,400 required — collected by more than 100 volunteers.\footnote{Franklin. \textit{Vietnam and Other Fantasies}. 85. See Daryl Lambke. “Protests Force City to Vote on Napalm Factory.” 17 April 1966: \textit{Los Angeles Times}. 8. ProQuest.UMI.com.} Officials claimed the
sublease decision was not the kind of decision subject to a referendum rules, and refused to accept the petition. Committee members sued.\textsuperscript{87}

Napalm production started while the parties waited for their case to come to trial. Acres of stacked crates of 500- and 750-pound bombshells lined the road along the causeway that led to the plant. Activists organized vigils. “In the mild California climate, the protesters could watch [the plant] from the other side of the wire-mesh fence which separated it from the road,” remembered Eric Prokosch, then a graduate student. “The empty aluminum bomb shells were brought in by truck (thoughtfully marked ‘Do Not Drop’); the polystyrene powder, used to thicken the napalm, came in by train and was mixed with the incendiary fuel in vats. The mixture was then piped into bomb cases through a tube, and the filled bombs were loaded on barges, to be towed across the San Francisco Bay to a naval storage site from which they would be shipped to Vietnam,” he continued.\textsuperscript{88} “You could even stand at the high chain-link fence and watch as the empty bomb casings were swung over to a raised platform and pumped full of napalm,” Franklin remembered.\textsuperscript{89} Protesters hectored workers through megaphones. Managers ostentatiously photographed demonstrators, and their car license plates, and blasted recorded music at them — Tchaikovsky’s \textit{Symphony Pathétique} was a favorite.\textsuperscript{90} On 16 and 17 May, in the first act of civil disobedience against


\textsuperscript{88} Prokosch. \textit{The Technology of Killing}. 129-30.

\textsuperscript{89} Franklin. \textit{Vietnam and Other Fantasies}. 85.

\textsuperscript{90} Prokosch. \textit{The Technology of Killing}. 130.
napalm, jazz musician named Aaron Manganiello, a Palo Alto psychiatrist, and two Stanford students, lay down in front of trucks delivering empty bomb shells. Police arrested them.91

Leaders of the Committee Against Napalm summarized their case to a crowd of 400 people who gathered in the auditorium of the local Sequoia High School in mid-May, just before the judge’s ruling on their suit to force a referendum. Napalm was indiscriminate, cruel, and racist. “We’re talking about a systematic planned murder of tens of thousands of civilians who have nothing to do with the war,” Colaianni said. “Imagine the terror of not knowing when the next airplane, flying at speeds greater than the speed of sound, will drop two acres of flame on the place where you live,” observed Unitarian minister and Committee Vice-Chair William Hough. “Except for a few raids against the Germans in World War II, it [napalm] has been used only against nonwhite people in Japan, Korea and Vietnam,” Franklin claimed.92

On 20 May 1966, judge Melvin E. Cohn rejected the Committee’s filing. The Redwood City lease to Standard Oil, he informed the courtroom, had actually expired on 1 May. A new lease, he reported, had been signed on 26 April between Standard, the U.T.C., and the port — six days after the petition by the protesters was submitted. That agreement, he ruled, now governed the property. If the plaintiffs wanted to challenge it, they had six days left to draft a new petition and collect new signatures.93 Moreover, the judge said, “I have no intention of trying to decide whether the United

91 Franklin. *Vietnam and Other Fantasies*. 85.

92 Wallace Turner. “Pacifists Balked in Napalm Fight: Judge Rejects a Plan That Would Shut Coast Plant.” 21 May 1966: *The New York Times*. The Pentagon denied that napalm was used against civilians. In a 1966 letter to Prokosh the Office of the Secretary of the Air Force wrote of the napalm, “It is mixed in California for employment in Vietnam against selected targets such as caves, reinforced supply areas, and the like, which do not involve civilians.” Prokosch, 130-31.

States should be fighting a war in Vietnam. Nor do I intend to try to decide whether the armed forces should be dropping napalm bombs in that fighting.” With those words, in an irony of history, Judge Cohn launched the campaign against napalm that swept the country over the next 18 months.

“Would You Want Your Daughter to Marry a Napalm Producer?”

Cohn’s decision infuriated activists, super-charged the local anti-napalm movement, and attracted attention from national anti-war leaders. On 28 May 1966, a Sunday, 1,200 people packed the Sequoia High School’s football stadium to launch a national campaign against napalm, beginning with a boycott of Dow. The national consumer goods company, Prokosch explained, was an easy target: “Its best-known product was Saran Wrap, a clear plastic tissue which clung to the food it enclosed, as Dow’s jellied fuel clung to the skin. Saran Wrap was to be found in households across the country; any local antiwar group could go to the nearest supermarket and call for a

---


95 A sign of things to come appeared almost immediately. On 27 May, four San Jose housewives dressed in high heeled shoes, stockings, gloves and pearls blocked trucks loading napalm bombs at the offices of a local trucking company for seven hours. The next day the women, dubbed the “napalm ladies” by the media, which gave the story wide coverage, moved on to a massive bomb storage facility in the nearby town of Alviso. The quartet delayed a forklift truck trying to place bombs on a barge for over an hour, caused the vessel to miss the tide, and delayed the shipment by a day. The women were arrested but received suspended sentences. Interview with Joyce McLean. In Wells. The War Within. 85.

96 Communications scholars Huxman and Bruce assert the anti-napalm campaign against Dow was “the first large-scale public efforts to hold a corporation morally responsible for its actions.” Susan Schultz Huxman and Denice Beatty Bruce. “Toward a dynamic generic framework of apologia: A case study of Dow chemical, Vietnam, and the napalm controversy.” Spring/Summer 1995: 46 Communication Studies 1-2. 61. InformaWorld.com.
boycott.” “Further opportunities for protest were afforded by the frequent visits of Dow recruiters to university campuses,” he added.97 Signs at the event did not point to easy compromise: “Peasants burned — profits up;” “Napalm kills democracy here too;” and “Would You Want Your Daughter to Marry a Napalm Producer.”98 Participants marched to the U.T.C. napalm plant after their meeting where Vietnam War opponent Senator Wayne Morse of Oregon and progressive Congressional candidate Robert Scheer, later himself a Ramparts Managing Editor, addressed the crowd.99 Redwood City had to spend $9,000 to manage the event. “Broadway in Redwood City is not a bright modern thoroughfare, but the merchants have always made a valiant effort to keep it neat and it is always cheerful and clean. ... Suddenly the street took on a dirty, grey and sombre look,” a resident lamented in a subsequent letter to the Redwood City Tribune. “The citizens of Redwood City must, in some way, repaint the tarnished and desecrated picture of this fair city, previously considered the jewel of the Peninsular Pendant,” they continued.100

Protests took place the same Sunday in New York City, and in Torrance. In Manhattan, about 75 people organized by the 15-member Brooklyn-based Citizens Campaign Against Napalm — supported by the anti-war groups Women Strike for Peace, Youth Against War and Fascism, and the

97 Prokosch. The Technology of Killing. 131.


In England, the indefatigable Bertrand Russell announced on 24 May that he planned a war crimes tribunal to try Lyndon Johnson, Robert McNamara, Dean Rusk, Henry Cabot Lodge and other US leaders for “the use of gas and chemicals, the torture and mutilation, the napalm ... the terrible bombardments and the brutal treatment of the people of Vietnam for 12 years.” New York Times. “Lord Russell Seeks to Try U.S. Leaders.” 8 June 1966: NYTimes.com.

United States Committee to Aid the National Front — rallied at Dow’s Rockefeller Center offices.


In Torrance, about 100 people organized by Students for a Democratic Society (S.D.S.) and Freedom Now activists picketed Dow’s facility. Counter-demonstrators from the Victory in Vietnam Association shouted support for the factory.

Rallies spread during the summer of 1966. In August, students from the University of Michigan, Wayne State University in Detroit, and the University of Toledo, joined by members of a dozen Detroit anti-war groups, converged on Dow’s headquarters in Midland, Michigan, 128 miles northwest of Detroit, population 27,000, for “August Days of Protest.” Representatives won a meeting with H. D. (Ted) Doan, the middle-aged president of the firm, and grandson of the its founder, followed by another on the 22nd by a quartet of S.D.S. activists, but the discussions produced no change in corporate policies. The Detroit Free Press dubbed the effort “a flop.” At the end of the


102 Brandt. Growth Company. 354.

103 Brandt. Growth Company. 354.

month, dissidents gathered again in Manhattan and Torrance. Police at Rockefeller Center arrested 29 who attempted to reach Dow’s 37th floor offices.\textsuperscript{105} Protests greeted Dow recruiters at Wayne State, Cornell, the University of South Florida, U.C.L.A., and the University of California at Berkeley that autumn.\textsuperscript{106}

Awareness grew. When the Johnson administration, as schools reconvened, dispatched “truth teams” across the country to explain Vietnam policy, war opponents put napalm front and center. Paul Soglin, a student leader, recalled the discussions at the University of Wisconsin at Madison:

The representative of the Defense Department was asked, ‘What does napalm do.’ So he gave a technical description of napalm, being a gel and so on. The crowd was rumbling. The question came back: ‘What does napalm do.’ He says, ‘Well, it can catch you on fire.’ Kept on hitting away: ‘What does napalm really do.’ The General said, ‘Well, you really want to know what it does. It burns. It burns people.’ Finally, out of frustration, he decided to just tell the truth, which everyone already knew.\textsuperscript{107}

Dow did not underestimate the potential threat represented by the protest movement. “I would hate for Dow to come out of Vietnam with the ‘Merchants of Death’ label that was pinned on du Pont after the First World War; and yet, unless we come to grips with this problem, it is likely to happen,” an internal company memo warned in December 1966.\textsuperscript{108} Public relations staff met frequently, developed a coordinated corporation-wide response, circulated a standard statement to

\textsuperscript{105} Brandt. \textit{Growth Company}. 354.

\textsuperscript{106} Brandt. \textit{Growth Company}. 354. See Maraniss. \textit{They Marched Into Sunlight}. 70.

\textsuperscript{107} Paul Soglin. In Glenn Silber and Barry Alexander Brown, Directors and Producers, \textit{The War Within}. 1979: Catalyst Media. 13’43”. Soglin was elected to the Madison City Council in 1968, and as Mayor in 1973.

\textsuperscript{108} Post Street Archives. In Maraniss. \textit{They Marched Into Sunlight}. 71.
local managers, and ensured that spokesmen stuck to it religiously. Executives used measured language, stressed respect for the free expression of ideas, and built their case around arguments similar to those used by the Sunnyvale U.T.C. executives: duty, humanitarianism, and patriotism. “Aside from our duty to do this, we might add that we would feel deeply gratified if what we’re able to provide helps to protect our fighting men or to speed the day when fighting will end,” Dow’s Eastern public relations manager, Dean M. Wakefield, said in response to the first Rockefeller Center pickets. “We’re a supplier of goods to the Defense Department and not a policy maker,” he added. “Fourteen GIs signed a letter including this statement: ‘The effectiveness of napalm in saving U.S. lives is overwhelming,’” Ted Doan reiterated in a Wall Street Journal Op-Ed the following year. “[W]e feel that our company should produce those items which our fighting men need in time of war when we have the ability to do so … we reject the validity of comparing our government with Hitler’s Nazi Germany,” he continued. “Basically, the debate over Vietnam, as long as it

109 The statement read:

The Dow Chemical Company endorses the right of any American to protest legally and peacefully an action with which he does not agree.

Our position on the manufacture of napalm is that we are a supplier of goods to the Defense Department and not a policy maker. We do not and should not try to decide military strategy or policy.

Simple good citizenship requires that we supply our government and our military with those goods which they feel they need whenever we have the technology and the capability and have been chosen by the government as a supplier.

We will do our best, as we always have, to try to produce what our Defense Department and our soldiers need in any war situation. Purely aside from our duty to do this, we will feel deeply gratified if what we are able to provide helps to protect our fighting men or to speed the day when fighting will end.


remains peaceful and honest debate, is a healthy thing,” Doan concluded.\footnote{Herbert D. Doan. “Why Does Dow Chemical Make Napalm?” 8 December 1967: The Wall Street Journal. 18. ProQuest.UML.com.} As to economic necessity, Dow stressed the opposite: napalm, officials said, was a minuscule part of its business.\footnote{The company said it produced about 25 million pounds of napalm at the Torrance plant for $3.5 million under two Air Force contracts. This figure did not, however, include the value of its military contracts for polystyrene. Journalist Seymour Hersh later estimated, based on an analysis of Pentagon budgets, that Dow received at least $18 million for napalm-related work between June 1966 and March 1967 — still under one percent of of Dow’s worldwide revenue. Hersh. Chemical and Biological Warfare. 254. $3.5 million: Douglas Robinson. “Dow Chemical Office Picketed For Its Manufacture of Napalm.” 29 May 1966: The New York Times. See Doan. “Why Does Dow Chemical Make Napalm?” 8 December 1967: The Wall Street Journal. 18. ProQuest.UML.com. (“[Napalm] amounted to less than one half of one percent of total sales [in 1966] — in the range of $5 million …. This year it will be in the range of one-fourth of one percent …”) See also Huxman and Bruce. “Toward a dynamic generic framework of apologia: A case study of Dow chemical, Vietnam, and the napalm controversy.” Spring/Summer 1995: 46 Communication Studies 1-2. 61. InformaWorld.com. (“No more than twelve of Dow Chemical’s 50,000 employees worked on napalm at any given time. The chemical of war was only one of more than 800 products Dow manufactured.”}

Pentagon representatives stayed equally true to their argument that napalm affected few civilians. In response to a 1966 query from New York Senator Robert F. Kennedy, the Department of Defense asserted “Napalm is used against selected targets, such as caves and reinforced supply areas. Casualties in attacks against targets of this type are predominantly persons involved in Communist military operations.”\footnote{William F. Pepper. “The Children of Vietnam.” January 1967: 5 Ramparts 7. 58-59.} Chairman of the Joint Chiefs of Staff Earle Wheeler explained to reporters in February, 1967: “Napalm, by virtue of its splashing and spreading, can get into de-

Initially, Dow’s strategy appeared to work. The boycott accomplished little — only about eight percent of Dow’s sales, in any event, came from products sold directly to consumers — and the campus protests subsided as the year drew to a close.\footnote{Hersh. \textit{Chemical and Biological Warfare}. 261.} A September, 1966 position paper for the National Coordinating Committee to End the War in Vietnam shows the extreme actions protesters felt might be necessary: “Carry South Vietnamese victims of napalm and strafing — dead or alive — through white suburbs. If they cannot be smuggled into the country, obtain napalm in sufficient quantities to roast unquenchable pigs and cows in suburban streets. Or drop it from small airplanes on white suburban schoolyards on the opening day of school.” Of course, the paper noted, “Whether this would raise anti-war sentiment would have to be considered.”\footnote{Reickert. “Position Paper.” 1966. National Coordinating Committee to End the War in Vietnam Papers. State Historical Society of Wisconsin (Social Action Collection). In Wells. \textit{The War Within}. 85 note 53.}

Relief programs for those hurt by napalm emerged as a positive alternative for activist efforts. The most highly publicized program was the Committee of Responsibility for Treatment in the U.S. of War-Burned Vietnamese Children (CoR) started by Helen Frumin of Scarsdale that summer. Promises of hospital beds and convalescent care from doctors and citizens across the country...
poured in during the autumn. At the same time, news reports suggested the impact of napalm might be less than imagined. “[T]here are about two patients with serious napalm burns each week,” Neil Sheehan reported after a visit to one of the largest regional hospitals, located 80 miles south of Saigon. This dampened criticism further. As early as 6 August, only a few people stopped when a large New York peace march, organized to mark the 21st anniversary of the Hiroshima bombing, passed right by Dow’s midtown offices.

117 The C.O.R. met with resistance from U.S. and South Vietnamese government officials, who worried about the reaction large numbers of burned children transported for treatment might produce, and argued that more could be done directly in South Vietnam. “[T]he arrival of the first group of children [in England, under a program similar to the one proposed for the U.S.] had caused a tremendous stir about the cruel effect of the bombing,” Pepper observed. The group eventually managed to bring just 87 patients to the U.S., despite health care pledges that would have accommodated hundreds. William F. Pepper. “The Children of Vietnam.” January 1967: 5 Ramparts 7. 87. See Interview with Madeline Duckles in Wells. The War Within. 87.


“The flesh runs right down their faces onto their chests”


A trio of articles published in January 1967 described napalm’s effects on South Vietnamese civilians, especially children, to a mass U.S. audience for the first time, and transformed the movement. The reports ran in magazines at opposite ends of U.S. journalism, geographically, historically and and demographically: five-year-old *Ramparts*, from the west coast, with an audience of about 100,000, on the one hand, and the 84-year-old *Ladies Home Journal* and 64-year-old *Redbook* women’s periodicals, edited in New York, with circulations of 6.8 million and almost five
million, respectively, on the other. All concluded that napalm, far from the marvel of efficient warfare described by correspondents of an earlier age, was a diabolically cruel, child-seeking killer.\(^{120}\)

*Ramparts* offered the most detailed report and included 15 full-color pages of burn victims and jammed hospitals, the first such catalog of civilian napalm casualties distributed in a national American periodical.\(^{121}\) “Torn flesh, splintered bones, screaming agony are bad enough. But perhaps most heart-rending of all are the tiny faces and bodies scorched and seared by fire,” wrote author William F. Pepper, Director of the Mercy College Children’s Institute for Advanced Study and Research, and Executive Director of the Commission on Human Rights based in New Rochelle, New York.\(^{122}\) “Napalm, and its more horrible companion, white phosphorus, liquidize young flesh and carve it into grotesque forms. The little figures are afterward often scarcely human in appearance, and one cannot be confronted with the monstrous effects of the burning without


\(^{121}\) The magazine estimated that at least a quarter of a million children had been killed since 1961 based on an overall civilian casualty figure of at least 415,000, a 1964 UNESCO population study that estimated that 47.5 percent of the country was under age 16, a projected rate of increase to 50 percent by 1967, and the conjecture that about 70 percent of the population of the rural villages that bore the brunt of U.S. attacks were children because most of the older males were away fighting. Based on a “military rule-of-thumb of 3-1 casualties to deaths,” and available mortality figures, the magazine concluded that there had been at least one million child casualties since 1961. William F. Pepper. “The Children of Vietnam.” January 1967: 5 *Ramparts* 7. 53. The estimate has been challenged by some observers and supported by others. See United States Senate, Committee on Foreign Relations. *Impact of the Vietnam War.* 1971: Government Printing Office. Introduction. The General Accounting Office and Senator Edward M. Kennedy’s Subcommittee on Refugees estimated in 1971 that 150,000 Vietnamese civilians had been killed and 350,000 injured since 1965 by U.S. military action, or weapons supplied by the U.S. Neil Sheehan. “Should We Have War Crime Trials?” 28 March 1971: NYTtimes.com.

being totally shaken. … The initial urge to reach out and soothe the hurt was restrained by the fear that the ash-like skin would crumble in my fingers,” he continued. Pepper cited a report by the Swiss relief organization Terre des Hommes on hospital conditions: “In places with the atmosphere of slaughter houses for people, where flies circulate freely on children who have been skinned alive, there are no facilities for hygiene, no fans, and no air conditioning …”


---


Pepper asserted that napalm hurt children most severely, laid responsibility for the injuries directly on the United States, rejected claims of military necessity, and ended with a call for action. “A burn is especially critical in a child because the area of destruction relative to total body surface is proportionately greater than that of an adult,” he wrote.\textsuperscript{125} “The tragedy that is befalling children in Vietnam is all the more our responsibility where children burned by napalm are concerned; only the United States is using this weapon, and it is fitting that we should provide the care for the mutilated children,” he continued.\textsuperscript{126} As to the Pentagon’s assertions to Kennedy, Pepper retorted, “I am compelled to wonder what military functions were being performed by the thousands of infants and small children, many of whom I saw sharing hospital beds in Vietnam, and a few of whom appear in photographs accompanying this article.”\textsuperscript{127} He concluded, “Every sickening, frightening scar is a silent cry to Americans to begin to restore their childhood for those whom we are compelled to call our own because of what has been done in our name.”\textsuperscript{128}

Renowned war correspondent Martha Gellhorn’s article in \textit{The Ladies Home Journal} was equally heart-rending. “In the children’s ward of the Qui Nhon province I saw for the first time what napalm does. A child of seven, the size of our four-year-olds, lay in the cot by the door. Napalm had burned his face and back and one hand. The burned skin looked like swollen, raw meat; the fingers of his hand were stretched out, burned rigid. A scrap of cheesecloth covered him, for weight is intolerable, but so is air. His grandfather, an emaciated old man half blind with cataract,

was tending the child. A week ago, napalm bombs were dropped on their hamlet. ... All week, the little boy cried with pain, but now he was better. He was only twisting his body, as if trying to dodge his incomprehensible torture,” she wrote. “Farther down the ward, another child, also seven years old, moaned like a morning dove; he was still crying. He had been burned by napalm, too, in the same village. His mother stood over his cot, fanning the little body, in a helpless effort to cool that wet, red skin. Whatever she said, in Vietnamese, I did not understand, but her eyes and her voice revealed how gladly she would have taken for herself the child’s suffering,” the reporter continued.129

Gellhorn used a metaphor of instant familiarity to drive home her point. She recounted the observation of a New Jersey housewife and mother of six who had adopted three Vietnamese children, and traveled to the country to see conditions first-hand. “Before I went to Saigon, I had heard and read that napalm melts the flesh, and I thought that’s nonsense, because I can put a roast in the oven and the fat will melt but the meat stays there,” the American mother said. “Well, I went and I saw these children burned by napalm and it is absolutely true. The chemical reaction of this napalm does melt the flesh, and the flesh runs right down their faces onto their chests and it sits there and it grows there. ... These children can’t turn their heads, they were so thick with flesh. ... And when gangrene sets in, they cut off their hands or fingers or their feet; the only thing they cannot cut off is their head,” she explained.130

129 An advertisement on the same page suggested the suffering described was still distant for most Americas. “Who would have thought a patch of dry, flaky skin could lead to something serious? Dry, flaky skin ... a persistent itch ... a scaly patch? Ask your doctor: you may have the Heartbreak of Psoriasis,” read the advertisement for Tegrin skin cream. Martha Gellhorn. “Suffer the Little Children ...” January, 1967: Ladies Home Journal. 108.

The journalist asserted that napalm affected women, children and the elderly disproportionately, and agreed with Ramparts that children suffered particular harm. “Children are killed or wounded by napalm because of the nature of the bombings. Close air support for infantry is one thing. The day and night bombings of hamlets, filled with women, children and the old, is another,” she wrote.\(^{131}\)

Physician Richard Perry’s Redbook article, written with Robert Levin, was perhaps the most poignant. The doctor spent several years in Vietnam treating civilian victims of the war and his words carried the passion of personal experience:

I have been an orthopedic surgeon for a good number of years, with a rather wide range of medical experience. But nothing could have prepared me for my encounters with Vietnamese women and children burned by napalm. It was shocking and sickening, even for a physician, to see and smell the blackened flesh. One continues for days afterward getting sick when he looks at a piece of meat on his plate because the odor of burning flesh lingers so long in the memory. And one never forgets the bewildered eyes of the silent, suffering, napalm-burned child. What could anyone possibly say to such a child?\(^{132}\)


\(^{132}\) Richard E. Perry with Robert J. Levin. “Where the Innocent Die.” January 1967: Redbook. 103. Susan O’Neill, who served as an Army Nurse Corps operating room nurse in three locations in Vietnam in 1969-70, highlighted the risks napalm posed to U.S. troops, and offered additional details about the effects of the weapon in an interview after she returned to the U.S.: “The problem with napalm is that when you drop it, if the wind shifts, there’s really no telling where it’s going to go. It was more than once, we would get in members of [an American] platoon who had run afoul of napalm that was dropped and suffered a wind shift or something of that sort, and [it] ended up getting our people instead of their people or their forest or whatever the hell we were aiming for. It was very nasty because it would stick to you, being the gel sort of thing it was. You could actually find sometimes, if you were to strip off a burned shirt or something, you could see where the buttons were and you could see where the cuffs were ... because where the lines were, it would burn into them; where the seams were, it would burn into them. It was just awful, awful stuff. The real pity about this, I think in some ways, is that a lot of these guys would come in — and civilians too because when napalm [is] dropped, it’s not a precision instrument — but the people would come in often quite sensate. I mean, they’d be talking to you and they would be alert. They would be in pain or maybe not in as much [pain] as they should’ve been, because the burning ... [had] gone past the nerve endings, which was really awful because of the ramifications of that.” Richard Burks Verrone and Laura M. Calkins. Voices from Vietnam: Eye-witness accounts of the war, 1954-1975. 2005: David & Charles. 154-55. Books.Google.com.
“The Vietcong do not use napalm, we do,” the doctor concluded.133

A rebuttal of sorts by physician Howard Rusk, a renowned medical rehabilitation expert and part-time columnist for the New York Times, appeared two months later in the newspaper. An “intensive tour of 20 Vietnamese civilian hospitals from the 17th Parallel in the North to the Gulf of Siam in the South,” Rusk reported, found not one case of burns due to napalm. “There have been cases of severe burns from napalm but the numbers are not large in comparison to burns due to accidents,” he wrote. Rusk said he saw every burn case at the hospitals, and attributed the vast majority to cooking accidents, in particular the use of relatively inexpensive gasoline in stoves designed for kerosene. Just 15 percent of overall hospital admissions in South Vietnam, the physician asserted, came from war-related injuries. “[T]he picture that has been painted by some in the United States of large numbers of children burned by napalm is grossly exaggerated,” he concluded. Rusk’s lightning tour and summary findings, however, whatever their accuracy, were no match for the vivid testimony and searing photographs in the January articles. His two-part report was buried on pages 84 and 30 of successive Sunday editions, got relatively little notice.134


H. Charles Scharnweber, from Dow’s medical division, visited Vietnam during this period and reported that he also was unable to find any women or children killed by napalm. He attributed burn injuries he observed to “careless or ignorant use of gasoline.” “A Doctor Looks at Vietnam.” 1968: 31 Dow Diamond 4. In Brant. Chairman of the Board. 98.
Fire in the Streets

The unprecedented revelations in *Ramparts, Redbook, and Ladies Home Journal* about a staple of the U.S. arsenal for over two decades re-energized the protest movement against napalm and Dow. No longer was the incendiary just a bright flash in the jungle at the bottom of a television screen or newsreel sequence.


Martin Luther King, Jr. was one of the first to be moved. The Nobel Peace Prize recipient flipped through a stack of magazines at a restaurant in the Miami airport on 14 January 1967 while waiting for an airplane. He froze, according to companion Bernard Lee, when he reached Pepper’s piece in *Ramparts*: “Martin just pushed the plate of food away from him. I looked up and said, ‘Doesn’t it taste any good?’ and he answered, ‘Nothing will ever taste any good for me until I do everything I can to end that war.’” Lee continued, “That’s when the decision was made. Martin had
known about the war before then, of course, and had spoken out against it. But it was then that he
decided to commit himself to oppose it.”\textsuperscript{135} Within a month, in February 1967, 2,500 members of
the Women Strike for Peace group paraded posters of Pepper’s pictures at a demonstration outside
Secretary of Defense Robert McNamara’s Pentagon office.\textsuperscript{136} Napalm’s victims had a face.

Scattered campus demonstrations against Dow recruiters resumed in mid-winter as students,
newly energized, returned from vacation. These actions were more confrontational than those of
the previous fall, and received proportionately more media coverage, but were muted in compar-
ison with those that followed that autumn: a harbinger, but not yet a national movement. At the
University of Wisconsin at Madison, for example, where there had been continuous protests
against the war since 1963, about 100 students refused to leave a hallway outside interview rooms
used by Dow recruiters in Commerce Hall at the center of campus on 21 February 1967.\textsuperscript{137} “What
we had was these pictures from \textit{Ramparts} magazine of napalmed kids. Almost everybody had a
picket sign like that. … The idea was to confront people and make them face up to what was going
on,” explained Students for a Democratic Society (S.D.S.) protest group member Henry Haslach.\textsuperscript{138}
The students shouted “baby killers” and “good Germans” at the chemical company representa-
tives, chanted and sang, and refused to clear the area; police made 19 arrests. The next day, 200
protesters blocked the University Chancellor’s office to protest the incarcerations. The administra-

\textsuperscript{135} David J. Garrow. \textit{Bearing the Cross: Martin Luther King, Jr., and the Southern Christian Leadership Con-

\textsuperscript{136} Zaroulis and Sullivan. \textit{Who Spoke Up?} 103.

\textsuperscript{137} The first anti-war protests took place in mid-October 1963, according to Paul Soglin. Silber and Brown.
\textit{The War Within}. 5’35”.

\textsuperscript{138} Henry Haslach. Silber and Brown. \textit{The War Within}. 33’30”. 
tion bailed the students out in a gesture of sympathy, and the crisis passed. “Dow I,” as the event came to be called in Wisconsin, pushed the number of stories around the country about Dow and napalm over 1,000 for the first time.

Some students supported the use of napalm in Vietnam and came to Dow’s defense. A January demonstration by 20 S.D.S. members at Pennsylvania State University produced weeks of angry letters to the Daily Collegian. As one correspondent wrote, “[T]he purpose of the Viet Cong is strictly terror; whereas the purpose of the bombing — of the napalm — is to flush out the VC and thus rid the country of terror.” The author continued, “The Viet Cong have showed their mettle by taking the leader of each village they terrorize and splitting his legs like we would a wishbone … how do you fight that kind of ungodly savageness? … with the same type of warfare that they are using — because it is the only thing these animals understand.” Responses like these received less attention as the year continued, and perhaps fewer adherents, but did not entirely fade away.

In Madison, counter-protesters at the 21 February rally, many drawn from the local

---


140 Dow Chemical Company internal documents. In Maraniss. They Marched Into Sunlight. 487. On 16 May, several thousand anti-war students at Madison staged the first sit-in at the University of Wisconsin and peacefully occupied an administration building for several days before a compromise was reached. Robert Kenner, Producer and Director. “Timeline: 1966.” Two Days in October. 2005: PBS.org.


142 In November, for example, pro-napalm spectators threw mud at 75 members of the Kent Committee to End the War in Vietnam as they protested the presence of a Dow recruiter at Kent State University in Kent, Ohio. The counter-protesters tore away several placards that read “Dow Burns Babies” and burned them. Committee members, however, considered the protest a success. Kent Daily Stater. 1 November, 2 November, 14 November 1967: Kent Daily Stater. In Heineman. Campus Wars. 180.
R.O.T.C. training program, shouted support for Dow. “Napalm is good for V.C. acne,” read one placard.¹⁴³

New York peace activists continued actions through the winter and spring of 1967 that made impacts large and small. Sunday 19 March was designated “Napalm Sunday” by a group of about 75 protesters who marched from the Metropolitan Museum of Art to St. Patrick’s cathedral. A triptych that read “napalm burns people,” later adopted by protesters across the country, made its first appearance here. “We marched in threes, and each trio had signs that, when combined, read ‘Napalm Burns People,’ supplied to us by the Village Peace Center,” explained organizer Jack McGuire.¹⁴⁴ A few weeks later, on 4 April 1967, King delivered his seminal speech “Beyond Vietnam - A Time to Break Silence” — denounced the next day by 168 newspapers — at Riverside

¹⁴³ Silber and Brown. The War Within. 33’30”.

Church on Manhattan’s upper west side.\textsuperscript{145} In a spectacular hall modeled on France’s Chartres Cathedral, across the street from the granite mausoleum of President Ulysses S. Grant chiseled with his epitaph “Let Us Have Peace,” the reverend observed:

In 1957, a sensitive American official overseas said that it seemed to him that our nation was on the wrong side of a world revolution. ... This need to maintain social stability for our investments ... tells ... why American napalm and Green Beret forces have already been active against rebels in Peru. ... A true revolution of values will lay hand on the world order and say of war, ‘This way of settling differences is not just.’ This business of burning human beings with napalm ... cannot be reconciled with wisdom, justice, and love.\textsuperscript{146}

Less eloquently, but to the same point, activists gathered in New York’s Central Park for the “Spring Mobilization” on 15 April distributed fortune cookies that read “‘Help! I’m a prisoner in a US peasant-cooking facility’ — anonymous Dow employee.”\textsuperscript{147}

A sit-in on 20 March 1967 at Pomona College north of Los Angeles, the first in the school’s history, exemplified the whimsicality, and even good humor, that was an element of the anti-napalm student movement during this period. Dow representative Hans Beetz arrived a bit before 9.00 a.m. and was escorted to the campus Music Room, which had been reserved for his interviews. When administrators opened the locked door, however, they found 25 S.D.S. members jammed inside. A large poster on a tripod displayed photographs of people burned by napalm. The students

\textsuperscript{145} Neal Conan and Tavis Smiley. “The Story Of King’s ‘Beyond Vietnam’ Speech.” 30 March 2010: Talk of the Nation. NPR.org. (“After King delivered the speech, Smiley reports, ‘168 major newspapers the next day denounced him.’ Not only that, but then-President Lyndon Johnson disinvited King to the White House. ‘It basically ruins their relationship,’ says Smiley. ‘This was a huge, huge speech,’ he continues, ‘that got Martin King in more trouble than anything he had ever seen or done.’”)


demanded that two representatives from their group be allowed to attend the interviews to present their side of the matter. “Pomona College was not founded for the purpose of training people to burn children,” a demonstrator told the dean of students.\(^\text{148}\)

Determined, Beetz prepared to conduct interviews, despite the crowd. A pair of students arrived, collected applications and dropped off their resumes. The dogged human resources executive attempted to interview them remotely by telephone, but was forced to quit when protesters clustered around to listen to the call. Exasperated, he left, got into his car, and drove away. Students piled into three cars and sped off after him to make sure he left. “Once on the freeway, which would take him back to Los Angeles, he picked up speed and attempted to shake us, doing 80 mph and weaving in and out of lanes on the congested freeway. We stuck with him until he was five miles outside town and then turned off,” activist Mike Truman wrote in the S.D.S. newsletter \textit{New Left Notes}.\(^\text{149}\) The next week, the college’s student government adopted a resolution that condemned Dow for its production of napalm and urged students to “carefully consider those activities before before consenting to be interviewed by the company.” The \textit{Los Angeles Times} re-


\(\text{\textsuperscript{149}}\) Mike Truman. “Dow Run Out of Town.” \textit{New Left Notes}. 1 May 1967. 2.
ported that this was the first criticism of Dow by a student government in Southern California. The company told the school it would not be back that year.  

Through it all, Dow stood firm. In early 1967, United Technologies quietly stopped napalm production at its Redwood City facility when it delivered its 100-millionth pound to the government. Witco, the second of three military suppliers, also ended its manufacturing operations at about the same time. In March, 1967, at a two-day board meeting devoted to napalm policy, however, Dow executives resolved to “stand up for what it believed in,” according to Gerstacker.


“Our sons were serving in that war,” he recalled in an oral history interview, “we felt a strong obligation to support them.”

Physicians for Social Responsibility

Academia added to the growing public familiarity with napalm in July 1967 when The New England Journal of Medicine published the first clinical review of the weapon’s effect on people under the auspices of Physicians for Social Responsibility, an international non-governmental organization established in 1961 to examine the medical and public health effects of nuclear war.

Author Peter Reich was an instructor at Harvard Medical School; co-author Victor Sidel was a senior physician at the Massachusetts General Hospital: credentials that warranted attention.

Reich and Sidel characterized napalm as a “chemical weapon,” confirmed the horrific nature of the burns it caused and the particular risks to children, emphasized the special psychological power of the weapon, and concluded that doctors should familiarize themselves with the subject as part of their public health responsibilities. “Napalm burns are likely to be deep and extensive. The adhesiveness, prolonged burning time and high burning temperatures of napalm favor third degree burns in all affected areas, with coagulation of muscle, fat and other deep tissue likely. Burns of this depth will probably result in severe scar contractures and deformities, especially

152 Carl A. Gerstacker. “Oral History.” 21 July 1988. In Brandt. Growth Company. 357. Doan remembered: “It was a very open debate. There were no set positions. Frequently the board broke into small groups for very intense discussion. Members talked back and forth. At the end of the first day, with nothing firmly decided, but with three or four members looking as if they might take a stand against napalm, everyone went home and must have had a very troubled sleep. The next morning each of these men individually came to my office and said that after careful and troubled consideration they agreed that the company should continue doing what it was doing.” E. N. Brandt. Chairman of the Board: A Biography of Carl A. Gerstacker. 2003: Michigan State University Press. 97.

when they occur under conditions making early skin grafting difficult,” the men wrote.\textsuperscript{154} “Napalm wounds contaminated with white phosphorus may continue smoldering long after the initial trauma. The phosphorus in napalm is finely divided and may lodge deep in the tissues. Adequate debridement of such contaminated wounds will be difficult at best, and under field conditions may

\textsuperscript{154} Peter Reich and Victor W. Sidel. “Napalm.” 13 July 1967: 277 New England Journal of Medicine 2: 87. “As a practical matter, a burn of more than 20 percent of the body surface endangers life. … A burn of more than 30 percent is generally fatal to adults in the absence of adequate treatment,” the U.S. Department of Defense concluded in a 1958 N.A.T.O. handbook. United States Department of Defense. Emergency War Surgery: U.S. Armed Forces Issue of NATO Handbook Prepared for use by the Medical Services of NATO Nations. 1958: Government Printing Office. 22. The U.N. Group of Consultant Experts on Napalm and Other Incendiary Weapons wrote in 1972: “It must be stated that, despite the large quantities of napalm that have been employed in war, the medical literature so far contains rather little information on the direct effects of napalm and its combustion products on the human body. One team of surgeons serving in a civilian hospital in an active conflict area in South Viet-Nam in 1966 and 1967 have remarked that napalm is an ‘all-or-nothing weapon.’ Because of the infrequency with which they saw napalm burns, they concluded that its victims were more likely to be killed than to require medical aid. Another field observation made among the victims of napalm attack suggests that about a third of the casualties are likely to die within half an hour. An additional, and higher, proportion are likely to die within the next 24 hours. If this is so, napalm must be one of the most lethal weapons in existence today. U.N. Group of Consultant Experts on Napalm and Other Incendiary Weapons. Napalm and Other Incendiary Weapons and all Aspects of their Possible Use. 33: 114.
be impossible,” they continued.\textsuperscript{155} Children, the doctors wrote, “will suffer a disproportionately high mortality and morbidity because of special problems, acute and chronic, presented by the burned child.” Panic was “more likely to be observed among napalm victims than among those wounded by other agents. ... The fear of fire may lead to maladaptive reactions, such as irrational flight or immobilization, that increases vulnerability to serious injury. Panic may also favor cardiovascular collapse in the presence of severe burns.”\textsuperscript{156}

Sidel explained later that the primary purpose of the piece was informational, given the paucity of knowledge about napalm in the civilian medical community. Antipathy to the Vietnam conflict,

\begin{flushright}
\end{flushright}

Carbon monoxide produced by napalm, especially when burned in enclosed spaces and with incomplete combustion, was also a frequent cause of injury. M. F. Khan, a professor at the Faculté de Médecine de Paris and expert on the use of napalm in Vietnam, explained the risks at a 1968 Conference on Chemical and Biological Warfare held in London. “There are reports of Japanese soldiers killed in World War II by napalm without any visible burns,” he observed. “It is worth pointing out that carbon monoxide intoxication greatly increases the lethality of napalm since it prevents the victim from escaping the fire,” he added.

The phosphorus used to ignite the gel was also a poison. “As far as phosphorus is concerned, as well as horrible burning this compound causes a severe intoxication and hepato-nephritis (liver and kidney poisoning), which in most cases is fatal, even when the burning appears superficial. In fact, phosphorus penetrates deeply into the skin and the subcutaneous tissues, since it produces phosphoric acids which are very acidic, and spreads all over the body,” Kahn lectured. Finally, the professor noted, phosphorus has toxic effects on cattle, poultry and fish, and bombs that contained phosphorus which missed their targets and landed in lakes or waterways used for breeding fish could introduce poisons into the human food chain. M. F. Khan. “CBW in Use: Vietnam, Comment on the use of Napalm and Phosphorus.” Steven Rose, ed. CBW: Chemical and Biological Warfare. 1968 rpt. 1969: Beacon Press. 88.

The impact of napalm on the natural environment in Vietnam remains largely unknown. In their 2006 book Vietnam: A Natural History Eleanor Sterling, Martha Hurley and Le Duc Minh wrote, “During the war, the U.S. military dropped 14 million tons of bombs, or cluster-bomb units onto northern and southern Vietnam, Laos, and Cambodia, leaving an estimated 10 to 15 million large bomb craters and extensive unexploded ordinance. Little is known about the effects of these bombs, or of napalm, land mines, and other wartime technology, on Vietnam’s biological communities.” Eleanor Jane Sterling, Martha Maud Hurley and Le Duc Minh. Vietnam: A Natural History. 2006: Yale University Press. 42.

\begin{flushright}
\end{flushright}
however, ensured an immediate audience. “People were not aware of the use of napalm in previous wars, but because the opposition to the war in Vietnam was so widespread and so vehement there was interest. This was picked up as an example of the ways in which this war was being fought,” he said.157

Youth will be served

Towering political thunderheads had gathered above napalm by the end of the summer of 1967. Its effect on civilians was increasingly widely understood. The war was burning hotter: draft boards pulled in 119,265 inductees in 1963; 112,386 in 1964; 230,991 in 1965; and 382,010 in 1966, the most since the Korean War.158 Dow Chemical was as close as a campus recruiting visit or, as Prokosch noted, local supermarket. Ferocious clips of combat appeared nightly on television. Passions ran high. “Perhaps if you accept the war, all can be justified — the free strike zones, the refugees, the spraying of herbicide on crops, the napalm,” four staff members who resigned from the Vietnamese humanitarian relief organization the International Voluntary Service wrote in an open letter to President Johnson in September.159 The smattering of protests the previous autumn and spring proved to be like raindrops that herald a deluge.

157 The article received much less attention than an earlier evaluation of the medical effects of thermonuclear war produced by the same physicians’ group. A Journal editorial echoed the conclusions of that piece, and the military ordered thousands of copies for base libraries worldwide. However, “Thermonuclear war was such an overwhelming kind of problem virtually nothing could be done after thermonuclear weapons,” Sidel said. Napalm, a weapon about which something could perhaps have been done received comparatively little notice from the Journal and the military. Nonetheless, Sidel recalled, “The N.E.J.M. is a powerful communications medium and many people read the piece and were aware of it. … People did indeed contact us with respect to joining PSR as part of overall opposition to Vietnam War.” Victor Sidel. Interview with the author. 3 September 2009.


The tempest broke at the University of Wisconsin at Madison on 18 October when Dow executives again advertised interviews at Commerce Hall. As in the February “Dow I” action, students jammed the hallway outside the conference rooms and prevented would-be candidates from entering. This time, however, more than a thousand protesters and observers crowded around the building; Madison police officers in riot gear, summoned by university authorities, clubbed dozens of students inside the hall, and many more outside the building (the first extensive violence at a

---

160 A large peaceful anti-war protest on the 17th of October was conducted without incident. Silber and Brown. *The War Within.* 35’20”. The Commerce building was later renamed Mark Ingraham Hall and became part of the university’s School of Music. University of Wisconsin School of Music. “Facilities and Resources: Ingraham Hall.” 2010: Music.Wisc.edu.
rally against the Vietnam War); an activist cut down the U.S. flag on top of the building where the demonstration occurred, and set off firecrackers in the midst of the melee; a thrown brick smashed the face of a policeman, broke his nose and knocked him out; protesters rocked a police wagon so violently they forced the release of several prisoners held inside; and, as classes changed at the end of the hour and the crowd swelled to perhaps 4-5,000 students, tear gas was used for the first time on an American campus. A total of 65 students and police required hospital treatment, and 13 people were arrested. Images of the violent confrontation were broadcast coast to coast on the news and triggered almost two thousand newspaper articles and editorials about Dow and napalm: almost double the total number of articles about the firm and its controversial product previously published.161

Comments by participants illustrate how attitudes had hardened toward the “Best Weapon Used in Pacific,” since 1945.162 “Napalm was a hideous jellied gas burning at 2,000 degrees Fahrenheit. It didn’t just burn you, it tortured you. It has a complete reference to Zyklon B, the gas they used in the concentration camps. It felt like chemical warfare at its worst,” explained Mark Greenside, one of the student protesters. “To use the University buildings to in effect provide a subsidy to Dow, by providing them the space, we thought was absolutely wrong,” he said.163 “The horror of napalm made an indelible impression on all of us, and especially on students. … They didn’t want to see any more Vietnamese children running around with their clothes burned off. There were millions of us who thought if we put in enough time, and made enough noise, that it would be impos-


sible for the government to keep sending young men to Vietnam,” recalled professor Maurice Zeitlin.\textsuperscript{164}

The Madison confrontation and its attendant publicity spurred protests against Dow and napalm at campuses across the country.\textsuperscript{165} By the end of December students at the Universities of Illinois and Michigan, Boston College, the University of Minnesota, Harvard, Columbia, Brandeis, Boston University, several branches of the University of California, the University of Chicago, the City College of N.Y., the University of Indiana, New York University, the University of Pennsylvania, and numerous others had rallied against the incendiary.\textsuperscript{166} Dow reported confrontations at 46 of the 178 colleges recruiters visited that autumn, and 133 of the 339 schools they interviewed at

\textsuperscript{164} Maurice Zeitlin. Robert Kenner, Producer and Director. “Transcript.” \textit{Two Days in October}. 2005: PBS.org. The transformation was national. As El Paso Texas resident Jean Ponder Allen, married to an Army Lieutenant Colonel who was fighting in Vietnam, said of the time: “Assumptions that I had never questioned were being challenged. I was being assaulted by these images. What was being shown on television, every night in the nightly news; the bloody combat, the body bags that were coming back, shots of protestors in other parts of the country, and all of a sudden there was a whole new dimension to the war in Vietnam that was opened up to me. It was shattering. It felt as though I had been living a lie. And it did seem like a huge backdrop of Disneyland had all of a sudden been ripped apart, and in its place you saw women and children and soldiers on both sides being blown up, and body parts, and blood, and body bags, and people crying. And you had to ask: what is my role in this, what have I done, or what am I doing, that is keeping this going. How am I contributing to this devastation.” Jean Ponder Allen. Robert Kenner, Producer and Director. “Transcript.” \textit{Two Days in October}. 2005: PBS.org.

\textsuperscript{165} Newsweek. “Napalm: Dow Bows Out.” 1 December 1969: Newsweek. 78.

in the 1967-68 academic year — more than double the 55 anti-Dow protests in the 1966-67 school year.\textsuperscript{167}

Dow put on a brave face and attempted to follow the same public relations strategy that had served it well the previous spring. “Spokesmen for the Dow Chemical Company, a napalm manufacturer, said yesterday that campus demonstrations against the company had not hurt its recruitment drive at universities. They said the company had no intention of curtailing the drive or changing it,” news agencies reported.\textsuperscript{168} “The United States is involved in Vietnam. As long as we are involved we believe in fulfilling our responsibility to this national commitment of a democratic society. And we do this because we believe in the long-term goals of our country. … [O]ur company has made the decision to continue to produce napalm B and other materials as long as they are needed by our Government,” read a condensed version of the company’s policy statement dis-


tributed to staff members.\textsuperscript{169} “[E]ffective weapons such as napalm are saving the lives of American men,” president Doan told \textit{Time}.\textsuperscript{170}

A spokesman plaintively repeated earlier assertions about the minimal importance of napalm relative to Dow’s total business. Annual sales of the incendiary to the U.S. government were then $6.5 million, less than 0.5 percent of gross revenue.\textsuperscript{171} “Looming larger in the company’s marketing list of more than 800 products are water-purifying chemicals, cold medicines, insecticides and anesthetics — many of which are also used in Viet Nam,” \textit{Time} observed.\textsuperscript{172} The objection deterred no one. Students reiterated the vast absolute production: 54,620 tons delivered to the military in 1966 alone, and over 22,000 tons produced in the first six months of 1967.\textsuperscript{173}


\textsuperscript{170} \textit{Time}. “Ire Against Fire.” 3 November 1967: \textsc{Time.com}.


\textsuperscript{172} “Dow is also the maker of Saran Wrap, which some amorous college students have found handy in non-military emergencies,” the journal added in an arch aside. \textit{Time}. “Ire Against Fire.” 3 November 1967: \textsc{Time.com}.

Harvard’s confrontation on 25 October 1967, one week after the violence at Madison, was especially wrenching. Rhetoric was heated from the outset. “Is it in the interests of chemistry students — or of any students — that war profiteers like Dow prostitute science for repression and murder?” asked advance leaflets. A sit-in started at 9:30 a.m. in the James Bryant Conant Laboratory at 12 Oxford Street, where Director of Dow Labs Frederick Leavitt planned to interview recruits. “The demonstrators argued that any corporation guilty of war crimes and partner to genocide — in this case, Dow — had no right to come on the Harvard campus,” The Harvard Crimson student news-

---

paper reported. Conant Laboratory, named to honor the former N.D.R.C. head and Harvard president, was attached to the rear of the Converse Chemistry Laboratory building: the very place where Fieser and Hershberg conducted their window well experiments. It is unclear if protesters knew its history. At 11:00 a.m., activists discovered Leavitt had relocated to nearby Mallinckrodt Hall, where he was conducting interviews (a decoy Dow employee remained at 12 Oxford Street). Students ran to the new location. As the Crimson continued:

[Director of the chemical laboratories Ronald] Vanelli immediately attempted unsuccessfully to escort [Leavitt] through the crowd which by then had grown to over 100. They stepped on and over three tiers of seated demonstrators but were then met by rows of students standing, with arms linked. A spokesman for the demonstrators, Michael S. Ansara ’68, told Leavitt he could leave only after he signed a yellow sheet of paper bearing the hand-scrawled pledge: “I agree to stop interviewing on the Harvard campus and not to return for that purpose.”

The demonstrators questioned Leavitt aggressively on napalm, Dow, and the war, until one protestor shouted, “Quit badgering him.” Leavitt, a research chemist himself, said he didn’t know enough about the war or Dow’s policies to answer the questions. After a five-minute confrontation, he and Vanelli disappeared back into the conference room.


The two remained there until about 6:00 p.m., when students voted to end the protest. Leavitt’s ordeal was the longest of any Dow recruiter during the anti-napalm campaign. “Napalm — and the company that makes it — have become symbolic of a war that tries to destroy communism by bombing people,” the Crimson editorialized the next day.

Fieser, who had retired a few months earlier, was a “bystander,” in his words, at the protest. He declined to receive a student delegation that visited his office, which was also located in Mallinckrodt Hall. Leaflets handed out a few blocks away in Harvard Square showed a picture of a child with terrible burns. “CAN YOU SUPPORT NAPALM used against CHILDREN?” read the text. “If you met the mother and father whose 10-year-old daughter you see here, they would want you to explain why SHE is a victim of NAPALM. Dropped from American planes, this jellied gasoline roasts to death or maims countless other children every day,” the document exclaimed. “Don’t buy

178 Over the course of the afternoon, “virtually the entire Harvard Administration milled in and out of Mallinckrodt M-102,” according to the Crimson. Deans collected between 350 and 400 student IDs, some offered by sympathizers who did not join the sit-in. Springer. “300 Stage Sit-In at Mallinckrodt Hall To Halt Dow Chemical Recruitment.” 26 October 1967: TheCrimson.com.


180 “Dow has become anathema to anti-war groups because of its production of napalm. The substance is intended to burn out jungle overgrowth, but it falls all too often on Vietnamese civilians,” the editorial board wrote. The Harvard Crimson. “A Justified Demonstration.” 26 October 1967: TheCrimson.com. A minority opinion signed by 14 staff members appeared on 27 October: “But the protest was irrelevant and inappropriate since a change in Dow’s policies will not stop the war or even obstruct the use of napalm. If Dow suddenly refused to manufacture napalm, there are dozens of companies that would vie for the government contract to carry on production.” Boisfeuillet Jones Jr. et al. “The Wrong Way to Peace: On the Other Hand.” 27 October 1967: TheCrimson.com.

Dow products,” urged the Citizens Campaign Against Napalm, the Student Nonviolent Coordinating Committee, Students for a Democratic Society, and the Massachusetts Political Action for Peace group, who were among the signatories.  

**Louis Fieser: Hero to hated**

After World War II, Fieser returned to his interest in public health and carcinogens. His academic accomplishments were extraordinary: 284 research papers; more than 20 books, including the nation’s most widely used basic organic chemistry text; the prestigious Judd prize for cancer research and the Nichols Medal from the American Chemical Society; numerous teaching awards; membership in the American Academy of Arts & Sciences, and the National Academy of Sciences; the only chemist on the groundbreaking 1963 Surgeon General’s Advisory Committee on Smoking and Health that established a link between cigarette smoking and lung disease; and honorary degrees from Williams College and the University of Paris. 

---


Until Vietnam, the professor reported, nothing but congratulations followed his work on napalm. President Truman awarded him a Certificate of Merit for his invention in 1948. Letters rolled in from soldiers who said his gel saved their lives. Then, in 1966-67, everything changed. His mailbox was filled with vitriol. “He said some of the writers were saying, in effect, ‘We thought you were a great guy, and now you’re a bum,’” the New York Times reported.

When questioned, Fieser drew a bright line between his research and actual deployments of napalm. “I couldn’t foresee that this stuff was going to be used against babies and Buddhists. The person who makes a rifle … he isn’t responsible if it is used to shoot the President,” he told journalist John Lannan in November, 1967. “You don’t know what’s coming. That wasn’t my business. That was for other people. I was working on a technical problem that was considered pressing,” he told The New York Times one month later. More generally, he added, “It’s not my business to deal with the political or moral questions … Just because I played a role in the technological development of napalm doesn’t mean I’m any more qualified to comment on the moral aspects of it.” In 1968, he concluded in an interview with Time, “I have no right to judge the morality of

---


napalm just because I invented it.”189 To him, the gel was interesting primarily as a chemical innovation. As he said at his retirement party, held just three weeks after student demonstrations wracked his laboratory building at Harvard: “Until the day before the lecture, I had planned to demonstrate the interesting and completely non-personal uses of Napalm to be culminated by the burning of a handsome $7 box from the Harvard Coop. ... Mary talked me out of even mentioning Napalm.”190 None of the other speakers at the dinner mentioned the infamous incendiary.191 Hoyt Hottel, an M.I.T. professor and former N.D.R.C. Division 11 colleague of Fieser’s, confirmed how times changed in Cambridge, Massachusetts. In a 1995 interview he recalled, “There was a post-war period in which I would not dare say publicly that I had been involved during the war in the use of napalm, because that was such an ugly thing.”192

As if by unstated agreement, Fieser’s work on napalm, which had held a prominent place in his biography prior to 1967, was metaphorically airbrushed out of his record after the campus protests. His hometown newspaper did not mention the munition in its report on his retirement celebration.193 The Williams Alumni Review was equally discreet when it announced his appoint-

---


191 A single couplet in a hagiographical poem was the only reference to the munition at the dinner. Guest P. D. Bartlett rhymed: “Napalm was meant for factories, all quite neuter;/ Who could foresee ‘twould stop a Dow recruiter?” P. D. Bartlett “Louis F. Fieser Dinner.” 10 November 1967: Fieser Papers. HUGFP 20.3 Box 1. Folder: “Louis Fieser — retirement dinner, 1967.”


ment in 1968 as a research professor at Smith College. Napalm received scant, if any, mention in most of the many eulogies published after his death, from pneumonia, on 28 July 1977. At his memorial service, the closest anyone came to a mention of the gel was when associate Robert Woodward described WWII as the “Great Conflagration.” “One remembers him for the delight he took in his work … He approached each task with boundless energy, great zest and relentless efficiency,” marveled colleague E. J. Corey, in a characteristic assessment. The complete description of the professor’s war work in the 1977 compendium of member biographies published by the National Academy of Sciences read:

With the approach of World War II, Fieser was drawn increasingly into war-related projects. A brief excursion into the area of mixed aliphatic-aromatic polynitro compounds for possible use as exotic explosives was followed by studies of alkali salts of long chain fatty acids as incendiaries, but by far the most important of his war-related work was his long and intensive study of the quinone antimalarials.

The Academy did not mention Fieser’s patent on napalm, or the technical paper he wrote about its production, in its extensive bibliography of his publications. In the spring of 1996, Mary Fieser

---


dedicated the Louis and Mary Fieser Laboratory for Undergraduate Organic Chemistry at Harvard. The university’s official Gazette did not mention napalm when it lauded the honorees — “Lab Named for Two Harvard Legends” — at the end of the year: “Louis Fieser was a distinguished researcher whose career included work on antimalarial agents, cortisone, and vitamin K-1.”

**Dow besieged**

Dow could not distance itself as easily. By the end of 1967, the firm was besieged. Knowledge about the way napalm killed was now widespread. Opponents turned the company’s argument that the gel was a small part of its operations on its head, and asserted that Dow’s insistence on keeping the business when it didn’t need it made the firm especially culpable. Palo Alto activists returned to the fore when they published a petition against napalm in newspapers nationwide and submitted the massive document that resulted to the House Armed Services Committee. Students called on their schools to divest from Dow, and routinely blockaded recruiters in interview offices. There was so much activity, on 8 November public relations staff began to circulate an internal Napalm News bulletin to about two dozen top executives to keep them informed about the latest trouble spots, and how the firm was responding.

Boston University History professor Howard Zinn framed the issue in stark terms in *Dow Shalt Not Kill*, a pamphlet he wrote in the autumn of 1967 as anti-napalm protests engulfed his institu-

---


tion. “Dow manufactures the majority of Napalm-B used by American forces in Viet-Nam. … Napalm is dropped daily on the villages, the forests, the people of Vietnam by American bombers; the saturation bombing of that tiny country is one of the cruelest acts perpetrated by any nation in modern history; it ranks with the destruction of Lidice by the Germans, the crushing of the Hungarian rebellion by the Russians, or the recent mass slaughter in Indonesia,” he asserted. “We are not, then, dealing with trivialities, but with monstrous deeds,” he continued.

“The root issue, it should be clear, is not simply napalm; it is the Vietnam War as a whole,” the professor stressed. “The war itself is the object of civil disobedience; the use of napalm is one particularly bestial tactic in this war,” he wrote. However, he continued, “The fact that there is only an indirect connection between Dow recruiting students and napalm dropped on Vietnamese villages, does not vitiate the moral issue. It is precisely the nature of modern mass murder that it is not visibly direct like individual murder, but takes on a corporate character, where every participant has limited liability. The total effect, however, is a thousand times more pernicious than that of the individual entrepreneur of violence. If the world is destroyed, it will be a white-collar crime, done in a business-like way, by a large number of individuals involved in a chain of actions, each one having a touch of innocence.”


“The use of napalm is bringing shame upon our nation throughout the world. Its use is wholly unworthy of the ideals for which this nation stands. We demand that our President and the Members of our Congress take immediate steps to stop the manufacture and use of this barbarous weapon,” read the Palo Alto petition.  

When IBM President Thomas Watson Jr., in a letter to the student newspaper at his alma mater Brown University, said it was “ridiculous in the extreme” to expect a company to “subvert the democratic process” and refuse to sell one of its products to its own government — and noted there was almost no major US corporation that was not contributing in some way to the war — students brushed his concerns aside and urged alumni to withhold donations under all circumstances until the school divested from Dow.  

Pickets reappeared at Dow’s Rockefeller Center offices.

An 18 December protest at California State University Los Angeles showed how fully anti-napalm forces controlled the field by the end of 1967. The demonstration, the first ever organized by the local Students for a Democratic Society chapter, began with a rally and march to the school’s main administration building, then continued to the recruiting office housed in an old trailer. Dow recruiters locked themselves inside when the students arrived, so demonstrators pummeled it, and left it “dented, though not destroyed,” in the words of an S.D.S. newsletter. The protesters burned a dummy with home-made napalm and tossed a stink bomb into the trailer, which forced the recruiters out. They hurried to another building, which was promptly occupied by stu-

---


dents. Campus police, backed by 350 City of Los Angeles officers stationed about 300 yards away behind a small hill, announced that everyone was under arrest. The harried recruiters seized advantage of a break in the action, jumped out a back window, and raced to their car. “The students chased them, and looked at them through the car windows as they sped away,” S.D.S. said. The executives told a tale of horror on local evening radio shows, according to the newsletter.208

Dow felt the pressure. “[I]ts image is suffering. Next to LBJ, Dean Rusk and Hubert Humphrey, Dow, the manufacturer of napalm, has become the most popular target for campus anti-war protests,” Science magazine reported.209 Second-guessing began inside the firm. “Creative men,” might be more difficult to attract as a result of the demonstrations, Doan fretted.210 “You just don’t know what it is doing to the quality of students we’re talking to,” said Director of Corporate Recruiting Raymond F. Rolf.211 “It was very disheartening,” recruiter George Allen recalled of a visit to San Jose State College, “One of the fellows I was interviewing I had to talk to in the washroom because we were both so blinded by the tear gas.”212 The company began to assess its options.

“There is certainly a possibility of our not bidding or bidding high,” for a contract renewal, board chairman Gerstacker told the Los Angeles Times on 23 November.213 A spokesman, however,

208 New Left Notes. “Cal State, SFV and Dow.” 18 December 1967: New Left Notes. 3. See Brandt. Growth Company. 355-56 (“Save yourself through the window, Mr. Jones” headlined Pravda’s coverage of the event).

209 Science magazine. “Dow Chemical Company: Sales and Worries are Up.” In Hersh. Chemical and Biological Warfare. 261.


211 Hersh. Chemical and Biological Warfare. 261.


quickly backtracked. “My remarks were intended to mean only that I cannot commit my company at this time to a course of action for the indefinite future,” Gerstacker clarified the next day.\(^\text{214}\)

**Burned out**

By 1968, napalm’s identification with the horrors of the Vietnam War, and by extension Dow Chemical, was complete. Protests moved off campuses and activist clergy joined students as principal organizers. On 7 May, the New York-based group Clergy and Laymen Concerned About Vietnam (CALC\(\text{A}\)V) assembled hundreds of protesters for a rally at the University of Michigan at Ann Arbor followed by an overnight “March on Midland” caravan to Dow’s annual meeting, to be held at Midland’s Central Intermediate School. About 500 clergy and students, many wearing black armbands, crowded the school’s lawn the next morning. “Genocide via napalm,” “The war is wrong — so is Dow,” and “Dow Know-How In Every Drop of Napalm,” read signs. “[I]t will cost Dow hundreds and hundreds of millions of dollars to rebuild its image as a maker of chemicals for progress instead of chemicals of destruction,” Scarsdale stockbroker Daniel J. Bernstein, remonstrated with shareholders. “We must not surrender to government the right to make moral choices,” preached Quaker clergyman Rev. James Laird.\(^\text{215}\)

Dow denied corporate responsibility for the Vietnam War, and again pled duty and patriotism. Humanitarianism and commerce had been dropped from its list of arguments. “Companies don’t start wars, and companies can’t end them … if you want to stop the war why aren’t you talking to


legislators,” Gerstacker told CALCAV leader Rev. Richard Fernandez in a public discussion before the meeting held at a Presbyterian church across the street from the Intermediate School. A group of 17 counter-demonstrators may have increased the discomfort of corporate officers with their messages of support: “I Back Dow, I Like My V.C. (Vietcong) Well-Done,” read one.  

Managers carried the day. Bernstein’s nomination of war opponent and former Federal Reserve Board chairman Marriner Eccles to the Dow board was defeated by 25 million votes to 1,212. A show of hands soundly rejected a resolution to end Dow’s production of napalm. “You can harass us. You can hurt us — and we have been hurt. … But as long as our democratically elected government sends draftees to die Vietnam, we’re going to support those men,” Gerstacker said in closing remarks. The meeting adjourned to the strains of “We Shall Overcome” from demonstrators.

---


A few days later, nine committed Catholics led by brothers Daniel and Philip Berrigan — both priests, and dressed in clerical collars — broke into the Catonsville, Maryland draft board office, removed between 378 and 600 files for prospective draftees, covered them with home-made napalm made from gasoline and soap flakes, and burned them in front of waiting news cameras.²¹⁸

The action took less than 15 minutes.\textsuperscript{219} “We felt it was fitting that this agent which had burned human flesh in the war in Vietnam and in many other places should now be poured on the records which gave war and violence their cruel legitimacy,” David Darst, a Jesuit who was one of the participants, said at his subsequent trial.\textsuperscript{220} “We used a contemporary symbol napalm to destroy records which are potential death certificates,” said Thomas Lewis, another of the so-called Catonsville Nine.\textsuperscript{221} Mary Moylan, a nun and former nurse-midwife told the court: “To a nurse the effect of napalm on human beings is apparent. I think of children and women bombed by napalm, burned alive by a substance which does not roll off. It is a jelly. It adheres. It continues burning. This is inhuman, absolutely. To pour napalm on pieces of paper is certainly preferable to using napalm on human beings. By pouring napalm on draft files I wish to celebrate life, not to engage in a

\textsuperscript{219} Marilyn Julius. “Fire and Faith: The Catonsville Nine File.” 2005: Enoch Pratt Free Library, Maryland Digital Cultural Heritage. \url{MDCH.org}. See Andrea Seabrook. “Fire Sparked Push to End Vietnam War.” 17 May 2008: \textit{All Things Considered}. \url{NPR.org} ("Dean Pappas, a longtime political activist from Baltimore, helped the Catonsville Nine make the napalm from soap chips and gasoline.")

\textsuperscript{220} Berrigan. \textit{The Trial of the Catonsville Nine}. 33. The recipe was based loosely on a formula in the \textit{Special Forces Handbook} published by the School for Special Warfare at Fort Bragg, Darst testified. “We did not use all the ingredients called for. We made a very crude form of napalm consisting of two parts gasoline one part soap flakes. Nor did we cook our mix into a jelly. We left it in liquid form so we could pour it on the files,” he said. Berrigan. \textit{The Trial of the Catonsville Nine}. 34. The handbook referenced may have been the 1969 Army Special Forces Improvised Munitions Handbook, which provides detailed instructions for making “gelled flame fuels” from gasoline mixed with soap, egg whites, animal blood, and other thickeners. Headquarters, Department of the Army. “Improvised Munitions Handbook.” \textit{TM 31-210 Department of the Army Technical Manual}. 1969: Frankford Arsenal. V:4-1-7. 159-70. \url{Scribd.com}. See \url{LibertyReferences.com}. Subsequent authors gave this recipe wide distribution. Youth International Party founder Abbie Hoffman, for example, gave the following instructions for a Molotov Cocktail in his 1970 work \textit{Steal This Book}: “Fill a thin-walled bottle half full with gasoline. Break up a section of styrofoam (cups made of this substance work fine) and let it sit in the gasoline for a few days. The mixture should be slushy and almost fill the bottle. The styrofoam spreads the flames around and regulates the burning. The mixture has nearly the same properties as napalm. Soap flakes (not detergents) can be substituted for styrofoam. Rubber cement and sterno also work.” Abbie Hoffman. \textit{Steal This Book}. 1971: Pirate Editions. \url{Tenant.net}

\textsuperscript{221} Berrigan. \textit{The Trial of the Catonsville Nine}. 44-45.
dance of death.” Vietnam, Daniel Berrigan wrote in a meditation distributed to media at the event, was the “Land of Burning Children.” The raid inspired copycat actions in New York, Milwaukee, Boston, Chicago, and other cities. Similarly, on 22 March 1969 a different set of nine Catholics, including six priests, broke into Dow’s Washington D.C. office, wrecked office equipment, spattered human blood over the walls, ceilings and floors, put up photos of napalmed children, and threw documents into the street where they formed piles four inches deep. Whereas in 1965 just 38 percent of Americans were familiar with Dow according to a survey, by 1969 no less than 91 percent of the public “knew something about” the firm.

Even the company’s Canadian subsidiary felt the heat. In November 1968, a time bomb exploded in front of the home of General Counsel Len Weldon at 5.00 a.m. “It scared the devil out of my family,” the lawyer recalled. In early 1969, a trio of protesters threatened to blow up the firm’s Toronto sales office unless its manager signed a pledge to stop napalm production.

---


223 Berrigan. The Trial of the Catonsville Nine. 93.


227 One of the three was later revealed to be an undercover police officer, which presumably lessened the risk to the sales team. Brandt. Growth Company. 203-04.
Dow had had enough. In October 1969, when its Pentagon contract came up for renewal, the corporation re-submitted its 1968 bid without adjustment — and lost the contract to arms manufacturer American Electric Inc. of La Mirada, California, southeast of Los Angeles. It announced the development on 14 November. Its rival manufactured bombshells, and had been filling them since 1967 at its plant in Long Beach, south of Los Angeles, with napalm from Dow’s Torrance facility. American Electric had built a polystyrene plant just that year, perhaps with the napalm contract in mind. Napalm’s new manufacturer was a subsidiary of the City Investing conglomerate, produced no consumer products, and had no plans to recruit on college campuses. Dow denied it had deliberately over-bid and reaffirmed its commitment to provide whatever products the government required.

---


Branded

Absolution proved harder to obtain, perhaps because of the manufacturer’s lack of contrition. Days after Dow announced it had lost its contract, students at Notre Dame University locked up a company recruiter to protest the firm’s previous work on napalm. The confrontation drew national attention when the university suspended or expelled 10 students involved in what became known as the “C.I.A.-Dow” protest. Dow’s continued production of the Agent Orange herbicide gave demonstrators a separate reason to censure the company. And even though campus protests largely ended when Dow stopped napalm production in 1969 — the firm recorded 29 demonstrations in the 1968-69 school year, and just four in 1969-70; “no one talks about it anymore,” a reporter at


the Harvard Crimson student newspaper said of the incendiary in June 1970 — the company was fused as tightly to napalm in the public’s mind as the gel was to the skin of its victims. Gerstacker summed up the consequences:

Where we have been hurt is that we have in effect been cut off from a segment of society, the size of which is indeterminate, which has blocked us out emotionally because they see us as a symbol of the hated war in Vietnam. So we may have lost some recruits that we really would have wanted, we may have lost some sales that we otherwise would have had, we may have lost some stockholders that would otherwise have purchased and held our stock. The number of Dow shareholders dropped from 95,000 to 90,000 during the napalm demonstrations …. We suspect a good many of the 5,000 we lost reacted at least in part to the napalm stories …

Dow’s record as a manufacturer of napalm remains an important part of the company’s public identity. In 1987, for example, almost two decades after it had stopped producing napalm, Time magazine reported on the launch of a national public relations campaign as follows: “Dow Chemical, vilified on college campuses during the Vietnam War for manufacturing napalm, is reaching out to young people in television commercials that show freshly minted college graduates signing on to help feed the world.”


234 Carl A. Gerstacker. “Living with Confrontation.” 3 June 1970: Talk to New York Financial Writers. In Brandt. Growth Company. 361. The chairman noted that a 1970 study by Opinion Research found that the number of people who viewed Dow “Very Favorably” or “Favorably” declined from 64 precent to 60 percent between 1965 and 1970. During the same period, he added, “the percentage of persons who viewed the chemical industry favorably declined from 55 percent to 43.” His conclusion: “We were actually bucking a trend.” See Huxman and Bruce. “Toward a dynamic generic framework of apologia: A case study of Dow chemical, Vietnam, and the napalm controversy.” Spring/Summer 1995: 46 Communication Studies 1-2. 62. InformaWorld.com. (“Chairman Gerstacker announced, ‘… In the last year our total number of stockholders dropped by more than 5,000. This is by far the biggest drop we have ever had.’”)

Hans Beetz to interview candidates by telephone from the occupied Music Room at Pomona College, *The Economist* magazine, in an article titled “America’s most-hated companies: a roll-call of commercial vilification,” awarded Dow a satirical “lifetime achievement award for the courting of controversy,” in part because of its work on napalm.²³⁶ Dow’s President, C.E.O., and Chairman Andrew Liveris observed the following year at a conference on “Ethics and Compliance:” “Believe me, we have had our share of ethical challenges, most of them very public … starting with the manufacture of Napalm during the Vietnam War … when suddenly we went from being a company that made Saran Wrap to keep food fresh to a kind of war machine … at least, according to the characterizations of the time.” The company remains a defense contractor, but appears not to manufacture weapons.²³⁷

The anti-napalm protest movement merged with the broader anti-war movement after Dow left the business. American Electric’s Long Beach plant never attracted sustained opposition. This dénouement, however, was not immediately clear. On 1 December 1969, the *New York Times* dubbed Long Beach “napalm capital of the world” and reported that protests had started against American Electric. The opposition in Southern California, however, in contrast to that in Redwood City, came largely from local homeowners outraged by a series of industrial accidents rather than principled opponents of the war. On 25 June 1969 an explosion rained hot molten plastic on the adjoining Cherry Manor community of 226 homes. The next week, a truck spilled seven 750-pound shipping containers filled with napalm onto the Long Beach Freeway. Tempers frayed, even


though no one was hurt. Another explosion on 2 October sprayed hot plastic over the lawns of homes that adjoined the plant, and a dozen cars and trucks owed by a neighborhood business. The City Manager moved to shut down the plant, and the Cherry Manor Homeowners Association sued the city on grounds of negligence, not immorality (they also lost). When the plant solved its start-up difficulties and the accidents ended, the protests stopped.

Civilian injuries caused by napalm remained a fixture of anti-war protests until the conflict ended. A series of December 1971 “napalm” attacks against Christmas trees decorated with war toys and medals in several cities organized by Vietnam Veterans Against the War was typical in its use of the incendiary to call attention to a broad protest. Posters of napalm burn victims, mixed in which other protest signs, were a common feature of mass demonstrations.

Thus, by the time Kim and little Danh began their run from the temple on 8 June 1972, napalm was closely associated with the war in Vietnam in the minds of millions. Moreover, as a result of the nationwide education program that was one result of the anti-napalm protests, accounts like that of reporter Fox Butterfield for the *New York Times* could be comprehended at a level of detail hard to conceive before 1966: “Sgt. Nguyen Van Hai watched incredulously as a South Vietnamese plane mistakenly dropped flaming napalm right on his troops and a cluster of civilians. In an instant five women and children and half a dozen Vietnamese soldiers were badly burned, their skin

---


239 An 4 November 1971 accident in which a semi-trailer loaded with napalm went off a curve on a suburban street in Fallbrook California while on its way to the nearby Naval Weapons Station at 700 Ammunition Road (adjacent to Camp Pendleton, near San Diego), received front-page coverage in the local newspaper, a quick response from firefighters, and no apparent protests. Betty Johnson. “35 YEARS AGO: Napalm trucking accident on East Mission makes headline news.” 2 November 2006: NCTimes.com.

peeling off in huge pink and black chunks. ‘This is terrible, the worst I’ve ever seen!’ said Sergeant Hai.”

The war, in turn, was increasingly associated with failure by the summer of 1972 as battlefield reports worsened, the South Vietnamese government wobbled, and preparations for a U.S. withdrawal became more apparent by the day. U.S. authorities did not censor “The Terror of War,” as they did comparable images from Japan during World War II and the Korean War, and the photograph captured a moment of high drama, but it was not unique: photographs of children injured by napalm in Vietnam had circulated in the U.S. for years. The napalm that hit Kim Phúc was an intimation of national defeat as much as a record of tragedy. It hardened, like a scar, into certainty.

The last U.S. combat troops left Vietnam in March 1973. Most of their napalm went with them: 23 million pounds in 34,653 ten foot long, cigar-shaped, Army-green aluminum canisters, each packed in an individual wooden crate, completed a round-trip to California. Troops stacked


the bombs about half-way between Los Angeles and San Diego on 67 open acres at the Seal Beach Naval Weapons Station in the Fallbrook Naval Weapons Facility next to the Camp Pendleton Marine base.\textsuperscript{246} Final defeat for the United States came on 30 April 1975 when its last helicopters left the U.S. embassy in Saigon.\textsuperscript{247} In Southern California, the nation’s napalm arsenal sat in the sun and waited to hear its fate. Gradually, over the next almost quarter century America, and the world, formed their judgment.


V. “NAPALM IN THE MORNING,” 1969-2009

Napalm Close Up: Charlie’s Point, Nung River, 1969

Napalm made its worldwide screen debut in the 1979 blockbuster Hollywood film Apocalypse

Now, seen by tens of millions of people:

FULL SHOT — HELICOPTERS — DAWN. What seems like hundreds of Hueys standing, their rotors churning a great wind. Inside, the men of the 1st Cavalry Airmobile — toughest unit in Vietnam. Kilgore’s helicopter is being loaded with ammunition and has surfboards strapped underneath.

MED. VIEW. Kilgore [Robert Duvall] strides up to the side door, dressed for battle. He looks out, around. He turns to his door GUNNER. KILGORE: How do you feel, boy? GUNNER: Like a mean motherfucker, sir. …

INT. COMMAND COPTER. Kilgore cranes his neck and almost leans out to watch the waves — then he sits back relaxed. KILGORE (to Willard [Martin Sheen]): We’ll come in low out of the rising sun — We’ll put on the music about a mile out. WILLARD: Music? KILGORE: Yeah. Classical stuff — scares the hell out of the slopes — the boys love it.

MED. SHOT. POV behind the PILOT and CO-PILOT — the ocean rushes below. PILOT: Big Duke six to Eagle Thrust — turn on coordinates 1 - 0 - niner, assume attack formation. The helicopter banks into a tight turn and bears toward the coast. RADIO (V. O. ): Eagle Thrust formation target 2800 yards — begin psych-war operations.

CLOSE SHOT — LOUDSPEAKERS. The ocean rushes below as suddenly the LOUDSPEAKERS BLARE out Wagner’s “Ride of the Valkyries.”

FULL SHOT — HELICOPTERS From the water we SEE the massive grouping of Hueys — gun-ships — troop carriers — medevac and recon — ROAR over low in battle formation BLARING out “Ride of the Valkyries.”

INT. HELICOPTER — MED. SHOT —CREW POV behind pilot — PILOT: 700 - 600 yards - 500 — Commence firing. The whole copter shakes. …

EXT. HELICOPTERS — MONTAGE. We SEE rockets ROAR from pods — MA-CHINE GUNS RATTLE —grenade launchers POUND away — and MINI— GUNS pour streams of lead and tracers with the SOUND of a DIESELHORN. …
DISSOLVE TO FULL SHOT — SURF — MIKE AND JOHNNY. They walk through shallows carrying brightly colored boards. They look very scared. JETS SCREAM overhead, FIRING CANNONS. Helicopters wheel by carrying out wounded. They wear olive drab surfing trunks with the Cav’s shield on the left leg. The same shield is emblazoned on the boards along the word “Airmobile”. They edge into the water and paddle through the mild shorebreak. …

CLOSE SHOT ON LANCE AND KILGORE. Another SHELL SCREAMS over and EXPLODES down the beach. Lance looks over at Willard. … WILLARD: Incoming! Lance ducks — puts his hands over his head. The SHELLS SCREAM over Kilgore and out towards the point. Kilgore looks through his glasses — two EXPLOSIONS in the water are HEARD. KILGORE: Son of a bitch. Lance looks up and out toward the point in horror. …

FULL SHOT — THE POINT, SURFERS. They come up near their boards and climb on — smoke hangs over the water. KILGORE (O. S. ) (megaphone): Try it again, you little bastards. BACK TO SCENE. He turns to Willard. KILGORE (continuing): I’m not afraid to surf this place. I’ll surf this place.

CLOSE SHOT ON KILGORE He turns, glowering to his lackeys. KILGORE Bring that R. T. [Radio Telephone], soldier. He grabs it. KILGORE (continuing) Big Duke Six to Hell’s Angels — Goddamit, I want that treeline bombed — yeah — napalm — gimme some napalm — son of a bitch — yeah, I’ll take H.Z. or C.B.U.’s if you got any of them — just bomb ’em into the Stone Age, boy. He throws the R. T. back to a soldier — another SALVO WHISTLES over — everyone drops. KILGORE (continuing, to himself): Son of a bitch. As the SHELLS EXPLODE on the beach behind him, Kilgore raises his M-16 and EMPTIES it full automatic in the general direction of the trees. He mumbles a few un-intelligible swear words and jams a new clip into his rifle turning to Lance — KILGORE (continuing): We’ll have this place cleaned up and ready for us in a jiffy, boy. Don’t you worry. He FIRES another clip as the JETS SCREAM overhead. …

FULL SHOT — PHANTOMS — MONTAGE Phantoms RAKE the trees with 20 mm CANNONS — FIRE five inch ROCKETS in salvo — “Bull Pup” MISSILES — drop H.E. (high explosives) and C.B.U’s (Cluster Bomb Units) and finally an immense amount of NAPALM. …

FULL SHOT — THE POINT — KILGORE, WILLARD, LANCE, OTHERS. Kilgore watches the waves with his field glasses — smoke drifts over. Lance crouches below. Willard is up looking off in another direction. SHELLS SCREAM over, but even their noise is drowned out by the fierce SHRIEK of the PHANTOMS and the deafening BLAST of HIGH EXPLOSIVES. Willard stares at the tree line where it comes down to the river. The JETS are making a hell of the tree line; a hell of fire and bustling steam that nothing could live in. … Kilgore FIRES another clip
at the tree line, and then strides back without looking at them. KILGORE: (almost to himself) You smell that. (louder) You smell that? LANCE: What? KILGORE: Napalm, boy — nothing else in the world smells like that. They reflect the glow from the burning trees. KILGORE (continuing; nostalgically): I love the smell of napalm in the morning. One time we had a hill bombed for 12 hours. I walked up it when it was all over; we didn’t find one of ‘em … not one stinking gook body. They slipped out in the night — but the smell — that gasoline smell — the whole hill — it smelled like … (pause) victory. … He looks off nostalgically.

WILLARD: You know, some day this war’s gonna end. KILGORE (sadly): Yes, I know. Suddenly he senses something — he stops — lifts his hand — then frantically licks his fingers and puts them up in the air. KILGORE (continuing): The wind —. LANCE: What? Sure enough there is a rushing breeze that increases. KILGORE (rising maniacally): Feel it — it’s the wind — it’s blowing on shore — It’s on shore! …

MED. SHOT — THE BEACH — LANCE, WILLARD, KILGORE. KILGORE: It’s the napalm — it’s causing the wind — ruining my perfect left. He staggers off toward the trees followed by his guards and other lackeys. KILGORE (continuing; mumbling): The napalm — ruin — napalm my perfect left — my perfect left point break — napalm — Lance motions with his eyes to Willard. … They break and run like hell.¹

---
¹ John Milius and Francis Ford Coppola. Apocalypse Now. 3 December 1975: DailyScript.com, 44-99. The production grossed $79 million in its initial U.S. release. Worldwide revenue figures are not available and are estimated at approximately twice domestic revenues. At an average ticket price of $4, perhaps 40 million people paid to see the film in a cinema; far more have seen it on television, video, DVD, and other recorded media. Gross Revenues: Box Office Mojo. “Apocalypse Now.” 2009: BoxOfficeMojo.com. Apocalypse Now remains widely known and influential. A 2005 survey of 6,500 British movie fans conducted by Blockbuster U.K., the British subsidiary of the U.S. video rental firm, judged Kilgore’s “napalm in the morning” commentary to be the best speech in the history of cinema. BBC. “‘Napalm’ speech tops movie poll.” 2 January 2004: BBC.co.uk. See John Ezard. “We love sound of napalm in the movies: Poll on best film speeches puts Apocalypse Now, A Few Good Men and On the Waterfront at head of list with Britain’s Trainspotting seventh.” 1 January 2004: Guardian.co.uk. See Mark Caro. “Top film quotes list will make your day; As AFI winnows its rolls down from 400 entries, readers weigh in with favorites of their own.” 24 December 2004: Los Angeles Times. E15. ProQuest.UMI.com. (Tied for 17th most favorite movie line in reader survey). In 2001, as another example of the enduring fame of the line, German thrash metal band Sodom released its song “Napalm in the Morning.” “Skin peeling off to drop your timid mask/ You wish that death redeems you fast/ Creation of the fire seems the perfect nude/ Your carbonized torso just a part of you/ … you’re gonna die!/ Unholy evil prophets rise/ Fire is raining from the endless skies/ Can you hear the final thunder roaring/ Napalm in the morning.” Sodom. “Napalm in the Morning.” M-16. 22 October 2001: Steamhammer/Sony Music. Sodomized.info.
During and immediately after the Vietnam War, U.S. writers, artists, musicians, and many leading politicians, adopted the thesis first articulated by the Redwood City protesters: napalm was cruel, lamentably American, and a metaphor for futility in Vietnam. Arbiters of popular culture, led by Hollywood, developed this message about weapon, country, and defeat in the late 1970s and early 1980s, and sold it to hundreds of millions of people worldwide. By the mid-1980s “napalm,” acquired a slang meaning that connoted anything extreme — with an underlying implication of violence. After 11 September 2001, as demands for vengeance swept the country, admiration for the incendiary in some pockets of U.S. culture rose to heights not seen since the 1950s: film directors used it as a form of entertainment; marketers found advantage in its fame; and fan communities formed on the Internet. This most recent shift does not appear broad enough to have altered the negative popular consensus about napalm, but remains a significant cultural cross-current.

From “Napalm sticks to kids” to “baby burners”

Criticism of napalm by artists during the Vietnam War started in the late 1960s. Novelist J. G. Ballard picked up in 1969 where his fellow Englishman and napalm critic Graham Greene left off in 1955 in *The Quiet American*. In *Love and Napalm: Export U.S.A.*, published in New York, Ballard cited the incendiary as a metaphor for American perversions. It was, he wrote, the perfect tool to produce an “Optimum child-mutilation film.” His fiction continued:

Using assembly kits of atrocity photographs, groups of housewives, students and psychotic patients selected the optimum child-torture victim. Rape and napalm burns remained constant preoccupations, and a wound profile of maximum arousal

---

2 Many other commenters in countries around the world offered contemporaneous criticisms of napalm. See, for example, Bettina L. Knapp. “Reviewed work(s): Napalm by André Benedetto.” Autumn 1969: 43 Books Abroad 4. 557. JSTOR.org. (“Scenes, dramatizing the value of human life (or lack of it), of war, the meaning of conquest and disaster, give the play universal qualities rather than circumscribing it in the usual obsessively anti-American pattern so characteristic of French political playwrights.”)
was constructed. Despite the revulsion expressed by the panels, follow-up surveys of work-proficiency and health patterns indicate substantial benefits. The effects of atrocity films on disturbed children were found to have positive results that indicate similar benefits for the TV public at large. These studies confirm that it is only in terms of a psycho-sexual model such as provided by the Vietnam war that the United States public can enter into a relationship with the world generally characterized by the term ‘love.’


Musicians far from the nation’s cultural capital, however, produced the most widely publicized artistic commentary on napalm during the war. A dozen or so anti-war active-duty soldiers stationed at the Mountain Home Air Force Base in the town of Mountain Home, population, 7,000, near Boise, Idaho opened a coffee house and musician’s collective in 1971 called the Covered Wagon: Air Force security code for “sabotage.” Local critics made death threats, urged attacks on the coffee shop and its members, broke the building’s doors and windows on numerous occa-

---


sions, and committed arson against it, but Covered Wagon persevered. In 1972, the men released “We Say No to Your War! Songs Written and Sung By the Covered Wagon Musicians Active-Duty Air Force People, Mountain Home AFB, Idaho,” which included “Napalm Sticks to Kids,” a biting parody of a call and response training cadence.

Member John Boychuk explained the history of the lyrics in album notes: “A group of Air Force and Army GIs assigned to the 1st Air Cavalry sat down one night in a hootch in Vietnam to write these words. Each person made a verse about an incident in which he had taken part ….” The reminiscences, he wrote, have “been reprinted in GI newspapers all over the world, [and are] probably the most widely quoted poem to come from the GI movement.” Indeed, although only a relatively small number of albums were sold, “Napalm Sticks to Kids” became a nationwide anthem for anti-war protestors:

We shoot the sick, the young, the lame,/ We do our best to maim,/ Because the kills all count the same./ Napalm sticks to kids./ Flying low and looking mean,/ See that family by the stream/ Drop some nape and hear ‘em scream/ Napalm sticks to kids. … A baby sucking on his mother’s tit/ Children cowering in a pit/ Dow Chemical doesn’t give a shit/ Napalm sticks to kids./ Eighteen kids in a ‘no fire zone’/ Books under arms as they go home/ Last in line goes home alone/ Napalm sticks to kids./ Gather kids as you fly over town/ By tossing candy on the ground/ Then grease ‘em when they gather round./ Napalm sticks to kids. … They’re in good shape for the

---


7 John Boychuck “Liner Notes: Napalm Sticks to Kids.” Covered Wagon Musicians. We Say No to Your War! 1972: Paredon Records. Folkways.SI.edu.
shape they’re in/ But, God, I wonder how they can win./ With napalm running down their skin./ Napalm sticks to kids.  

Anti-war politicians singled out napalm to emphasize their movement credentials. In his poem “Vietnam Message,” Minnesota Senator and 1968 Democratic presidential candidate Eugene McCarthy wrote, “We will take our napalm and flame throwers/ out of the land that scarcely knows the use of matches …/ We will leave you your small joys/ and smaller troubles.”

South Dakota Senator George McGovern, in the final days of the 1972 presidential campaign, reduced an audience at the University of Minnesota to stunned silence, and tears, when he played a clip from Boston radio talk show host Jerry Williams’ program in which a veteran described the aftermath of napalm strikes in Vietnam: “We went into villages after they dropped napalm, and the human be-

---

8 The entire lyrics are as follows:

We shoot the sick, the young, the lame,/ We do our best to maim,/ Because the kills all count the same,/ Napalm sticks to kids./ Flying low across the trees,/ Pilots doing what they please,/ Dropping frags on refugees,/ Napalm sticks to kids./ Flying low and looking mean,/ See that family by the stream/ Drop some nape and hear ‘em scream/ Napalm sticks to kids./ A group of gooks in the grass,/ But all the fightin’s long since past,/ Crispy youngsters in a mass/ Napalm sticks to kids./ Drop some napalm on the barn,/ It won’t do too much harm,/ Just burn off a leg or arm/ Napalm sticks to kids./ CIA with guns for hire/ Montagnards around a fire/ Napalm makes the fire higher/ Napalm sticks to kids./ A baby sucking on his mother’s tit/ Children cowering in a pit/ Dow Chemical doesn’t give a shit/ Napalm sticks to kids./ Eighteen kids in a ‘no fire zone’/ Books under arms as they go home/ Last in line goes home alone/ Napalm sticks to kids./ Gather kids as you fly over town/ By tossing candy on the ground/ Then grease ‘em when they gather round/ Napalm sticks to kids./ Ox cart rolling down the road/ Peasants with a heavy load/ They’re all V.C. when the bombs explode/ Napalm sticks to kids./ Cobras flying in the sun/ Killing gooks is lots of fun/ Get one pregnant and it’s two for one/ Napalm sticks to kids./ There’s a gook down on her knees/ Launch some flechettes into the breeze/ Her arms are nailed to the trees/ Napalm sticks to kids./ Blues out on a road recon./ See some children with their mom./ What the hell, let’s drop the bomb./ Napalm sticks to kids./ They’re in good shape for the shape they’re in/ But, God, I wonder how they can win./ With napalm running down their skin./ Napalm sticks to kids.


ings were fused together like pieces of metal that had been soldered. Sometimes you couldn’t tell if they were people or animals.”

Veterans often bore the brunt of popular outrage. Helicopter commander Bob Parker, for example, returned from combat in 1971. He spent his first night in the United States with his wife at a motel. “The next morning, we drove to the nearest shopping mall to buy me some civilian clothes .... A college-aged fellow noticed my flame-thrower qualification badge and made some remarks about me being a baby-burner. ... I got used to people walking away when they figured that I was in the army. ... It was almost like we smelled bad. I was an outsider in my own country, and in many ways, have stayed that way ever since,” he said.

Wages of failure

In the years immediately after the war napalm came to connote the pathos, cruelty, and futility of America’s greatest defeat. Novelist and veteran Phillip Caputo captured the former when he wrote in his 1977 autobiography *A Rumor of War*: “A man saw the heights and depths of human behavior in Vietnam, all manner of violence and horrors so grotesque they evoked more fascination than disgust. Once I had seen pigs eating napalm-charred corpses — a memorable sight, pigs eating roast people.” Singaporean poet, traveler, educator, and sometime diplomat Robert Yeo warned of the political implications of the gel’s harsh effects in *And Napalm Does Not Help*, pub-

---


lished the same year. “[D]emocracy is a wind-blown seed and the land/ is now too soiled for any sprig to grow/ but the hardiest; and napalm does not help.”

*Apocalypse Now* celebrated napalm’s short-term power — the sequence cited at the start of this chapter is visually stunning — but recorded only longer-term futility from its use. Colonel Kilgore’s “napalm in the morning” speech described a fruitless effort: his enemies “slipped out in the night,” and left just the smell of victory. The jungle strike he ordered in the movie created so much heat it changed the wind and ruined the offshore surf break it was intended to secure. In addition to its colossal worldwide audience, an indication of the attention the film garnered can be seen in its two Academy Awards, including Best Picture, and gross revenues of about $160 million.

---


Newspapers played relatively little role in this aspect of napalm’s story. The New York Times, a bellwether for the industry, set a record for annual mentions of napalm in 1951, the first full year of the Korean War, when it published 232 articles that mentioned the gel. Coverage plumbed to 146 mentions the following year, and just 45 in 1953. In 1967, as U.S. involvement expanded in Vietnam, the journal’s reporting on napalm hit a second peak, with 187 citations. Coverage declined from there: 120 stories in 1968, about 83 mentions each year from 1969 to 1972, 49 in 1973, and not more than 36 citations in any subsequent year — many just terse summaries of remote battles, printed deep in the newspaper. The year 2001, when America invaded Iraq, was the only exception: coverage more than doubled from 14 mentions in 2000 to 37 references, but

---

trailed off after that. The Los Angeles Times followed a similar pattern, with less coverage of the Korean War but comparable reporting from 1955 on.\textsuperscript{16}

Artists, however, commented far more frequently on napalm, and in a wider range of media, in the 1980s than in previous decades. They generally saw the gel as a proxy for brutality and oppression. In 1981, British musicians Nicholas Bullen and Miles Ratledge established grindcore punk music, an internationally popular musical genre, with their band Napalm Death. The group, which has performed in thousands of venues worldwide, released over 30 albums, and remains a globally known grindcore exponent, performed short fast songs accompanied by deep, guttural vocals, that mirrored the “atavistic sounds of the first wave of anarcho (short for anarchist) punk bands,” in the words of critics Albert Mudrian and John Peel.\textsuperscript{17} Bullen, a committed vegetarian, and Ratledge, who later opened a yoga school in Denmark, named their group as form of sarcastic political commentary, and an homage to Apocalypse Now.\textsuperscript{18} The complete lyrics of the first track on their 1987 debut album are revealing: “Multinational corporations/ Genocide of the starving nations.”\textsuperscript{19}


\textsuperscript{18} Albert Mudrian and John Peel. Choosing Death: The Improbable History of Death Metal and Grindcore. 2004: Feral House. 27.

Wehrmacht, another punk band with a substantial following, formed in 1985 in Portland Oregon, invoked napalm along similar lines to criticize government authority. Lyrics to its 1987 song “Napalm Shower” read:

One flick of the switch, and we’re all dead./ One nation destroyed, it moves on ahead./ Bombs destroy everything here, no time to live, or/ cry a tear./ Beg for your life, down on your knees. War-/ mongers hate! Kill as they please. Fallout is/ arising, people vaporizing. The blast is so/ bright, it takes out your sight. Cars over-/ turned, houses are burned. Nature is lost, to/ total chaos. Deathly air, everywhere, decay- ing/ flesh, here and there. [Chorus:] Napalm spreads on, our city is gone./ Ever the task, what more could you ask? It’s just too late, we agree with fate/ Our govern- ments fucked, and we we’re all shucked!20

Napalm Records, established in Austria in 1992, is today the world’s largest distributor of death metal punk recordings.21

With respect to Vietnam in particular, views of napalm grew harsher as awareness of its effects spread and the reality of U.S. defeat sank in. In 1981, Scottish novelist William Boyd updated Greene’s elegiac flames that “go over them like water,” and Ballard’s fantasies, with a notably un- flinching exposition of napalm burns. In his short story On the Yankee Station he wrote of a young Vietnamese prostitute, “She turned abruptly to reveal her back. … When he saw her back, Lydecker’s brain screamed in silent horror. His hands rose involuntarily to his mouth. The girl looked at him over her shoulder. ‘Nay-pom,’ she said quietly in explanation. ‘Nay-pom, G.I.’ …. 

---


Her back was a broad stripe, a swath of purpled shiny skin where static waves of silvery scar tissue and blistered burn weals tossed in a horrifying flesh-sea."\(^{22}\)

Poet Bruce Wiegel was equally blunt in his 1988 ode, “Song of Napalm,” dedicated to his wife:

But still the branches are wire/ And thunder is the pounding mortar,/ still I close my eyes and see the girl/ running from her village, napalm/ stuck to her dress like jelly,/ her hands reaching for the no one/ who waits in waves of heat before her.

So I can keep on living,/ so I can stay here beside you,/ I try to imagine she runs down the road and wings/ beat inside her until she rises/ above the stinking jungle and her pain/ eases, and your pain, and mine.

But the lie swings back again./ The lie works only as long as it takes to speak/ and the girl runs only as far/ as the napalm allows/ until her burning tendons and crackling/ muscles draw her up/ into that final position/ burning bodies so perfectly assume. Nothing/ can change that, she is burned behind my eyes/ and not your good love and not the rain-swept air/ and not the jungle-green/ pasture unfolding before us can deny it.\(^{23}\)

A decade after it was published at a coffee shop in a tiny Idaho town, “Napalm Sticks to Kids” was chanted in movie theaters across America, and around the world. In July, 1982, Hollywood studio Paramount Pictures released the picture *An Officer and a Gentleman* about two candidates in a Navy officer training program. In the final release Director Taylor Hackford toned down the lyrics somewhat from the original film script below — and removed the author’s reference to Dow Chemical — but kept the chorus, the gist of the lines, and the commentary on napalm:

**EXT. CROSS-COUNTRY COURSE — THE FIRST DAY.** Foley runs the candidates over the cross-country course with rifles raised overhead. Sunlight filters through the dense trees that overhang the narrow trail. FOLEY (jody-calling): Flying low and feeling mean. Spot a family by a stream. Pickle a pear and hear ‘em scream. ‘Cause napalm sticks to kids.

---

\(^{22}\) William Boyd. *On the Yankee Station: Stories by William Boyd*. 1984: William Morrow and Company, Inc. 123. Yankee Station was the northern analog to Dixie Station described above by Frank Harvey.

EXT. CROSS-COUNTRY COURSE — NEAR THE LIGHTHOUSE — DAY. Foley runs his Poopies through the surf, past the old lighthouse, CAMERA MOVING WITH Sid, Zack and Casey, near the end of the group. FOLEY: Eighteen kids in a free fire zone. Books under arms, just walking on home. Last kid walks home alone. ‘Cause napalm sticks to kids. …

EXT. CROSS-COUNTRY COURSE — THE GUN EMLACEMENTS — DAY. Foley stands at the entrance to a dark tunnel, watching the candidates run past. FOLEY: Here’s my favorite one now. See if it ain’t your favorite, too. (Resuming). Family of gooks sittin’ in a ditch, baby sucking on her mama’s tit. Dow Chemical don’t give a shit, that napalm sticks to kids. 24

Hackford also added a line in the film for a female character to shout after the first chorus: “That’s disgusting!” Her male training partners responded with disdain. 25 The movie won two Academy Awards, grossed $130 million domestically, and perhaps twice that worldwide, and introduced tens of millions to Covered Wagon’s poetry. 26

Running on Empty, a smaller film with just $2.8 million in gross domestic revenues, released in 1988, continued this harsh portrayal of napalm. The picture, written by Naomi Foner Gyllenhaal and directed by Sidney Lumet, followed two fugitives, perhaps modeled on 1960s Weather Underground activists Bill Ayers and Bernardine Dohrn, as they traveled around the country with their teenage son Danny and his younger brother Harry. In this scene, set in a motel bedroom, the boys discussed their parents’ past.

MOTEL INT. Danny, cross-legged on the bed, practices piano on a wooden keyboard. Harry is half dressed. HARRY (fishes newspaper out of a stack by the bed next to Danny): Who’s this?


DANNY: Mom and Dad, who do you think?

HARRY: You’re kidding! (reads while walking across the room toward camera) Arthur and Annie Pope continue to elude capture, despite several sightings of the couple who went underground after claiming responsibility for the 1971 bombing of the University of Massachusetts Military Research Lab (pauses); what’s “elude” mean?

DANNY: Not getting caught.

HARRY (continues): The laboratory is credited with the development of (mispronounces) nap-palm, used extensively in the Vietnam War (flops down on his own bed, spreads newspaper in front of him); why'd they have to blow it up?

DANNY: Because they didn't stop making it when they asked ‘em politely.

HARRY (continues): C’mon Danny, I’m serious!

DANNY: They were dropping that stuff on people (trails off). Harry looks up, startled.27

**Great American Dream Machine**

As time passed, portrayals emphasized napalm’s destructive power and, in the context of Vietnam, the gel’s relative inability to change the outcome of the war. *Platoon*, a hit 1986 war film written and directed by Oliver Stone and set “somewhere near the Cambodian border” in 1967, presented the gel as a creation of almost supernatural might. In a climactic final scene a desperate U.S. officer radioed the air force to “expend all remaining” on his overrun outpost. Cataclysm followed that killed friend and foe and left a silent charcoaled world: the first ground-level depiction of a napalm strike in a Hollywood film. Stone didn’t show any specific images of injury or death: napalm smote the world, and then vanished.28 An Academy Award for Best Picture and three other

---


Oscars helped produce gross domestic revenues of $139 million, global receipts of perhaps $280 million, and tens of millions of viewers.29

*Forrest Gump*, released in 1994 and even more honored and widely seen, followed a similar paradigm. In a dramatic finale to the film’s Vietnam segment, napalm fire clouds chased the hero out of the jungle with a wounded companion in his arms. Flames — again shot from ground level — destroyed everything, but didn’t hurt anyone visible. The film then jumped immediately to the U.S. “That’s all I have to say about that,” the titular Gump averred.30 An Academy Award for Best Picture and five other Oscars followed. *Gump* and had gross revenues of over $677 million, which suggested perhaps 100 million cinema viewers.31

Napalm was now better known by more people in more places around the world than ever before and, arguably, depicted with more abstraction than at any time since the 1967 *Ramparts* photographs showed what the incendiary could accomplish.32 Fraudulent *USA Today* journalist Jack Kelley caught the *zeitgeist* when he ascribed practically supernatural powers to “napalm-

---


30 Eric Roth and Winston Groom. “Forrest Gump.” No Date: The Internet Movie Script Database. [IMDB.com](http://IMDB.com). The 21 April 1992 video for anti-war hit “Something’s got to give” by the U.S. hip hip group Beastie Boys (concluding couplet: “Someday we shall all be one/ Jesus Christ we’re nice”) also showed a montage of napalm explosions filmed from the air — many from Vietnam — without any visible people. Beastie Boys. “Something’s Got to Give. 21 April 1992 posted 15 May 2007: [YouTube.com](http://YouTube.com).


tipped matches” supposedly produced at a former Cold War munitions plant in the Ukraine. In a May, 1993 “exclusive,” Kelley wrote:

The new 3-inch-long, napalm-tipped matches — yes, napalm — do give a strong, sure light. They’ll light when wet and stay lighted — or give off an eerie red, nuclear-like glow — for one minute. Cost: a mere 25 cents for a box of 45. They’re made from a dangerous jellied gasoline used in aerial bombs since World War II. Officials at a factory in Shostka, Ukraine, which produced several tons of napalm a year during the Cold War, are confident their new creation will bring in big bucks. … The napalm fire is so intense it instantly burned through a half-inch glass ashtray and a quarter-inch-thick wooden table under it, then set a rug on fire. It was extinguished only when the napalm burned out. The matches, like trick birthday candles, can’t be extinguished by persistent blowing. Dousing them with water usually doesn’t work, either. Stepping on them only breaks the matches into little pieces, which continue to glow. … Factory officials have been honest enough to include a boxtop warning: a picture of a half-burned naked man, pondering his newly — and probably accidentally — burned-down field of trees and shrubs.33

Editors fired Kelley in 2004 after an extensive investigation revealed that many of his stories had been fabricated. With respect to his piece on napalm matches, USA Today never retracted the dispatch, but declared that an accompanying photograph was actually just a regular firestarter.34

Fight Club, a film released in 1996, took the conception of napalm as a Siva-like destroyer to an end point of sorts. Hero Tyler Durden, a soap salesman (perhaps a genuflection to the early role of chemical soaps in napalm’s manufacture), introduced himself with a do-it-yourself recipe for napalm: “Did you know if you mixed equal parts of gasoline and frozen orange juice concentrate you can make napalm? … One can make all kinds of explosives using simple household items, if

one were so inclined.” Violence trailed Durden throughout the film. Chuck Palahniuk was even more explicit in the novel that inspired the picture. His story opened on the roof of the world’s tallest building, with a gun pressed to the back of the narrator’s throat (“With my tongue I can feel the silencer holes we drilled into the barrel of the gun.”) Unseen protagonists inside the building shattered windows and hurled desks and filing cabinets onto a street far below. In the context of this mayhem, the narrator introduced himself with a formula: “The three ways to make napalm: One, you can mix equal parts of gasoline and frozen orange juice concentrate. Two, you can mix equal parts of gasoline and diet cola. Three, you can dissolve crumbled cat litter in gasoline until the mixture is thick.”

Napalm was an abstraction, even an emotion, for some by the turn of the millennium. In 2000, for example, New York musician Tim Stegall decided to call his startup punk rock band the Napalm Stars because “It sounded sexy, shiny, and explosive, like the music I wanted to make.” Author David Schickler saw the intensity of the gel’s effects as a metaphor for determination.

---


“Some fiber of her soul longed to kill … to cleanse countries with napalm, or to be taken viciously by a man on the steps of a church,” he wrote in his 2001 story “Kissing in Manhattan.”

“Burn, you cocksuckers”

After 9/11, America’s gloves came off and napalm returned to earth as a patriotic, if imperfect, fighter with a job to do. We Were Soldiers, a dramatization of the 1965 Battle of la Drang in Vietnam, set the new tone on 1 March 2002. For the first time in a cinema, audiences saw napalm used on a battlefield. As in Platoon, a U.S. commander called in an incendiary strike on his own overrun position. Unlike Platoon, flames marked the beginning rather than the end of the story. Fire first caught a squadron of Vietnamese troops, who collapsed with dreadful screams. Then, a pair of silver bombs tumbled onto a U.S. position. Hal Moore, commander of U.S. forces (played by actor Mel Gibson), recalled the moment in a memoir he co-authored with journalist Joe Galloway: “I jerked my head around and looked straight into the noses of two F-100 Super Sabre jet fighters aiming directly at us. At that moment, the lead aircraft released two shiny, six-foot-long napalm canisters, which slowly began loblollying end over end toward us. … The fearsome sight of

---


those cans is indelibly imprinted in my memory. It was only three or four seconds from release to
impact and explosion, but it seemed like a lifetime." Director Randall Wallace focused on the
horror-stricken face of Jimmy Nakayama, a 22-year-old U.S. soldier and new father, then lowered a
curtain of fire. Galloway described what happened next:

> Their hair was burned off in an instant. Their clothes were incinerated. One was a
> mass of blisters; the other not quite so bad, but he had breathed the fire into his
> lungs. When the flames died down we all ran out into the burning grass. Somebody
> yelled at me to grab the feet of one of the charred soldiers. When I got them, the
> boots crumbled and the flesh came off and I could feel the bare bones of his ankles
> in the palms of my hands. We carried him into the aid station. I can still hear their
> screams.

Nakayama’s feet were those that crumbled, and the movie showed his suffering in grisly detail. A
final shot focused on his scorched face as a rescue helicopter lifted off. “Tell my wife and baby I
love them,” he screamed, from half a mouth.

> Friendly fire notwithstanding, We Were Soldiers gave napalm much of the credit for the event-
> ual U.S. victory at Ia Drang. Reconnaissance platoon leader Pat Payne, interviewed by Moore and
> Galloway, explained how the strikes looked to most soldiers on the ground:

> [The Air Force planes] were a sight for sore eyes, and the cheers rang out as they
> made their first runs. The plane was so close that as the pilot flew by you could see

---

40 Harold G. Moore in Harold G. Moore and Joseph L. Galloway. We Were Soldiers Once … And Young: Ia
Drang — The Battle that Changed the War in Vietnam. 1992 rpt. 2004: Ballantine Books. 175. For descrip-
tion of a somewhat similar friendly fire incident with napalm in 1966 see New York Times. “U.S. Troops
GaleGroup.com.

41 Randall Wallace, Director and Writer. We Were Soldiers. 1 March 2002: Paramount Pictures.

42 Moore and Galloway, We Were Soldiers Once … And Young. 176. See 17 November 1965: San Francisco

43 Nakayama died three days later. His wife learned the details of his death almost four decades later when
she saw the film. Associated Press. “Wife sees re-creation of her soldier husband’s death in “We were sol-
his profile in the cockpit. He made repeated passes to strafe the advancing NVA; he would slow the plane, slow it down, shoot his guns, and literally chew up the ground in front of him. Other planes arrived and began to use napalm. You could see a large number of North Vietnamese, fifty or a hundred, quite a number, within fifty or seventy-five yards of us — massing to attack — when one of the Air Force planes dropped the napalm on a direct hit on them. We began to cheer.

Millions watched the motion picture, which grossed $115 million worldwide.\(^44\)

In a poignant sidelight, the Center of the Tokyo Raid and War Damages, a Tokyo museum organized by survivors of the March 1945 napalm attacks and dedicated to their memory, opened eight days after We Were Soldiers was released.\(^46\) Attention was insignificant compared to the multi-million dollar Hollywood blockbusters: $828,000 in private donations funded the memorial, and a few thousand visitors visited on its opening day. A short New York Times note did not even mention the facility’s name. “Japan’s cities were incinerated after similar Allied firebombing of German cities, whereas the atomic attacks even now remain unique in history,” asserted reporter Howard French, “For Japanese leaders, remembering the firebombing victims could mean explaining things like the deliberate placement of war industries in dense residential areas, or the prolongation of the war for many months after its outcome was clear — topics that even now have rarely been discussed here. … For Americans, it would raise questions about the prosecution of the war according to standards that Washington had long denounced as inhuman.”\(^47\) A teacup melted into

---

44 Pat Payne in Moore and Galloway. We Were Soldiers Once … And Young. 282.


47 Howard W. French. “Tokyo Journal; 100,000 People Perished, but Who Remembers?” 14 March 2002: NYTimes.com. See Jonathan Rauch. “Firebombs Over Tokyo.” July-August 2002: TheAtlantic.com. (“I believe the firebombing of Tokyo should be considered a war crime, a terror bombing, if those terms are to have any meaning at all.”)
a shapeless lump was one memorial to the ferocity of the napalm attacks preserved by the Center.⁴⁸

_Napalm Dreams_, a 2004 Vietnam War novel by Special Forces veteran John Mullins was characteristic of the post 9/11 attitude toward napalm among some groups in the U.S. A squad of Green Berets reinforced an isolated Special Forces base. The men found a lost squad of three U.S. soldiers and four native Montagnard tribal allies: “They still sat at their last recorded position, the four Montagnards lying in a semicircle around the three Americans. Almost as if they had been placed there for some barbaric religious ceremony,” Sergeant First Class Walter “Spearchucker” Washington recalled in the story.⁴⁹ “One of the U.S. soldiers had been shot, the other killed with more than 100 cuts. The other sat against a tree, sightless eyes staring out into the jungle. His pants had been pulled down around his ankles, and his genitals were missing. There were no other wounds. The claw marks on the trunk of the tree to which his hands had been tied were mute witness to his suffering. So, while Washington had a grudging admiration for his adversaries, he didn’t have much sympathy,” Mullins wrote.

The commandos selected napalm, without debate, for their revenge. “The Montagnard soldiers unquestioningly flattened themselves against the clay, one so close to Washington his merry brown eyes were staring into his own. The expression changed when the first whoosh of a napalm canister struck just outside the wire,” the narrative continued. “Glad I’m wearing a hat, Washington thought as the blast of searing heat struck them. It was like opening the door to a furnace, the heat seeming

---


to penetrate to the bone.” Sympathy was the soldier’s first reaction. “The shifting valley winds brought back to him the smells: burning gasoline, woodsmoke, and underlying it the unmistakable stench of charred flesh. Someone was out there, he thought. Poor bastards.” Reflection, however, established the weakness of such thinking: “‘Burn, you cocksuckers,’ he said as another flight of Phantoms came in.”

Closer to home, home-made napalm had passed from 1996 *Fight Club* fantasy to everyday necessity by 2007. In the Paramount Pictures thriller *Shooter*, former military sniper Bob Lee Swagger, framed for murder by a corrupt military officer and renegade F.B.I. Special Agent Nick Memphis started a quest for redemption with a jury-rigged arsenal that included do-it-yourself incendiary gel:

INT. GIANT HARDWARE STORE. Swagger and Memphis push their carts down the aisle. SWAGGER: You got your list, right.

MEMPHIS: Yeah.

SWAGGER: All right, you make sure you stick to it. *The men walk through the aisles and hastily load spray paint, small cans of propane, pipes, and clothes line, among other items, into their carts.*

SWAGGER (continues): Let’s go

EXT. WIDE DRY GRAVEL RIVERBANK IN THE MIDDLE OF THE WOODS. *The men work with tools on the open rear panel of a dusty pick-up truck parked between the forest and the water. Parts are strewn in front of them.* MEMPHIS (soldering): OK, so what are these for again?

SWAGGER (picks up a propane tank with small bottles taped to it): All right. Tear gas is going to be on my remote. *(Puts down the tank, picks up a plastic bottle filled

---


with yellow gel). Napalm on the first four. (Puts down the bottle, picks up a pipe). Pipe bombs on the rest of them. Now, be very careful with these. It’s got a 15-foot kill radius (puts down the pipe).

MEMPHIS: So, what exactly are we getting ready for?

SWAGGER: As much as we can be.53

Memphis later used the napalm to kill a small army of guards and free Swagger from an ambush. Victims flailed, screamed, and died covered in flames. No non-combatants suffered.54 Shooter grossed $96 million in theaters around the world,55 and was the best-selling DVD in the U.S. in the first week after its release.56


54 Antoine Fuqua, Director. Shooter. 23 March 2007: Paramount Pictures.


Merry Christmas, asshole!

Businesses saw opportunity in napalm’s new respectability. The first napalm-branded consumer product, a skin cream, appeared on 15 November 2007. Avant Research, “the newest, most dynamic, most innovative, and the most cutting-edge brand in the dietary supplement industry,” introduced Napalm™, a “unique and ‘explosive’ mixture of ingredients that is sure to help you make quick work of enemy fat cells dug in deep on the battlefield of your body.” Promotional materials promised, “By applying it to specific areas of your body, such as your abdominals, glutes, or thighs, the scientific concoction of glycyrrhetinic acid, raspberry ketones, SesaThin™, yohimbine HCl, and synephrine HCl, all work together through different physiological pathways to help you take out stubborn body fat that doesn’t go away fast enough.” Application was simple: “As explained in the Performance Pyramids, rub gel into skin, twice daily, where fat loss effects are desired.” A panel assembled by the BodyBuilding.com website nominated Avant for 2008 New Brand of the Year.

Napalm Orange hair dye, which glows in the dark, debuted the next year from Melbourne, Florida dye specialist Special Effects LLC. The color joined Blue Haired Freak, Blue Mayhem, Bright as F#$% Yellow, and others in the company’s lineup. A pair of testimonials from customers gives a sense of napalm’s meaning to some younger Americans: “I did it while my family was away

---

for Christmas, and they came home expecting me to look terrifyingly weird [sic], but had nothing but good things to say to me when they finally saw it. The lighting in the first photo does not even do justice to how ungodly bright it actually was. Not only that, but it looked absolutely mindblowing under blacklight.” A second: “I recently bleached my hair to platinum blonde — almost white and then dyed napalm orange special effects dye. It is actually as bright as the picture shows!! people are amazed when they see how crazy bright my hair is. I *love* my hair this color and will always have special effects orange!!”

By 2008, napalm was just good clean fun for some. On 22 August, Universal Pictures released *Death Race*, its remake of 1975 film *Death Race 2000*. Inmates on a prison island competed to the death in heavily armed cars. In the final turns of a semi-final round the hero Jensen Ames, nicknamed “Frankenstein” and played by British martial artist Jason Statham, found himself pursued by an enemy equipped with a powerful machine gun. Case, his navigator, played by model Natalie Martinez, Coach, his mechanic, and Lists, an assistant, helped him:

INT. FRANKENSTEIN’S CAR. Shields “Power Up” light blinks. Alarm beeps. CASE: Defense weapons are on.

EXT. PURSUIT CAR. Heavy caliber machine guns fire furiously. Bullets score the six-inch-thick metal “Tombstone” plate that protects the back of Frankenstein’s car. INT. FRANKENSTEIN’S CAR. AMES (driving): Let him have it!

CASE (flips switch): The napalm won’t fire.

EXT. PURSUIT CAR. Drawing abreast of Frankenstein’s car on the right, guns blazing. INT. FRANKENSTEIN’S CAR. AMES (driving): Smoke!

CASE (flips switch) nothing happens. EXT. PIT CREW. COACH (looking at car through binoculars): No smoke? No oil? No napalm? (hands binoculars to colleague, covers headset microphone, turns to Lists) Again?

---

EXT. SECOND PURSUIT CAR. Driver laughs maniacally; bumps first pursuit car off the track; directs repeated machine gun blasts at Frankenstein’s car. RACER (driving): Remember me, motherfucker?

EXT. FRANKENSTEIN’S PIT CONTROL CENTER. LISTS (looking at computer screen): Coach, the Tombstone won’t take much more of this. Shot of Tombstone being pounded by bullets.

INT. FRANKENSTEIN’S CAR. COACH (voice over, through headset): Frank, Case, those 50 caliber shells will be through the Tombstone in a matter of seconds.

EXT. FRANKENSTEIN’S PIT CONTROL CENTER. COACH (speaks into headset, wipes hands on rag) My advice: either lose him or kill him.

EXT. PURSUIT CAR. Driver laughs maniacally; volleys of bullets hit Frankenstein’s car as it dodges and weaves. Cars zoom into a vast warehouse. INT. FRANKENSTEIN’S CAR. AMES (driving) Unhook the napalm. Looks across at Case. She is startled; looks back at him.

EXT. PURSUIT CAR. Bullets kick up dirt to the side of Frankenstein’s car. INT. REAR OF FRANKENSTEIN’S CAR LOOKING FORWARD. Metal clasps that secure a red canister about the size of a large fire extinguisher pop open. EXT. PURSUIT CAR. Machine gun bullets pock-mark the Tombstone, which is now a lattice of dents and holes. INT. FRANKENSTEIN’S CAR. AMES (driving) Get on my lap.

CASE: What?

AMES: Get on my lap!

EXT. FRANKENSTEIN’S PIT CONTROL CENTER. Coach and Lists exchange speculative glances and half-smiles. EXT. PURSUIT CAR. Bullets pound the Tombstone. INT. FRANKENSTEIN’S CAR. Case sits on Ames’ lap. A tight v-neck t-shirt shows cleavage. Ames drives with one hand. NAPALM CANISTER FROM ABOVE ‘NAPALM’ is stamped in red in an Army-style font diagonally across the canister. INT. FRANKENSTEIN’S CAR. Case and Ames look into each other’s eyes. She smiles and nods. EXT. PURSUIT CAR. Roof blows off Frankenstein’s car and flips 30 feet into the air. INT. FRANKENSTEIN’S CAR. Case parts her lips, reaches between Ames’ legs, and pulls a thick black and yellow lever. EXT. WAREHOUSE. Napalm canister ejects, hits a steel beam in the warehouse roof, bursts, and drenches pursuit car with red gel. EXT. PURSUIT CAR. RACER (driving): Fuck. What the hell!

INT. FRANKENSTEIN’S CAR. Case pulls glowing cigarette lighter from its socket. She stands in open roof, windblown, looking back. EXT. PURSUIT CAR. Racer sticks
his head out of the window of his napalm-covered car to see. EXT. FRANKENSTEIN’S CAR. CASE (gestures with lighter): Merry Christmas, asshole!

EXT. PURSUIT CAR. RACER (head out window). Aww, shit!

VIEW FROM PURSUIT CAR. Case tosses lighter. WIDE SHOT OF PURSUIT CAR. Car bursts into flames. INT. PURSUIT CAR. Driver being burned alive. Screams in agony. EXT. WAREHOUSE. Pursuit car swerves, hits another competitor, and flips high into the air covered in flames in a spectacular, spinning, slow-motion crash. INT. FRANKENSTEIN’S CAR. CASE: (Drops back into her seat looks at Ames; smiles): Nice work.63

Death Race received weak reviews — “an assault on all the senses, including common,” according to Roger Ebert of the Chicago Sun-Times; “as hard as metal and just as dumb” averred Robert Koehler of Variety; and “an ill-advised and severely wussified remake” in the opinion of San Francisco Chronicle critic Peter Hartlaub — but grossed $76 million.64

You were BURNED by Napalm.Net!

Computer games and the Internet allow napalm aficionados who see the gel primarily as a form of entertainment to find each other. Napalm.net offers gel for sale (“Napalm.Net has bought 5,000 pounds of weapons grade Napalm and has individually packaged it in safe, attractive, displayable canisters. Each canister holds one liter of actual Napalm which you can ONLY purchase through Napalm.Net.”) but is actually a hoax website that sells t-shirts (HA!!! Did you actually think that we would sell YOU napalm? You were BURNED by Napalm.Net! On this joyous occasion, we are offering a personalized “i got burned @ napalm.net” T-Shirts.)65 “Napalm” freeware


from Firestarter lets users write notes in burning letters on their computer desktops. Video games routinely offer napalm armaments. Sony gamers, for example, can buy a “Napalm and Cordite” Playstation expansion pack for *Killzone 2* by Guerrilla Games: “use the Flamethrower and Boltgun to lay waste to your enemies with the Napalm & Cordite Pack!” *Mercenaries 2: World in Flames* for Xbox offers napalm airstrikes to obliterate enemies.


Social networks facilitate napalm fan clubs. The most popular, “NAPALM Fun Club” on Facebook, has about 3,800 members; a smaller one boasts around 1,300 “likes.” Users have posted

---


and commented on a selection of videos of napalm strikes. YouTube offers many videos that explain how to make napalm by dissolving styrofoam in gasoline. “Pen 15 Productions Presents Napalm,” among the most popular, has been viewed over 144,000 times and garnered hundreds of comments. Vice Magazine researchers testified in 2009 to the flammability of this formula. A lighter applied to a small piece of napalm concocted in this way, they reported, “immediately produced a high-temperature flame and, shortly after, began to drip apart into tiny pools of fire that stayed lit for a good five minutes. Stepping on these puddles will just transfer the napalm to your shoe, so letting them burn out is really the only viable option.” Experimenters daubed their gel on a television: “Upon ignition, the set immediately went up in an inferno and smoke billowed toward the roof.”

---


71 Their report continued, “The landlord, who was inexplicably watching from the balcony, started to shout something about tripping the sprinklers and before long insisted that it be put out. The foamed nitrogen from the fire extinguisher combined with the smoke to create noxious plumes of gas that forced everyone from the building.” Rocco Castoro. “TECH-ARCHY - Beyond the Pages of The Anarchist Cookbook” April 2009: ViceLand.com. More serious consequences might have followed. In October 2001, as post-9/11 hysteria swept the country, a 15-year-old resident of Bowie, Maryland, just south of Fort Meade, was arrested, charged with multiple counts of manufacturing an incendiary device, and held overnight in jail after experiments with napalm started a small fire in his bedroom. Investigators searched his house for 12 hours until 6:00 a.m. Jamie Stockwell. “Bowie Youth Charged With Making Napalm.” 11 October 2001: Washington Post. B03.
‘Napalm’ is contemporary slang for any extreme behavior. Singer Jon Mayer summed up his relationship with pop star Jessica Simpson as follows in an interview with *Playboy*:

PLAYBOY: You were addicted to Jessica Simpson?

MAYER: Sexually it was crazy. That’s all I’ll say. It was like napalm, sexual napalm.72

Twitter commenters often use the word similarly. “Any long term deficit plans will require some tax increases and cuts to defense and Medicare all of which are political napalm,” user CowboyKush, for example, tweeted in 2010.73

Although notable, the reach of this post-9/11 change in public opinion should not be exaggerated. *Death Race’s* cultural impact, measured by the film’s revenues, reviews, and subsequent in-

---


fluence, was far smaller than, for example, *Apocalypse Now*. Napalm’s Facebook fan groups and YouTube home chemists have audiences of only a few thousand: infinitesimal in the context of the audiences of millions for popular films. Avant’s skin care product, Special Effect’s hair dye, and Firestarter’s freeware are obscure products. *Napalm Dreams* is ranked 1,790,678 in Books on Amazon.com.\(^\text{74}\)

---


“The Terror of War” better captures napalm’s mainstream contemporary identity. Kim Phúc, age nine, is a cultural icon cited by editorialists to illustrate commentary on everything from labor rights to land use. In a 1994 cartoon about plans to build a Disney theme park near a Civil War

---

battlefield, for example, Goofy raced her down Highway One. Kim Phúc illustrated a sign that said “Just Do It!,” the Nike slogan, in a 1997 cartoon about working conditions in Vietnamese factories owned by sub-contractors to the athletics firm. She stood behind an American suburban home in a 2001 illustration for a *Boston Globe* book review, and ran with a hooded prisoner in a 2004 cartoon about the Abu Ghraib prisoner abuse scandal. “She’s only a child/ a running, naked child/ so vulnerable/ she’s only ‘bout nine/ thin and so fine/ so destructible/ she runs scarified/ her arms swung out wide/ to relieve the pain/ she lives in Trang Bang/ where fire falls from the skies/ down Highway One/ there’s a girl that screams and cries,” sang Eric Geurts in his November 2002 release *The Girl in the Picture (Napalm Girl)*.75 “The Terror of War” remains “an indelible image of

---

terror that obsessively repeats itself,” communications scholars Robert Hariman and John Louis Lucaites wrote in 2003.76

Most unequivocally in popular culture, napalm is American. From novels like The Quiet American to Napalm Dreams, poems Vietnam Message to Song of Napalm, and films Apocalypse Now to Death Race, U.S. commanders are the ones who order death by immolation. Even in cases where America was not immediately responsible — the bomb that burned Kim Phúc in “The Terror of War,” for example, was dropped by a South Vietnamese Air Force pilot — its culpability is in-

ferred. As New York Times reviewer Walter Goodman wrote of Dutch filmmaker Manus van de Kamp's 1985 polemic documentary *Kim Phuc*, “The powerful pictures of the little girl running in pain and panic are shown over and over. They are offered as representing the sufferings of the Vietnamese people — and the blame, we are given to understand, is all America’s.”

The result is a politically devastating message that ties America in general, and its government and military in particular, to napalm and the suffering it can bring to civilians. British graffiti artist

---

77 Walter Goodman. “‘Kim Phuc’ and ‘Sanctuary’ in Double Bill.” 11 December 1985: NYTimes.com. (“Kim Phuc herself says despite the misery America brought her, ‘I feel sympathy, because it was the American doctors who saved me at the time I was almost dead.’ Mr. van de Kamp couldn’t leave it at that. His narrator comments sarcastically that the girl’s treatment was publicized as a ‘showcase of American care.’ Such exploitation, if it did occur, is of course shameful, but so is the way Kim Phuc’s story has been exploited for this tendentious work.”) While a South Vietnamese pilot dropped the napalm that burned Kim, the gel was paid for by the U.S., made in California, dispatched by an American advisor, and delivered from a Douglas Aircraft Company airplane.
Banksy captured this conclusion in his 2004 tableau “Napalm:” Kim, naked and in agony, runs while Mickey Mouse and Ronald McDonald, American icons, hold her by the arms.\textsuperscript{78}

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{napalm_banksy}
\end{figure}

VI. TRIAL OF FIRE, 1899-2008

International laws of war, in the absence of global sovereignty, are statements of public opinion as much as enforceable codes of conduct. Lawyers and diplomats, like most arbiters of popular culture, largely ignored napalm until the Vietnam War. After the U.S. began its withdrawal, however, a worldwide effort to regulate the gel gathered strength. First, expert groups met to discuss napalm and review its effects. Next, multilateral conferences produced draft regulatory codes. Finally, in 1980, the United Nations adopted its Convention on Certain Conventional Weapons (C.C.W.). Its Protocol III, “Prohibitions or Restrictions on the Use of Incendiary Weapons,” defined use of incendiary weapons, including napalm, against a “concentration of civilians” as a war crime. Initially, only a few dozen states accepted this judgment. But successive decades have added dozens of additional nations to the list, including the United States in 2009. Today there are 107 signatories to Protocol III. Napalm now exists on probation, as it were, under a code accepted by much of the world.

Solferino, Italy 24 June 1859

The road to international legal control of napalm began, improbably, in 1859 in Sétif, Algeria, a leafy town 190 miles east of Algiers. It was the centerpiece of a 20,000-hectare concession

---

1 But see creation of the International Criminal Court on 17 July 1998: “The International Criminal Court (ICC), governed by the Rome Statute, is the first permanent, treaty based, international criminal court established to help end impunity for the perpetrators of the most serious crimes of concern to the international community.” International Criminal Court. “About the Court.” No Date: ICC-CPI.int.


granted by French emperor Napoleon III to a Genevan colonial venture. Jean-Henri Dunant, 31-year-old scion of one of the Swiss city’s wealthiest families, proposed a massive real estate development project in the territory. To succeed, he needed water rights controlled by the emperor. Napoleon was battling Austria in northern Italy at the time, so the perspicacious entrepreneur traveled to the front lines to plead his case. He arrived at Castiglione della Stiviere, west of Verona, on 24 June 1859, just as the Battle of Solferino, one of the largest military engagements in European history, began to thunder seven kilometers to the east.

It was an eye-opening experience for Dunant. “More than 300,000 men stood facing each other; the battle line was five leagues long, and the fighting continued for more than fifteen hours,” he observed in *A Memory of Solferino*, a memoir he published three years later:

> Here is a hand-to-hand struggle in all its horror and frightfulness ... crushing skulls, ripping bellies open with sabre and bayonet. No quarter is given; it is a sheer butchery; a struggle between savage beasts, maddened with blood and fury. Even the wounded fight to the last gasp. When they have no weapon left, they seize their enemies by the throat and tear them with their teeth. ... Here come the artillery following the cavalry, and going at full gallop. The guns crash over the dead and wounded, strewn pell-mell on the ground. Brains spurt under the wheels, limbs are broken and torn, bodies mutilated past recognition — the soil is literally puddled with blood, and the plain littered with human remains.”

Things got worse the next day. Jean-Henri continued, “When the sun came up on the twenty-fifth, it disclosed the most dreadful sights imaginable. Bodies of men and horses covered the battlefield;
corpses were strewn over roads, ditches, ravines, thickets and fields; the approaches of Solferino were literally thick with dead.”

Then,

Scenes as tragic as those of the day before, though of a very different sort, began to take place. There was water and food, but even so, men died of hunger and thirst; there was plenty of lint, but there were not enough hands to dress wounds; ... there was a shortage of medical orderlies.... With faces black with the flies that swarmed about their wounds, men gazed around them, wild-eyed and helpless. Others were no more than a worm-ridden, inextricable compound of coat and shirt and flesh and blood. ... There was one poor man, completely disfigured, with a broken jaw and his swollen tongue hanging out of his mouth. He was tossing and trying to get up. I moistened his dry lips and hardened tongue, took a handful of lint and dipped it in the bucket they were carrying behind me, and squeezed the water from this improvised sponge into the deformed opening that had been his mouth. Another wretched man had had a part of his face — nose, lips and chin — taken off by a sabre cut. He could not speak, and lay, half-blind, making heart-rending signs with his hands and uttering guttural sounds to attract attention. I gave him a drink and poured a little fresh water on his bleeding face.

The colonialist deferred his commercial ambitions and helped organize a volunteer corps. Local women, girls, and boys distributed water, soup, and tea. Passers-by, including a pair of English tourists and a Parisian writer, bathed the wounded and changed their dressings. Local leaders organized thousands of beds across the region.

Enthusiasm ebbed, however, after about a week. “With a few most honourable exceptions, the people grew tired and weary,” Dunant wrote. And care was limited. “It must not be thought that the lovely girls and kind women of Castiglione, devoted as they were, saved from death many of the wounded and disfigured, but still curable, soldiers to whom they gave their help. All they could

---

7 Dunant. A Memory of Solferino. 11. ICRC.org.
10 Dunant. A Memory of Solferino. 24. Over 40,000 men died in the battle, and another 40,000 died or were hospitalized over the next two months, Dunant wrote. 24-25. ICRC.org.
do was to bring a little relief to a few of them,” he cautioned. Stricken, the merchant proposed an international voluntary organization to organize relief efforts for future wars:

There is need, therefore, for voluntary orderlies and volunteer nurses, zealous, trained and experienced, whose position would be recognized by the commanders or armies in the field, and their mission facilitated and supported. … The only possible way is to turn to the public. … The imploring appeal must therefore be made to men of all countries and of all classes, to the mighty ones of this world, and to the poorest workman …. Such an appeal is made to ladies as well as to men — to the mighty princess seated on the steps of the throne — to the poor devoted orphan serving maid — to the poor widow alone in the world and anxious to devote her last strength to the welfare of her neighbour. It is an appeal which is addressed equally to General and Corporal; to the philanthropist and to the writer who, in the quiet of his study, can give his talent to publications relating to a question which concerns all the human race and in a more particular sense, concerns every nation, every district, and every family, since no man can say with certainty that he is forever safe from the possibility of war. …

A global conclave, he proposed, could enunciate universal principles to guide the program:

On certain special occasions, as, for example, when princes of the military art belonging to different nationalities meet at Cologne or Châlons, would it not be desirable that they should take advantage of this sort of congress to formulate some international principle, sanctioned by a Convention inviolate in character, which, once agreed upon and ratified, might constitute the basis for societies for the relief of the wounded in the different European countries? … Humanity and civilization call imperiously for such an organization ….

On 7 February 1863, the Société Génévoise d’Utilité Publique, or Geneva Society for Public Welfare, appointed a committee of five, including Dunant, to consider implementation of his proposal. They called for an international conference to endorse and advance the project. Swiss officials backed the idea. Dunant criss-crossed Europe, at his own expense, to obtain promises from nations to attend. On 26-29 October, 39 delegates from 16 states approved sweeping resolutions that laid the groundwork for a gathering of plenipotentiaries. On 22 August 1864, a dozen nations

---

signed an agreement for “Amelioration of the Condition of the Wounded in Armies in the Field,”
and agreed to guarantee neutrality to relief personnel and expedite supplies for their use.\textsuperscript{13} To
honor Switzerland, the group chose its national flag, reversed, for its logo: a red cross on a white
field.\textsuperscript{14} This was the first “Geneva Convention.” An international law of war was born.

\textbf{The Age of Innocence}

Treaties adopted in Europe between 1868 and 1907 established an initial consensus about
principles of legal warfare and the illegality of most incendiaries, especially fire bombs. Russian
Chancellor Prince Alexander Gorchakov, a veteran diplomat, took a foundational step in 1868
when he invited the world’s greatest powers to an International Military Commission at St. Peters-
burg. It was to be a gathering “to examine the expediency of forbidding the use of certain projec-

\textsuperscript{13} The United States, with its civil war raging, was one of 16 states that attended the conference. But it did
not immediately sign the convention. International Committee of the Red Cross. “State Parties.” \textit{Convention
for the Amelioration of the Condition of the Wounded in Armies in the Field. Geneva, 22 August 1864.}
2005: ICRC.org.

\textsuperscript{14} NobelPrize.org. “Biography: Henry Dunant.” 20 June 2010: NobelPrize.org. See Dunant. \textit{A Memory of
Solferino}. 2, 30.

Dunant’s own life spiraled down almost as quickly as the Red Cross organization he established rose. He
never won the water rights he sought from Napoleon, and declared bankruptcy in 1867. Many acquain-
tances, some of whom had lost money in his ventures, shunned him. He left Geneva. In a few years, according
to the Red Cross, “he was literally living at the level of the beggar. There were times, he says, when he
dined on a crust of bread, blackened his coat with ink, whitened his collar with chalk, slept out of doors.”
Gifts from friends and small allowances from his family sustained him. After 1875, he disappeared from pub-
lic view and did not surface until 1890, when a local teacher reported he was living in a small Swiss village.
Illness forced him to move to a community hostel in 1892, and he maintained a withdrawn existence for the
rest of his life. An 1895 newspaper profile brought him back to world attention, and he won the 1901 Nobel
Peace Prize and other awards. At his death in 1910, he was carried to his grave “like a dog,” in accordance
with his wishes. No mourners attended, and there was no funeral. He donated his prize monies posthu-
tiles in time of war between civilized nations.” On 11 December, about four years after foundation of the Red Cross, 17 of the world’s strongest states, including the United Kingdom, France, Prussia, Austria-Hungary, Turkey, and Russia, agreed to “technical limits at which the necessities of war ought to yield to the requirements of humanity.” Diplomats established a distinction between combatants and non-combatants, and asserted that only the former are legitimate targets in war: “[T]he only legitimate object which States should endeavour to accomplish during war is to

---


16 International Military Commission. “State Parties: Declaration Renouncing the Use, in Time of War, of Explosive Projectiles Under 400 Grammes Weight. Saint Petersburg, 29 November [Gregorian 11 December] 1868.” 2005: ICRC.org (The Grand Duchy of Baden and Brazil ratified the Declaration on 11 January and 23 October 1869, respectively. No other states have subscribed to the accord).
weaken the military forces of the enemy.”17 Delegates judged illegal weapons that “uselessly aggravate” suffering: “[I]t is sufficient to disable the greatest possible number of men; That this object would be exceeded by the employment of arms which uselessly aggravate the sufferings of disabled men, or render their death inevitable; That the employment of such arms would, therefore, be contrary to the laws of humanity.”18 Finally, among numerous other conclusions, the 1868 assembly declared it a crime to use incendiary projectiles that weighed less than four kilograms (deemed the dividing line between bullets and artillery shells): “The Contracting Parties engage mutually to renounce, in case of war among themselves, the employment by their military or naval

---


troops of any projectile of a weight below 400 grammes, which is either explosive or charged with fulminating or inflammable substances.”

America came late to the discussion. Although the U.S., wracked by civil war, attended the Geneva Convention of 1864, it did not ratify the convention that resulted, and was not invited to the St. Petersburg Commission. On 21 May 1881, Clara Barton and a group of supporters established the American Red Cross in Washington, D.C. Due in large part to their lobbying efforts, the United States ratified the First Geneva Convention the next year, and began to participate in international law of war debates.

Subsequent multilateral agreements reaffirmed the basic findings at St. Petersburg. In 1899, a First Peace Conference proposed by Tsar Nicholas II convened at The Hague in the Netherlands. “The intellectual and physical strength of the nations, labor and capital, are for the major part diverted from their natural application, and unproductively consumed,” the emperor wrote in a dedicatory message. “Hundreds of millions are devoted to acquiring terrible engines of destruction, which, though today regarded as the last word of science, are destined tomorrow to lose all value in consequence of some fresh discovery in the same field. National culture, economic progress, and the production of wealth are either paralyzed or checked in their development. Moreover, in proportion as the armaments of each Power increase, so do they less and less fulfill the object which the Governments have set before themselves,” he continued. Among other statements,


20 American National Red Cross. “A Brief History of the American Red Cross.” No Date: RedCross.org.

delegates agreed categorically that the “right of belligerents to adopt means of injuring the enemy is not unlimited;” clarified the 1868 “useless aggravation” concept ("propres à causer des maux superflus," in the definitive French text) as “superfluous injury;” asserted that “The attack or bombardment, by whatever means, of towns, villages, dwellings, or buildings which are undefended is prohibited;” and banned for five years “the launching of projectiles and explosives from balloons, or by other new methods of similar nature.”\textsuperscript{22} A total of 49 countries, including the United States and major European powers, signed the agreement, which was limited to wars between signatories and revocable if a non-signatory joined the fight.\textsuperscript{23}

A follow-up Second Peace Conference in 1907 re-translated “maux superflus” or “useless aggravation” as “unnecessary suffering” (the two translations are now judged synonymous),\textsuperscript{24} and renewed the ban on “discharge of projectiles and explosives from balloons or by other new meth-

\begin{footnotesize}
\begin{enumerate}

As a practical matter, as Julius Stone has written, “‘[N]ot defended’ still means not only that the city is not fortified, but also that the attacker is put in a position to take the town …. Certainly, no other interpretation has commanded the obedience of belligerents under modern conditions.” Thus population centers located behind front lines — hence not subject to immediate capture — are considered “defended.” Stone. \textit{Legal Controls of International Conflict}. 621.

\end{enumerate}
\end{footnotesize}
ods of a similar nature” until such time as a Third Peace Conference might be convened. The United Kingdom and the United States, China, the Netherlands, Belgium, and Norway, and several other smaller powers, ratified the document. France, Germany, Italy, Japan, and Russia, which together controlled most of the world’s military forces, did not.

World War I put the strength of the St. Petersburg covenant to the test. In 1916, British scientists developed the world’s first incendiary bullet: a forbidden munition because it weighed less than 400 grams. Attorneys in the United Kingdom determined the weapon could legally be used against balloons — deployed at the time to drop fire bombs on London — so long as pilots followed special procedures. Royal Air Force Lieutenant Walter Noble explained: “This special ammunition is not used against enemy aeroplanes; and when taken up for use against balloons a card, signed by the G.O.C. [of] the R.A.F. in the Field, is pinned to the cockpit of the user, certifying that it is for use against balloons only. There is no doubt as to the necessity for this. One of


these bullets if lodged in one’s flesh would, it is said, proceed to burn away all flesh and blood in its vicinity.” Enforcement was swift and harsh for those deemed to have broken international rules. “The thought came to me,” a U.S. officer wrote after he crashed in No Man’s Land in June 1918, “that if I were nearer the German lines than the French, I had better get rid of the incendiary balls in my machine. If you are captured with incendiaries they shoot you without trial.” That the U.S. was not a party to the St. Petersburg Declaration was a subtlety evidently too fine for the battlefield. The officer hid his incendiaries under the body of a dead German soldier, and escaped.  

Rise of the Machines

Superficial progress and fundamental decay in international regulation of incendiary weapons marked the period between the World Wars. Treaties that ended the Great War stripped fire weapons from members of the defeated powers but did not affect arsenals of the winners. An agreement to rule poison gas illegal was adopted, but comparable efforts for incendiary munitions did not advance beyond drafts. Simultaneously, developments in bomber technology expanded the size of battlefields to entire countries, and undermined the distinction between combatants and civilians. Attorneys offered no new constructs to respond to these changes. Thus, by the late 1930s, although in theory a case could be made that some forms of incendiary warfare, especially the use of incendiary bullets, was illegal, in practice, given the fragmented state of international law, the argument was hard to sustain.

---


Armistice agreements left little room for debate: the Central Powers could not have incendiary weapons. The *Treaty of Peace between the Allied and Associated Powers and Germany*, signed at Versailles, precluded ownership of incendiary weapons by German forces with comprehensive restrictions on their manufacture, importation, and storage. ²⁹ “The use of flame throwers, asphyxiating, poisonous or other gases, and all similar liquids, materials or devices being prohibited, their manufacture and importation are strictly forbidden in Austria. Material specially intended for the manufacture, storage or use of the said products or devices is equally forbidden,” read Article 135 of the *Treaty of Saint-Germain-en-Laye*, which ended hostilities between the Entente and Vienna. ³⁰ Article 82 of the *Treaty of Neuilly-sur-Seine*, which brought peace to Bulgaria, and Article 119 of the *Treaty of Trianon* which ended hostilities with Hungary, contained almost identical language. ³¹

Diplomats discussed changes to international law that might have significantly limited deployments of incendiary weapons during this period, but in the end made no changes. The first effort was a 1923 attempt to legalize and regulate incendiary bullets. A conference of jurists dispatched by the governments of the U.S., Britain, France, Italy, Holland, and Japan suggested that

---


such munitions should be allowed against aircraft, but not against civilians under most circumstances. "The use of tracer, incendiary, or explosive projectiles by or against air, is not prohibited. This provision applies equally to States which are parties to the Declaration of St. Petersburg, 1868, and to those which are not," read one proposed protocol. "Aerial bombardment for the purpose of terrorizing the civilian population, of destroying or damaging private property not of a military character, or of injuring non-combatants is prohibited," stipulated another.32 No states adopted the proposal.33

League of Nations diplomats made a more determined effort at regulation during the General Conference for the Limitation and Reduction of Armaments, the world’s first global disarmament conference, convened at Geneva in February 1932. Every member of the international body, plus the United States and Soviet Union, attended: 60 nations in all. A Special Committee established to review incendiaries concluded they should be banned. When used against cities, the committee wrote, fire weapons are “particularly threatening to civilians,” and when used in flamethrowers against combatants, “the cruelty inherent in the use of these appliances causes suffering that cannot be regarded as necessary from the military point of view.” Thus, they should be forbidden. A majority of the Committee added that incendiary weapons were inherently weapons of offense and


thus warranted additional limitations. On 23 July, diplomats agreed unanimously that “incendiary weapons shall be prohibited under the conditions unanimously recommended by the Special Committee.” By March 1933, it was “An established rule of international law” that incendiary weapons should not be used as projectiles, “flame projectors” or in any other way except for defense against airplanes, as the British government wrote in a draft convention submitted to the disarmament conclave. On 22 September 1933, delegates unanimously adopted this language as the basis for a future legal code.

---


36 The text proposed by the British read:

The prohibition of the use of incendiary weapons shall apply to:

1. The use of projectiles specifically intended to cause fires. This prohibition shall not apply to: (a) Projectiles specially constructed to give light or to be luminous and generally to pyrotechnics not intended to cause fires, or to projectiles of all kinds capable of producing incendiary effects accidentally; (b) Incendiary projectiles designed specifically for defence against aircraft, provided that they are used exclusively for that purpose.

2. The use of appliances designed to attack persons by fire, such as flame projectors.


Outside the conference rooms, a new military paradigm approached from above. Prior to the airplane, as legal scholar Julius Stone has written, “[A]rmies did the fighting while in their rear civilians (or non-combatants) worked, if male, or wept, if female. Only professional soldiers came to grips with one another.” It became axiomatic, he continued, that war should be waged only against armed men — the “only legitimate object,” in the words of the St. Petersburg Declaration. Stone observed:

\begin{quote}
It was a praiseworthy principle in the circumstances of the pre-air age in war, but it was not one which could survive the arrival of the bombing aircraft. For, objectively considered, it was not a logical principle. By no process of reasoning could a beligerent be persuaded that the manufacturers of armaments in his enemy’s country were less active enemies than the men who wore uniform and opposed him in the field. They had been spared so far because they could not be got at and for no other reason at all. They can be got at now.\footnote{\textit{Stone. Legal Controls of International Conflict}. 43-44. Stone suggested a designation of some individuals as “quasi-civilians” as a way to accommodate international law to this changed reality: “The principle of civilian immunity does not make sense when it is offered to protect the men and women in the hinterland who make, equip or service the airplanes, tanks, ships, and munitions, and the multitude of machine tools and precision instruments on which military success depends. If true civilians are to receive any protection, these latter must be set apart, perhaps under the title ‘quasi-civilians’ as not entitled to that same protection.” Stone. \textit{Legal Controls of International Conflict}. 628.}
\end{quote}

The international law of war for incendiary weapons, scanty though it was, was about to be swept away entirely.
Martial Law

Early incendiary bombardments made possible by technological developments drew legal protests. Britain, for example, proposed an inquiry into the 1937 Luftwaffe attacks on Guernica, and the U.K., U.S., and France all complained to Japan about its fire attacks on Chinese cities in the same year. As World War II progressed, however, allegations of criminality disappeared in the face of military determination. “It may well be, and I personally do not blink the fact, that these great German war industries can only be paralysed by bringing the whole life of the cities in which they are situated to a standstill, making it quite impossible for the workmen to carry on their work. That is a fact we may have to face and I do face it. It is, I suggest, a full justification for our present bombing campaign,” British Lord Cranborne told the House of Lords on 9 February 1944. “If the town also suffered,” German General Karl Bodenschatz testified of the approach taken by his planners to the bombardment of Coventry at the post-war Nuremberg Tribunal, “that is comprehensible in view of the navigation facilities available at that period of the war.” Concerns about the legality of incendiary weapons like those that produced the Great War’s cockpit notecards disappeared. “[T]he degree of each side’s confidence in its air superiority was the main factor controlling its determination to destroy enemy military objectives at all costs,” Stone reported.


might almost say that it has been found necessary to reverse the process by which the Chinese arrived at the secret of roast pork. The cooking could be done, after all, by the burning of the house down,” summarized U.K. airpower expert J. M. Spaight.44

Victor’s justice

To victors belong spoils, history, and, apparently, international law. After World War II established the effectiveness of incendiary bombardments — in particular, napalm attacks — lawyers used a two-step process to legalize them. First, post-war attorneys defined the key issue for incendiaries as precision, rather than cruelty (in contrast, for example, to the approach taken in 1925 toward poison gas). As Article 14 of the first major project to address the subject, “Draft Rules for the Limitation of the Dangers Incurred by the Civilian Population in Time of War” produced in 1956 by the International Committee of the Red Cross (I.C.R.C.), phrased the issue: legal prohibitions properly applied only to “weapons whose harmful effects — resulting in particular from the dissemination of incendiary, chemical, bacteriological, radioactive or other agents — could spread to an unforeseen degree or escape, either in space or time, from the control of those who employ them, thus endangering the civilian population.”45 Second, attorneys defined napalm as a preci-


Indeed, as Parks wrote, “The legality of weapons was a field not easily entered. Governments historically viewed determinations of legality of weapons as within their prerogative, a view reaffirmed in Additional Protocol I [to the 1949 Geneva Conventions], which makes each State Party responsible for determining whether its weapons are consistent with its law of war obligations.” Parks. “Means and Methods of Warfare.” 2006: 38 George Washington Int’l. Law Rev. 514-15.
sion weapon in most cases. International law largely followed the argument advanced by British authorities in response to Korean War complaints about napalm’s inhumane and indiscriminate qualities: almost all weapons create terrible suffering but napalm was, at least, more discriminating than high explosives.\textsuperscript{46} Incendiaries, I.C.R.C. commentators wrote in their analysis of the Draft Rules, “are sometimes limited in their effects e.g. the flame-thrower or napalm when used against a tank, but sometimes have uncontrollable consequences as in the case of certain bombs scattering inflammable material over a considerable distance.”\textsuperscript{47} As the U.N. Secretariat concluded in a 1973 review: “It would appear that the I.C.R.C. was attempting in article 14 to deal with incendiaries other than napalm and flame-throwers, which were then seen as having limited effect.”\textsuperscript{48}


The result was a quiet tolerance of napalm by international law for more than two decades after 1945. Commanders used it extensively, in Korea and elsewhere, and no international code was even proposed specifically to regulate its use. Napalm reigned unchallenged.

The world turned upside down

Vietnam shattered this consensus and ushered in years of wrangling that ended in the world’s first treaty to criminalize particular uses of napalm.

Soviet Bloc countries, arrayed against the U.S. and its allies in Vietnam, raised the first objections. In April 1965, as napalm bombing increased dramatically in Indochina, a joint communique issued by the U.S.S.R. and the Democratic Republic of Vietnam, or North Vietnam, condemned “the use of barbarous weapons of annihilation, including napalm bombs, against the peaceful population.” A few months later, on 24 January 1966, the President of North Vietnam specifically protested napalm attacks against his county. Finally, on 6 July 1966, Warsaw Pact nations collected...
tively decried the munition that clung to flesh and burned to the bone. These protests dragged napalm onto the world stage.

Publicity increased on 13 May 1968 when 84 states, including the U.S., assembled under United Nations auspices at Teheran for the first International Conference on Human Rights ("We pledge ourselves once again to the holy struggle for human dignity," U.S. President Johnson wrote in his benediction). Delegates singled out bombing with napalm as one of the modern world’s worst practices: “[T]he widespread violence and brutality of our times, including massacres, summary executions, tortures, inhuman treatment of prisoners, killing of civilians in armed conflicts and the use of chemical and biological means of warfare, including napalm bombing, erode hu-

---


man rights and engender counter-brutality,” asserted Conference Resolution XXIII. A detailed re-
view of the munition, attendees resolved, was warranted. The General Assembly, the resolution
continued, should ask the Secretary-General to study “The need for additional humanitarian inter-
national conventions or for possible revision of existing Conventions to ensure the better protec-
tion of civilians, prisoners and combatants in all armed conflicts and the prohibition and limitation
of the use of certain methods and means of warfare.” Law of war consultant to the U.N. Secretar-
iat and professor of law at Harvard Richard Baxter commented, “The stimulus to renewed thought
about the prohibition or restriction of use of certain conventional weapon was, not surprisingly, the
war in Vietnam, coupled with a renewed concern with the humanitarian law of war in general.”
On 19 December 1968, as campuses across its host country reverberated with anti-napalm pro-
tests, the United Nations General Assembly affirmed the Tehran Conference’s Resolution XXIII.
A curtain began to lift on napalm. U.N. Secretary General U Thant turned up the spotlight. In a
report commissioned by the General Assembly and released on 20 November 1969, he made ex-
PLICIT what Resolution XXIII implied: napalm deserved special scrutiny. “[I]n view of the reference
to napalm in the Teheran Conference resolution, the legality or otherwise of the use of napalm


United Nations. UN.org. Note that “The majority of General Assembly resolutions are adopted without a
would seem to be a question which would call for study and might be eventually resolved in an international document which would clarify the situation,” his office asserted in the first of five Respect for Human Rights in Armed Conflict reports prepared for the Assembly between 1969 and 1973.\(^{59}\) In 1970, after no action had been taken, the Secretary General repeated his call. “The contemplated report on the question of napalm which might be prepared by the Secretary-General could facilitate subsequent action by the United Nations with a view to curtailing or abolishing such uses of the weapons in question as might be established as inhumane,” he wrote in that year’s Respect report.\(^{60}\)

Reiteration produced results. On 20 December 1971, as the U.S. advanced plans for a military draw-down in Vietnam, the nations of the world, gathered at the U.N., declared napalm “cruel” and affirmed the need for a comprehensive study of it and other incendiaries. Existing surveys, the General Assembly resolved, “do not deal with the question of prohibiting or restricting the use of other methods of warfare that are cruel, such as napalm, or that indiscriminately affect civilians and combatants.” The Assembly members requested the Secretary General “to prepare as soon as possible, with the help of qualified governmental consultant experts, a report on napalm and other incendiary weapons and all aspects of their possible use.”\(^{61}\)

---


Expert witnesses

A Group of Consultant Experts selected by Thant, seven in total, set to work on 15 May 1972 in New York. Military, medical, chemical, and diplomatic authorities from Nigeria, Romania, Czechoslovakia, Sweden, the U.S.S.R., Peru, and Mexico, supported by members of the U.N. Secretariat, the World Health Organization, and the I.C.R.C., examined the nature, history and use of napalm and other incendiary weapons. The U.S., still at war in Vietnam, declined to participate on the grounds that the U.N. was not an appropriate forum for such arms control negotiations. On 9 June, while the team was in recess, “The Terror of War” photograph of Kim Phúc ran on front pages around the world. Anti-napalm and anti-Vietnam War protests rocked New York throughout the summer. On 22 September 1972, after a final set of meetings in Geneva, the United Nations received Napalm and Other Incendiary Weapons and all Aspects of their Possible Use: Report of the Secretary-General.

---


Expert opinion was unequivocal: incendiary weapons were powerful, cruel, and indiscriminate; impossible to protect against; spreading fast; and largely lawless. Napalm was an extraordinary munition within this category and particularly in need of regulation. “Incendiaries are among the most powerful means of destruction in existence; they characterize the savage and cruel consequences of total war,” the specialists wrote.65 “Except for nuclear weapons, and perhaps also certain biological and chemical weapons, no other armament places such destructive power in the hands of military commanders,” they elaborated.66 As to cruelty, the authorities observed, “Burn injuries … are intensely painful and, compared with the injuries caused by most other categories of weapon, require exceptional resources for their medical treatment. Under war conditions only a few of the people exposed to more extensive napalm burns survive to the period of real convalescence, which is long and difficult.”67 More to the point, “When judged against what is required to put a soldier out of military action, much of the injury caused by incendiary...
weapons is [therefore] likely to be superfluous. In terms of damage to the civilian population, incendiaries are particularly cruel in their effects."\(^{68}\)

The panel dismissed the arguments that incendiaries could be precision weapons: “Even when they are used as individual weapons, they may still strike over a considerable area, or initiate fires that spread far beyond their immediate targets. The element of control which can be exercised over the effects of such weapons as bullets, or even high explosive bombs, is lacking in the case of most incendiary weapons, and like all area weapons they are essentially indiscriminate. They may bring uncontrollable destruction of the lives, possessions and habitations of combatants and non-combatants alike.”\(^{69}\) That protection from napalm and incendiary weapons was almost impossible, the experts wrote, highlighted their indiscriminate nature:

> The possibilities of providing protection for the civilian population against the effects of incendiaries are not very promising … Although it is possible to conceive of a shelter programme of sufficient quality to enable a city population to survive a conflagration or even a fire-storm, such a programme would be very expensive, both economically and in terms of changes in the society, and would take many years to establish. Few if any countries have undertaken such a programme. … In situations where incendiaries are used tactically, the local non-combatants are, as a rule, much more vulnerable than the combatants, who are familiar with the destructive properties of incendiary weapons, and trained in the various countermeasures. The indiscriminate nature of the effects of incendiary weapons is thus

---

\(^{68}\) United Nations Group of Consultant Experts on Napalm and Other Incendiary Weapons. *Napalm and Other Incendiary Weapons and All Aspects of Their Possible Use.* 55: 187. Use of the term “superfluous” had an obvious resonance with the prohibition on superfluous injuries defined in the 1868 St. Petersburg and 1899 Hague conventions.

\(^{69}\) United Nations Group of Consultant Experts on Napalm and Other Incendiary Weapons. *Napalm and Other Incendiary Weapons and All Aspects of Their Possible Use.* 50: 176. The panel reiterated: “Incendiary weapons, when used in massive raids against urban targets, demonstrate the total quality of war: its savage and cruel consequences for all of society.” United Nations Group of Consultant Experts on Napalm and Other Incendiary Weapons. *Napalm and Other Incendiary Weapons and All Aspects of Their Possible Use.* 51: 177.
further underlined by the difficulties of providing adequate protection for the civilian population.”

As to napalm in particular, the experts reaffirmed Fieser’s 1942 definition — “any gelled-hydrocarbon incendiary,” according to the U.N. group — and asserted it was worst of all. First, it was particularly prone to misuse. “Because of the considerable area covered by each napalm bomb and often great inaccuracy of its delivery, and because also of the frequently close proximity of military and civilian objects, fire-bombs may cause severe damage in the civilian sector even when, ostensibly, the targets of attack are military. … Similarly, there may be instances where incendiary ground weapons, notably flame-thrower employment in street fighting, may be used by the military in such a way that considerable civilian casualties result, again drawing attention to the indiscriminate nature of napalm and other incendiary weapons.”

Second, it was easy to produce, hence available in large quantities: “Many of these weapons are extremely simple to manufacture, and the necessary raw materials are readily available the world over. This is particularly true of napalm weapons …”

---

70 United Nations Group of Consultant Experts on Napalm and Other Incendiary Weapons. Napalm and Other Incendiary Weapons and All Aspects of Their Possible Use. 52-53: 183.

71 “Nowadays the meaning of the word ‘napalm’ has broadened to include … all types of thickened hydrocarbons used as incendiary agents,” the experts wrote. They did not specify what the narrower definitions might have been. United Nations Group of Consultant Experts on Napalm and Other Incendiary Weapons. Napalm and Other Incendiary Weapons and All Aspects of Their Possible Use. 10-11: 31. See Chapter 1. Fieser. The Scientific Method. 29 (The term napalm was “now seen to be nondescriptive:” a generic for any incendiary made from thickened petroleum).


73 United Nations Group of Consultant Experts on Napalm and Other Incendiary Weapons. Napalm and Other Incendiary Weapons and All Aspects of Their Possible Use. 54: 184.
Regulation, the experts concluded, was urgently needed. “The rapid increase in the military use of incendiary weapons, especially napalm, during the past 30 years is but one aspect of the more general phenomenon of the increasing mobilization of science and technology for war purposes. … Clear lines must be drawn between what is permissible in time of war and what is not permissible. Incendiary weapons, in particular napalm, are already the subject of widespread revulsion and anxiety, and because they are weapons of great destructive power, they are a fitting subject for renewed efforts of this type,” they wrote. General Assembly delegates, the authorities suggested, should devise measures “for the prohibition of the use, production, development and stockpiling of napalm and other incendiary weapons.” Napalm stood publicly accused.

Countries around the world embraced the report. On 16 November 1972, 100 states backed a resolution by the Political Committee of the General Assembly that deplored napalm’s use in combat. No countries opposed the measure. The U.S. and 14 other states abstained. Proponents of regulation decried this effective refusal to endorse the experts’ conclusions. “The United States’

---

74 United Nations Group of Consultant Experts on Napalm and Other Incendiary Weapons. *Napalm and Other Incendiary Weapons and All Aspects of Their Possible Use*. 55: 190. The report did not specifically mention Vietnam. See Bailey. “Book Review” 1973: 15 *Survival: Global Politics and Strategy*. 4. 204 (“For a ban on using certain incendiaries, other control measures [than reprisal] could be added: standardization of military manuals; the possibility of prosecuting violators before an international criminal court; and a complaints procedure similar to that contained in the recent Biological Weapons Convention.”)


use of napalm in Vietnam was attacked during the committee debate, which focused on a report by a group of experts calling napalm one of the most destructive weapons known,” the New York Times reported.78

Further evidence for a changing consensus on napalm came at the end of the month, when General Assembly Resolution 2932 A affirmed the Political Committee’s conclusion that napalm’s use in combat was deplorable, and labeled incendiary weapons “largely indiscriminate.”79 As the Secretary General later observed of the resolution: “Those delegations speaking in support of the resolution did so in terms suggesting that the use of napalm — for it was to this weapon that atten-

---


79 “Conscious that incendiary weapons have always constituted a category of arms viewed with horror and that the International Conference on Human Rights, held at Teheran in 1968, in its Resolution XXIII on human rights in armed conflicts considered napalm bombing to be among the methods and means that erode human rights … Deplores the use of napalm and other incendiary weapons in all armed conflicts.” Precision: “the massive spread of fire through incendiary weapons is largely indiscriminate in its effect on military and civilian targets.” Civilians: “the long upheld principle of the immunity of the non-combatant appears to be receding from the military consciousness.” Injuries: “[B]urn injuries, whether sustained directly from the action of incendiaries or as a result of fires initiated by them, are intensely painful and require exceptional resources for their medical treatment that are far beyond the reach of most countries” (citing United Nations Group of Consultant Experts on Napalm and Other Incendiary Weapons, Napalm and Other Incendiary Weapons and All Aspects of Their Possible Use. 54:187). United Nations General Assembly. “Resolution 2932 (XXVII). General and complete disarmament. A.” 29 November 1972: UN.org.
tion was principally given — ought to be forbidden but was not yet prohibited by general interna-
tional law.”∗80

There was a deafening legal silence. No conferences convened. No treaties emerged. A funda-
damental weakness, some scholars asserted, had been revealed in a core principle of the interna-
tional law of war: “unnecessary suffering” and “superfluous injury” could not be defined.81 “No scale of values can establish what suffering is necessary because proportionate with the military advantage gained and what suffering is unnecessary because of disproportionality between the effects of the weapon and what is gained in a military sense from its use. And if one adopts a somewhat impressionistic approach to the question, then it would seem that the more effective a weapon is in disabling and killing, the more likely it is to be ‘unlawful’ because of the suffering it causes,” wrote Harvard’s Baxter.82 Precision, he argued, was a more practical standard: “If a


Reports from Vietnam continuously informed the debate. “As a result of the use of napalm in the war in Vietnam, a number of persons writing on the subject have stated that the weapon has been used so indiscriminately and causes such suffering that it belongs in the category of weapons which are forbidden on those accounts,” the Secretary General observed. United Nations Secretariat. Respect for Human Rights in Armed Conflict: Existing rules of international law concerning the prohibition or restriction of use of specific weapons. 7 November 1973: U.N. Document A/9215 (Vol. I). 145: 82.


82 Baxter. “Conventional Weapons Under Legal Prohibitions.” International Security. 48. “If anything, the report demonstrated that generic rules are very difficult to apply to particular weapons and that the specific rules do not cope with the weapons that are the most likely to do harm to the civilian population or to cause injury and suffering out of proportion to the military advantage to be gained from the use of such weapons,” he wrote of the Secretary General’s 1973 Respect for Human Rights in Armed Conflict report. Baxter. “Conventional Weapons Under Legal Prohibitions.” International Security. 47.
weapon directed against military personnel or against military objectives indiscriminately harms civilians because there is no possibility of confining its effects to the military target, the weapon might be stigmatized as unlawful on that account.”

Stymied, napalm’s opponents attempted to open a second front in 1972: the gel, they argued, should be banned as a gas weapon. Napalm “gives off large quantities of carbon monoxide, which may cause poisoning and death. In other words, the use of napalm for military purposes is regarded as particularly cruel because its victims, besides being burnt alive, are asphyxiated and poisoned. Such a use is therefore considered to be a violation of the 1907 Hague Convention and the 1925 Geneva Protocol for the prohibition of the use of chemical and bacteriological (biological) weapons,” the Secretary General’s 1973 Respect for Human Rights in Armed Conflict report observed when it documented this line of reasoning. This argument never advanced beyond preliminary stages, however, likely because advocates could not conclusively establish the frequency with which napalm acted through gas effects rather than burns.

**Dunant’s ghost**

Red Cross officials attempted to advance debate. At its XXII International Conference in November 1973, the Geneva-based International Committee and 98 national societies, joined by representatives from 78 governments and 20 inter-governmental and non-governmental organizations — over 500 delegates in all — agreed to expand the organization’s mandate from humanitarian

---


law to the law of war. “An organization that had over the years acquired very great expertise in
the protection of such war victims as civilians and prisoners of war was now called upon to assist
in the assessment of weapons and their effects — to move from humanitarian law to the law of
combat,” Baxter explained.

Not without controversy. As Pentagon law of war expert W. Hays Parks recounted in 2006,
“The fact that the I.C.R.C. sought and gained a mandate to pursue the conventional weapons issue
… gave pause within and outside the I.C.R.C. Historically, the I.C.R.C.’s role has been protection of
war victims: military wounded, sick, and shipwrecked on the battlefield; prisoners of war; and ci-
vilians in enemy hands. Some within the I.C.R.C. believed that assuming a role with regard to the
legality of weapons would detract from its long-time humanitarian mission.” Nonetheless, the
XXIInd conference resolved to convene its own group of government experts to advise a Diplomatic
Conference on the Reaffirmation and Development of International Humanitarian Law Applicable
in Armed Conflicts called by the Swiss government for February 1974 (the “Diplomatic Confer-
ence”), about a possible expansion of the 1949 Geneva Conventions to cover conventional
weapons.

87 “Some I.C.R.C. representatives believed the I.C.R.C. should not be seen as regarding any weapon as ac-
ceptable. Challenging one weapon might suggest it was putting its ‘seal of approval’ on weapons it did not
challenge, an action inconsistent with its humanitarian mission,” the U.S. expert continued. Parks. “Means
Delegates in New York kept up the pressure. On 6 December 1973, the United Nations adopted “Napalm and Other Incendiary Weapons and all Aspects of their Possible Use,” Resolution 3076 (XXVIII). “Aware that the Diplomatic Conference … will be convened at Geneva on the invitation of the Swiss Federal Government” to consider revisions to the Geneva Conventions, the world body declared, it invited attendees to consider “the question of the use of napalm and other incendiary weapons … and to seek agreement on rules prohibiting or restricting the use of such weapons.”89

Experts assembled by the Red Cross to advise the Diplomatic Conference did their part to keep attention focused on napalm. Over the next 27 months, authorities produced two extensive reports on the law of war and legality of specific weapons. Each contained an extensive review of the incendiary. Ultimately, the Diplomatic Conference, which finalized proposed revisions to the Conventions in 1977, did not produce specific rules for napalm. It did, however, resolve on a “Follow-Up Regarding Prohibition or Restriction of Use of Certain Conventional Weapons” that included napalm by name and drew heavily on the expert reports.90 These findings, along with an additional General Assembly resolution in 1974 that again condemned napalm and urged a code to govern its use, set the stage for adoption in 1980 of Protocol III of the United Nations Convention on Certain Conventional Weapons.

The first I.C.R.C. expert gathering met at the picturesque Swiss lakeside town of Lucerne, south and west of Zurich, in September and October 1974. Members, including a U.S. delegation,


agreed unanimously that burns are the most painful kind of injury, saturation incendiary bombardment of cities was a war crime, and public opinion plays an important role in the formulation of international law.\footnote{U.S. participation: Baxter. “Conventional Weapons Under Legal Prohibitions.” \textit{International Security.} 50.}

Specific rules for napalm, however, foundered on the now-familiar definitional shoals of suffering and precision.\footnote{The Lucerne report was based to an important degree on another Red Cross report: \textit{Weapons that may Cause Unnecessary Suffering or have Indiscriminate Effects: Report of the work of experts} released in Geneva in 1973. That document, which asserted that it was limited to “facts — legal, military and medical” concluded “that several categories of weapon tend to cause excessive suffering and particularly severe injuries or may, either by their nature or because of the way in which they are commonly used, strike civilians and combatants indiscriminately,” but offered no suggestions about what, if anything, should be done in response. International Committee of the Red Cross. \textit{Weapons that may Cause Unnecessary Suffering or have Indiscriminate Effects: Report of the work of experts.} 1973: I.C.R.C., Geneva. 71: 243-44. \textsc{loc.gov}.} “All experts agreed that … generally speaking, severe burn wounds were probably the most painful type of wound and frequently remained so for long periods of time. … and that they may result in permanent disability, including physical, functional, cosmetic, social and psychological disability,” the final report stated.\footnote{International Committee of the Red Cross. \textit{Conference of Government Experts on the Use of Certain Conventional Weapons (Lucerne, 24.9-18.10.1974): Report.} 1975: I.C.R.C., Geneva. 27: 85. \textsc{loc.gov}.}

Napalm’s responsibility for such injuries, however, was unclear. One group of experts (cloaked in anonymity by Red Cross rapporteurs) asserted that burns from incendiary weapons were inhumane. They argued from “such factors as the nature of the wounds inflicted, the degree of pain which victims of war burns had to suffer, and the difficulty and prolonged duration of medical treatment. In all these respects, they were convinced that the suffering due to severe burns caused by incendiary weapons was considerably worse than that resulting from other war wounds,” according to their report. A second unidentified group denied it: “While admitting that, generally speaking, severe burn wounds were probably the worst possible type of wound, these experts were not convinced that the use of incendiary weapons resulted in all cases in an exceptionally high
incidence of casualties, let alone of gravely wounded; on the contrary, they thought that in certain situations these figures might even be significantly lower than those resulting from the use of other weapons.” Replacement of incendiary weapons with alternatives, the skeptics argued, “even if militarily feasible, might well result in an increased number of casualties and of severely injured in particular.”

Similar paralysis gripped specialists on the subject of precision. “According to a number of experts, incendiary weapons are unquestionably indiscriminate in that they exert their primary effect over a certain area, while moreover the secondary effect they often have and which is due to the self-propagating character of fire is beyond the control of the user of the weapons,” wrote authors of the final conference report. However, they continued, other experts, “while conceding that incendiary weapons, like most other weapons, could be used without discrimination, denied that they were indiscriminate in all cases, or by their nature. In the view of these experts, modern incendiary weapons are as accurate as other weapons and are, indeed, at times even more discriminate than other weapons that might be used in their stead; their primary effect can be confined to a strictly limited area, and the spread of the fire, as with many alternative weapons, depends upon the nature of the target.”

Area attacks like those of World War II, members of the latter group


maintained, were obsolete and, since they could only be mounted by a few countries, unlikely to the point of irrelevance. “It was stated by some experts that large-scale incendiary attacks on urban or rural areas were no longer considered important in military doctrine. It was also pointed out that the capacity for mounting and conducting fire-raid attacks on cities, such as those of World War II, was today at the disposal of only a very few States, if any at all. In the opinion of these experts, therefore, large incendiary area attacks were a thing of the past,” the Red Cross report observed.96

As a practical matter, the latter scholars concluded, “In more recent armed conflicts, while incendiary weapons might at times have been used indiscriminately, in other instances they had proved their capacity for discriminate use.”97 Specialists proved similarly divided over whether a general rule was sufficient to prevent saturation firebombing of cities, or if a specific legal prohibition against urban area attacks was necessary.98


98 “[T]hey felt there could be little doubt that the massive use of incendiary weapons against civilian population centres was either already in contravention of existing international law, or should be banned one way or another,” the expert report stated. However, “The question whether it would be preferable to supplement such a general rule with a specific prohibition on the use of incendiary weapons against such targets, was answered affirmatively by some of these experts, while others preferred to leave it open for the moment.” International Committee of the Red Cross. Conference of Government Experts on the Use of Certain Conventional Weapons (Lucerne, 24.9-18.10.1974): Report. 32: 105, 34: 112. LOC.gov. As Parks summarized the point, “One group felt strongly that all incendiaries should be prohibited without exception, while the other group was equally adamant that the use of incendiaries against military targets was neither inhumane nor inherently indiscriminate, and in many circumstances had unique military value.” In a harbinger of decisions to come, he continued “However, members of the second group were in agreement with the first group that measures should be taken to protect areas populated by civilians from mass incendiary attacks of the kind that occurred during World War II.” W. Hays Parks. “The Protocol on Incendiary Weapons.” 1990: 279 International Review of the Red Cross. 537-38.
In the end, there was no consensus about the best legal standard. Some experts called for a complete prohibition on incendiary weapons and napalm. Others urged proscription of “indiscriminate attacks against civilian population centres.” A final group recommended that laws control specific weapons rather than assert broad principles.

Experts did appear to agree, however, that public opinion worldwide militated against the use of incendiary weapons — although they split as to the importance of that observation as a matter of law. “In the eyes of some, public opinion concerning the use of incendiary weapons provided yet another argument for the illegality of the use of those weapons,” the Lucerne report advised. Others, it continued, “who could not accept the public conscience as an independent source of international law, were prepared to admit that existing public opinion with respect to incendiary weapons provided a strong political factor for governments to take into account.”

Diplomatic immunity

The United Nations General Assembly was more unified. On 9 December 1974, the world body sounded yet another clarion about napalm. Resolution 3255 (XXIX) seized on the unanimity of the I.C.R.C.’s Lucerne experts about the pain of burn injuries to condemn the gel and urge its abolition. Delegates pushed the ongoing Diplomatic Conference to write these recommendations


into international law. In a relatively rare recorded vote, 98 states approved the resolution and 26, including the U.S., its N.A.T.O. allies, the U.S.S.R., and members of the Warsaw Pact, abstained. “[S]evere burn wounds are probably the most painful type of wound and frequently remain so for long periods of time,” the U.N. resolution observed. “Emphasizing the consensus of the Conference of Government Experts,” the statement continued, the world body “Condemns the use of napalm and other incendiary weapons in armed conflicts in circumstances where it may affect human beings or may cause damage to the environment and/or natural resources,” and “Urges all States to refrain from the production, stockpiling, proliferation and use of such weapons, pending the conclusion of agreements on the prohibition of these weapons.” The global assembly invited governments, the I.C.R.C., specialized agencies and other international organizations to transmit to the Secretary-General “all information about the use of napalm and other incendiary weapons in armed conflicts,” requested a follow-up report from the Secretary-General, and encouraged the “Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts to continue its consideration of the question of the use of napalm … and its search for agreement on possible rules prohibiting or restricting the use of such weapons.”

Red Cross functionaries resumed their deliberations in January, 1976. In coordination with an ad hoc committee assembled by the Diplomatic Conference, the group assembled a second collection of specialists, again with U.S. representatives, at a different Swiss lakeside resort: Lugano,

---


30 kilometers east of historic Solferino. Napalm was still center stage. “Of all incendiary weapons, it is napalm which has aroused the greatest public concern,” the experts stated.  

Advocates for regulation, aware of the divisions at Lucerne, offered three main proposals. All cited precision, rather than suffering, for their legal basis. “All of these proposals have one thing in common, in that they consider solely the protection of civilians, that is to say, they take account only of the propensity of those weapons for producing indiscriminate effects,” the experts observed. Mexico suggested a complete ban of incendiaries. Sweden proposed a ban with limited exceptions (for example, fire weapons specifically designed for use against armored vehicles). The Netherlands, with Australia, advanced a simple rule: “[I]t is prohibited to make

---


any city, town, village or other area containing a concentration of civilians the object of attack by any incendiary munition.”

Group members discussed research findings for the first time. An unidentified expert — masked, as at Lucerne, in accordance with meeting policies — described experiments on goats that suggested little risk to the animals from napalm: “Goats had been clipped and then tethered in the open or in narrow slit trenches. Each one was covered with a single army blanket. A standard napalm bomb was dropped on the animals, completely enveloping 30 goats in its fireball. One goat was severely injured from a direct hit from the bomb casing. Two goats had slightly reddened skin, and six had singed hairs. No goat was asphyxiated or displayed signs of carbon monoxide poisoning.” The same anonymous expert also reported experiments on people that suggested *homo sapiens* might be more at risk from napalm than *capra aegagrus hircus*: “A burning blob of napalm on the bare skin became intolerable after one second. The size of the blob had no impact on the pain threshold. A single layer of cotton protected the skin against burning for 6-7

---


Spain argued for a special prohibition on napalm, and for protection of combatants as well as civilians. “[T]he shocking effects of this weapon justify its being expressly banned even though it falls within the general prohibition … In all cases napalm causes unnecessary suffering and serious or irreparable consequences. This means that the most important aspect of the problem — the protection of combatants — is not covered by this [Dutch] proposal.” Government of Spain. “Analysis of the Proposals Submitted Concerning Incendiary Weapons.” International Committee of the Red Cross. Conference of Government Experts on the Use of Certain Conventional Weapons (Second Session—Lugano, 28.1-26.2.1976): Report. 188.

seconds, and a second layer for 30 seconds. Of the thickened-napalm blobs striking an individual in a simulated hit, 69% could be extinguished with the bare hands.”

Results from Korean War studies presented at Lugano underlined the vulnerability of people to napalm: “it was to be expected that about 35% of those caught by a firebomb would be killed, and of the survivors 25-30% would need to be evacuated by other people and 50-55% would be hors de combat.” Striking though these figures were, results from war game simulations showed that “general purpose bombs and bomblets-dispenser munitions would cause, respectively, 1.5 and more than 5 times as many incapacitating wounds to enemy troops as would napalm,” another anonymous authority reported. Other experts attacked these conclusions for not considering alternate weapons such as aircraft guns, rockets and smart bombs, and ignoring complicating factors like weather, battlefield illumination, and the psychological effect of napalm.

Opponents of regulation advanced arguments similar to those made at Lucerne. They revisited the inconclusive debate over suffering (“There is no consensus on whether injuries from incendiary


A report on victims from seven napalm accidents in 1968-69 found that injuries to the 31 people caught within fireballs were similar to victims of burns received from other vectors. An expert who had treated 34 napalm burn cases from 1966-1970 reported comparable findings. Skeptics rejected these results because of the small sample size. International Committee of the Red Cross. Conference of Government Experts on the Use of Certain Conventional Weapons (Second Session—Lugano, 28.1-26.2.1976): Report. 111-12: 35-37.
weapons are likely to impose more suffering either than other war burn injuries or than any other type of traumatic injury;”)\textsuperscript{115} asserted napalm might be a blessing (“the military value of napalm could perhaps be considered to reside more in its psychological effects than in its physical ones; and since it thereby achieved its desired results more by stimulating flight than by direct casualty-production, a case could be made that it was likely to cause less overall suffering than alternative types of weapon;”)\textsuperscript{116} and simultaneously maintained incendiary weapons were uniquely valuable (“represent an important element in the military arsenals of some States, and the security of those States would be weakened by a general prohibition of use”)\textsuperscript{117} and that napalm in particular didn’t warrant special scrutiny because it probably could be replaced (“it would be unduly shortsighted to concentrate on napalm for it was readily conceivable that other incendiary agents, perhaps more destructive ones, could be used in place of it.”)\textsuperscript{118}

Unsurprisingly, the experts again failed to achieve consensus. Nonetheless, under the glare of relentless publicity, international law, now with precision as its guiding principle, appeared to have drawn its net tighter than ever before around napalm. “[S]erious attempts were made to reduce the distance between opposing views, to explore the middle ground lying between them and to show more flexibility,” Austrian head of the General Working Group Erich Kussbach observed with dip-


plomatic blandness. “This attitude has to be welcomed even though for the time being it did not succeed in achieving any conclusive agreement on the subject,” he continued.

After this lengthy lead-in, the Diplomatic Conference itself sidestepped incendiary weapons. Delegates from the Soviet Union, Italy, and Germany, among others, echoed the 1972 U.S. argument that arms control was distinct from international law. The former, they said, had no place at such a conference. Diplomats acceded to what is perhaps, in practice, a distinction without a difference. Additional Protocols I and II to the Geneva Convention of 1949 — 130 articles adopted on 8 June 1977 — cover care for the wounded, prisoners and the sick, and provide rules to reduce unnecessary suffering and protect civilians, but say nothing about incendiary weapons.

---


121 An 11 April 1975 report by The New York Times, “Ban on Cruel Arms Adopted at Geneva,” underlined the confusion that can arise from these concepts: “An international conference on bringing the Geneva war conventions up to date has agreed to ban weapons that cause unnecessary suffering or that permanently harm the environment, a conference communiqué said today. The communiqué did not list the weapons, but an International Red Cross Meeting last September specified napalm, white phosphorus, fragmentation weapons, and time bombs among weapons considered excessively cruel.” The September meeting presumably refers to the Lucerne Conference. In fact, of course, no such specific determination about napalm was adopted. The New York Times. “Ban on Cruel Arms Adopted at Geneva.” 12 April 1975: NYTimes.com.

Napalm appeared to have escaped the law. On the final day of the almost two-and-one-half-year diplomatic assembly, however, attorneys opened a pursuit route that ultimately led to its capture under international jurisprudence. Resolution 22, “Follow-Up Regarding Prohibition or Restriction of Use of Certain Conventional Weapons,” identified a rogue’s gallery of weapons delegates believed deserved special scrutiny: bombs that splintered into plastic fragments invisible to X-rays, land mines, booby traps, and incendiary weapons — including napalm, specified by name. A conference was to be convened not later than 1979 to promulgate “prohibitions or restrictions” on these and other devices. Napalm’s court date was set.

Advice of counsel

Pentagon authorities, with their napalm-drenched Vietnam debacle in its final throes and one eye on the I.C.R.C.’s new interest in conventional weapons, started a continuous process of legal review for new weapons in 1974 to ensure they met America’s legal obligations. As the 1970s continued, U.S. policymakers for the first time stepped back diplomatically, commercially, and operationally from napalm.

---

123 Resolution 22 was supported in particular by Sweden, Egypt, Mexico, the Netherlands, Norway, Switzerland, Austria, and Yugoslavia. Parks. “Means and Methods of Warfare.” 2006: 38 George Washington Int’l. Law Rev. 517.


Defense Department attorneys produced a two-page standard statement of the U.S. understanding of law of war principles to guide their review. Their language was so carefully hedged, it seems unlikely to have imposed much practical limitation on action. Its existence, however, shows that policy makers acknowledged international law and saw value in genuflection, at least, to its principles. Of “unnecessary suffering,” the lawyers wrote, “There is no agreed international definition ... A weapon or munition would be deemed to cause unnecessary suffering only if it inevitably or in its normal use has a particular effect, and the injury caused is considered by governments as disproportionate to the military necessity for it .... This balancing test cannot be conducted in isolation. A weapon’s or munition’s effects must be weighed in light of comparable, lawful weapons or munitions in use on the modern battlefield.” Despite the benchmark’s ambiguity, attorney’s continued, certainty was required for a determination of illegality: “A weapon is not unlawful merely because it may cause severe suffering or injury. .... The correct criterion is whether the employment of a weapon for its normal or expected use inevitably would cause injury or suffering manifestly disproportionate to its military effectiveness.”

Motivations of individual soldiers, which had to be assessed case-by-case, trumped the characteristics of particular weapons. The statement continued:

In determining legality, a State is not required to foresee or anticipate all possible uses or misuses of a weapon, for almost any weapon can be misused in ways that might be prohibited. A soldier armed with a handgun may murder an innocent civilian or a prisoner of war in his or her custody. The soldier has committed a violation of the law of war for which he or she should be brought to trial and, if convicted, punished. The fact that a pistol was used to perpetrate the crime does not transform an otherwise lawful weapon into an illegal weapon. The same may be said of an aircraft attack on a civilian object, or indiscriminate attacks by ground or air forces. A lawful weapon used to commit a crime makes the act criminal but does not make the weapon system or weapon illegal.
Finally, with respect to targeting, the U.S. eschewed general principles in favor of a case-by-case approach. “Law of war issues related to lawful targeting are addressed at the time of employment, to be determined by the on-scene commander under the circumstances ruling at the time. … The commander authorizing a weapon’s use should consider its characteristics where innocent civilians are present in order to ensure consistency with mission rules of engagement and law of war proscriptions on the directing of attacks at civilians not taking an active part in hostilities, or who otherwise do not pose a threat to friendly forces,” attorneys advised.126

Politicians, diplomats and operational military commanders were less circumspect. Jimmy Carter charged in the 1976 presidential campaign that “moral bankruptcy” had turned the U.S. into “an arsenal” for the world, and hurt the country.127 In 1977, after his election, he endorsed Presidential Review Memorandum 12, produced by the State Department’s Bureau of Political-Military Affairs, which ordered the U.S. to stop exports of “brutalizing” weapons such as napalm bombs.128 On 9 May, the administration leaked this new policy at a summit with Britain, France, West Germany, Italy, Japan, and Canada. Napalm was now a “forbidden” weapon, Time magazine an-
nounced, whose export was prohibited along with nuclear, chemical, and biological munitions.\textsuperscript{129} Napalm bombs, however, remained in the U.S. arsenal.\textsuperscript{130}

Traditional flamethrowers were the next to go. In 1978, the Army declared its arsenal obsolete. FLASH, the Flame Assault Shoulder Weapon, a shoulder-mounted rocket launcher that shot 1.3-pound rockets filled with thickened triethylaluminum (a liquid that burns at 1,400-2,200 degrees Fahrenheit when exposed to air), replaced the weapons that won such praise from U.S. commanders in World War II. The new system, in an echo of the range limitations that made Greek Fire obsolete after cannons appeared, shot five times farther, was half as heavy, and required less maintenance than portable flamethrowers, according to FLASH’s Army Training Circular. When set to semi-automatic, the system delivered one rocket per second.\textsuperscript{131} For the first time in history, the U.S. commitment to napalm was less at the end of a decade than at its start.\textsuperscript{132}


Conference on Certain Conventional Weapons

The United Nations Conference on Certain Conventional Weapons (C.C.W.) opened as proposed in Diplomatic Conference Resolution 22 on 10 September 1979. Representatives from 82 nations convened at the Palais des Nations in Geneva. Incendiary weapons drove debate. “The prohibition or regulation of incendiary weapons was for many the raison d’être for the C.C.W., given the extensive and widespread destruction resulting from their use in World War II and, to a lesser degree, in post-World War II conflicts,” U.S. delegation member Hays Parks observed. “Many felt that any agreement on conventional weapons which did not include a Protocol on incendiary weapons would have the distressing appearance of a fire-brigade which had forgotten to bring the hose-pipe. If nothing had been achieved on this subject, it is likely that all the work of...”

---


134 Parks. “Means and Methods of Warfare.” 2006: 38 George Washington Int’l. Law Rev. 521. 512 (On post-World War II conflicts: “Controversy arose during the United States’ war in Vietnam as to weapons it employed there: its new, smaller-caliber (5.56x45mm) M-16 rifle, napalm, cluster munitions, flechettes, blast (high explosive) munitions, and so-called ‘plastic fragmenting munitions,’ for example.”) See Parks. “The Protocol on Incendiary Weapons.” 1990: 279 International Review of the Red Cross. 539, 541. (“In the conflicts since 1945, civilians had suffered all too often as a result of aerially-delivered incendiaries; even if incendiaries were lawful, new rules were necessary to increase protection of innocent civilians.”)
the Conference would have been wasted,” agreed professor of international humanitarian law Yves Sandoz, who was employed at I.C.R.C. headquarters during the period.\(^\text{135}\) To make the overall treaty easier for states to accept, drafters segregated rules for specific weapons in individual protocols linked by a core treaty document that specified administrative procedures for the protocols. This allowed governments to subscribe to regulatory regimes \textit{a la carte}: devices that produced non-detectable fragments (Protocol I); mines, booby traps, and other devices (Protocol II); and (or) incendiary weapons (Protocol III). Signatories had to endorse to the basic treaty and at least two protocols.\(^\text{136}\)

Lawyers at two preparatory conferences, and at the C.C.W.’s two negotiating sessions, reviewed familiar arguments about napalm: its lethality, military efficacy, and the proper scope of international law. Medical debates again proved inconclusive.\(^\text{137}\) Opponents of a blanket prohibition repeated the argument, advanced at Lucerne, that area incendiary attacks were militarily ob-


\(^{\text{136}}\) Blinding laser weapons (Protocol IV), and “Explosive Remnants of War” (Protocol V, “the first multilaterally negotiated instrument to deal with the problem of unexploded and abandoned ordnance”) were added on 13 October 1995 and 28 November 2003, respectively. The Convention initially applied only to international armed conflicts. On 21 December 2001, Article 1 was amended to extend its authority to non-international disputes. Some delegates argued that Protocol I covered a non-existent weapon, since no examples of such weapons had ever been located. Protocol II was amended on 3 May 1996 “in response to the increasing human toll taken by these weapons.” United Nations Office at Geneva. \textit{The Convention on Certain Conventional Weapons}. No Date: \texttt{ONOG.ch}.

\(^{\text{137}}\) Artillery, for example, killed more civilians in World War II than bombardment, and even in cases of incendiary attacks burial under rubble and debris and injury from flying fragments, and secondary injuries from explosions, surpassed burns as causes of civilian casualties. Parks. “The Protocol on Incendiary Weapons.” 1990: 279 \textit{International Review of the Red Cross}. 539 (citing United States Strategic Bombing Survey).
solete, given the improved accuracy of modern aircraft and delivery systems. Moreover, they noted, massive bomber fleets like those of 1945 no longer existed. Rebutters asserted that sufficient capacity remained for devastating attacks.\textsuperscript{138} A study submitted without attribution by one of the principal delegations presented the value of incendiaries versus to high explosives in stark terms.\textsuperscript{139}

\begin{table}[ht]
\centering
\caption{SORTIES REQUIRED FOR 50\% TARGET DESTRUCTION}
\begin{tabular}{|l|c|c|c|}
\hline
TARGET & HIGH EXPLOSIVE ONLY & INCENDIARY ONLY & MIXED HIGH EXPLOSIVE/INCENDIARY \\
\hline
Electrical transformers & 8 & * & 7 \\
Ammunition storage & 996 & * & 456 \\
Aircraft plant & 58 & * & 17 \\
Petroleum storage & 89 & 13 & ** \\
Railroad car repair shop & 19 & * & 41 \\
\hline
\end{tabular}
\end{table}

* The figure for a purely incendiary load could not meet the 50\% target destruction requirement within reasonable parameters.

** Calculation of the HE/I [High Explosive/Incendiary] mix sortie rate was not required since incendiary munitions were found more effective than high explosives against this particular target.

The unnamed authors concluded incendiary weapons reduced the required number of attacks in


some circumstances, compared to the use of high explosives alone, and argued this cut risks for attackers and civilians near target sites.\textsuperscript{140}

\textbf{Protocol III}

Diplomats ultimately rejected finely calibrated arguments like these in favor of a simple standard for incendiary weapons: no attacks against “the civilian population as such,” or “concentrations of civilians” under any circumstances.\textsuperscript{141} As Parks, who negotiated the protocol for the U.S., wrote, “[N]otwithstanding rules of engagement [for napalm] drawn up by a number of nations in recent conflicts to limit the employment of incendiary munitions in proximity to inhabited urban areas, mistakes of combat had frequently led to suffering of innocent civilians. The distinction between intentional and unintentional injury or death is lost on the civilian who suffers that injury.”\textsuperscript{142}


\textsuperscript{141} Compromises between Sweden and the United States established the final language. “I locked horns with my Swedish counterpart daily. But when it came time for agreement, he and I sat down and drafted what became Protocol III. … once the United States and Sweden were in agreement, it was a text to be taken to the bank,” Parks wrote. Parks. “Means and Methods of Warfare.” 2006: 38 George Washington Int’l. Law Rev. 536.

Lawyers made a number of important exclusions. Combatants received no protection.143 “Munitions which may have incidental incendiary effects, such as illuminants, tracers, smoke or signalling systems,” including widely used white phosphorus, negotiators decided, did not count as incendiary weapons, and thus were not subject to the protocol. In a nod to Sweden’s 1976 proposal at Lugano for a ban with exceptions, “Munitions designed to combine penetration, blast or fragmentation effects with an additional incendiary effect, such as armour-piercing projectiles, fragmentation shells, explosive bombs and similar combined-effects munitions in which the incendiary effect is not specifically designed to cause burn injury to persons, but to be used against military objectives, such as armoured vehicles, aircraft and installations or facilities,” were also excluded from the definition of an “incendiary weapon.”144

A positive result of these restrictions was an easily comprehensible standard for napalm and other incendiaries. “Incendiary weapon” meant “any weapon or munition which is primarily de-

143 Parks wrote: “Agreement proved unobtainable … some delegations continuing to argue that protection for combatants from the effects of a lawful weapon was unprecedented and ill-advised.” Parks. “The Protocol on Incendiary Weapons.” 1990: 279 International Review of the Red Cross. 542-43. Sandoz asserted that the reason Protocol III does not cover combatants “is because emphasis was placed on the indiscriminate nature of these weapons and on the danger they present for civilians, rather than on their cruelty, an aspect which would have justified restriction of their use against combatants also. Sandoz. “Prohibitions or Restrictions on the Use of Certain Conventional Weapons.” January-February 1981: 220 International Review of the Red Cross. 13.

signed to set fire to objects or to cause burn injury to persons through the action of flame, heat, or combination thereof.” These “can take the form of, for example, flame throwers, fougasses, shells, rockets, grenades, mines, bombs and other containers of incendiary substances.”

“Concentration of civilians” meant “any concentration of civilians, be it permanent or temporary, such as in inhabited parts of cities, or inhabited towns or villages, or as in camps or columns of refugees or evacuees, or groups of nomads.” A “Military objective” was “any object which by its nature, location, purpose or use makes an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage.”

In addition to protection for civilian populations “as such,” it was “prohibited in all circumstances to make any military objective located within a concentration of civilians the object of at-

---


In sum, as Parks wrote, “Thermite (or thermate) munitions, flame throwers, and napalm are incendiary weapons, but weapons with incidental incendiary effects, such as white phosphorus and small arms tracer ammunition, are not.” Parks. “Means and Methods of Warfare.” 2006: 38 George Washington Int’l. Law Rev. 521-22.

tack by air-delivered incendiary weapons.” Incendiary weapons that were not air-delivered, such as for example flamethrowers, might only be used “when such military objective is clearly separated from the concentration of civilians and all feasible precautions are taken with a view to limiting the incendiary effects to the military objective and to avoiding, and in any event to minimizing, incidental loss of civilian life, injury to civilians and damage to civilian objects.” There was even a nod to natural resources, proposed by the Soviet Union: “It is prohibited to make forests or other kinds of plant cover the object of attack by incendiary weapons except when such natural elements are used to cover, conceal or camouflage combatants or other military objectives, or are themselves military objectives.”

These restrictions on napalm proved the most difficult hurdle for the Convention on Certain Conventional Weapons. The Soviet Union, less than one year into its invasion of Afghanistan,

---


balked at Protocol III. The United States, with no comparable military engagements, initially proved more amenable, and accepted the proposal in the first days of October 1980. Moscow could not stand alone. On 7 October, The New York Times reported “The Soviet delegation was the last to approve a ban on using napalm or similar flame-spreading substances in air strikes against military objectives near civilian concentrations. Moscow was left isolated when the United States last week approved the ban.” Delegates finalized the Convention on 10 October 1980. A total of 35 states signed it at the United Nations on 10 April 1981. It came into force with 50 signatories on 2 December 1983.

And just like that, napalm bombs became criminal when used against civilians “as such” or “concentrations of civilians” under any circumstances. “Delegates said the most important achievement was the banning of the incendiary bombing of cities and other areas where civilians are concentrated even if military objectives are present,” the Times noted at the end of the drafting

---


Washington, as a result, stood alone, under President Ronald Reagan, against all of its N.A.T.O. allies, except Turkey; every Warsaw Pact state, except Romania; and the People’s Republic of China: all approved Protocol III in relatively short order.\footnote{Countries that wanted to be designated “original parties” to the agreement had one year to endorse the C.C.W. and at least two of its protocols at U.N. headquarters in New York. U.S. representatives signed the main treaty and Protocols I (“Non-Detectable Fragments”) and II (“Mines, Booby Traps and Other Devices”) just 48 hours before the deadline. United Nations Office at Geneva “United States of America.” \textit{States parties and signatories C.C.W.}. No Date: \texttt{UNOG.ch}. Despite this significant initial group of signatories, broader global acceptance took several decades. “[After 2 December 1983] acceptance of the C.C.W. was, at best, underwhelming. Ten years after entry into force, only thirty-nine nations were State Parties,” Parks observed. “Means and Methods of Warfare.” 2006: 38 \textit{George Washington Int’l. Law Rev}. 524.}
VII. THE WEAPON THAT DARE NOT SPEAK ITS NAME, 1975-2009

Napalm Close Up: Kuwait and Iraq, February to April, 2003

On 6 January 2003 the American modular cargo delivery system ship S.S. Cape Jacob docked at Kuwait. 1 U.S. sailors and civilian contractors boarded and began a series of 24-hour shifts to unload napalm, hand grenades and 2,000-pound bombs for the 3rd Marine Air Wing (MAW). 2 By early February, as Colin Powell reviewed his speech on Iraqi weapons of mass destruction for the United Nations Security Council, and Pentagon planners said a bombing wave could quickly break the Iraqi army, the work was almost complete. 3 “Everything from hand grenades to 2,000-pound bombs and napalm are shipped, ready for use whenever 3rd MAW needs them,” the Department of Defense’s Defend America newsletter reported on the 12th. 4 Morale was high. “We’ve had no mishaps — that’s what you look for in ordnance,” said officer-in-charge Marty Groover. “This is motivating,” said Pennsylvania native Jim Brown, “It’s exciting to know the work we’re doing here is supporting … Marine aviation units.” 5

On 19 March, at 10:16 P.M., President George W. Bush announced, “The people of the United States and our friends and allies will not live at the mercy of an outlaw regime that threatens the


peace with weapons of mass murder. We will meet that threat now, with our Army, Air Force, Navy, Coast Guard and Marines, so that we do not have to meet it later with armies of fire fighters and police and doctors on the streets of our cities.”\textsuperscript{6} The first bombs had already fallen on Baghdad.\textsuperscript{7}

Safwan Hill, a few kilometers north of the Kuwait border in southern Iraq, looms over the main road that runs from Kuwait to Basra and continues on to Baghdad. An observation post at its summit bristling with soldiers, weapons and communications gear was an early target for U.S. planners. Marine howitzers rolled into place along the frontier on 20 March, a Thursday.\textsuperscript{8} Behind the lines, Navy technicians loaded airplanes with 750-pound Mark 77 firebombs, each packed with 110 gallons of napalm.

America attacked on Friday morning. “Marine Cobra helicopter gunships firing Hellfire missiles swept in low from the south. Then the marine howitzers, with a range of 30 kilometres, opened a sustained barrage over the next eight hours. They were supported by US Navy aircraft which dropped 40,000 pounds of explosives and napalm, a US officer told the Herald,” reporter Lindsay Murdoch wrote in the Australian \textit{Sydney Morning Herald} newspaper.\textsuperscript{9} “Anything that was up there that was left after all the explosions was then hit with napalm. And that pretty much put an end to

\begin{thebibliography}{9}
\bibitem{bush} George W. Bush. “President Bush Addresses the Nation.” 19 March 2003: Office of the Press Secretary, The White House. \texttt{Archives.gov}.
\bibitem{murdoch} Lindsay Murdoch. “Dead bodies are everywhere.” 22 March 2003: \textit{Sydney Morning Herald}, \texttt{SMH.com.au}.
\end{thebibliography}
any Iraqi operations up on that hill,” CNN confirmed.10 Dawn showed just a single antenna where the observation post had been, visible through clouds of smoke. “Dead bodies are everywhere,” a U.S. officer reported by radio. “I pity anybody who’s in there,” said a Marine sergeant, “We told them to surrender.”11

A Navy spokesman in Washington immediately denied napalm was used. “We don’t even have that in our arsenal,” Lieutenant Commander Danny Hernandez said the day the stories appeared. A subsequent statement from the Pentagon to the Herald asserted, “Your story claiming US forces are using napalm in Iraq is patently false. The US took napalm out of service in the early 1970s. We completed destruction of our last batch of napalm on April 4, 2001, and no longer maintain any stocks of napalm.”12

Sensational news, however, spreads like wildfire. Salon.com reprinted Murdoch’s report the day it was published, and immediately raised the issue of international law, and potential war crimes. “A legal expert at the International Committee of the Red Cross in Geneva said the use of napalm or fuel air bombs was not illegal ‘per se’ because the United States was not a signatory to the 1980 weapons convention that prohibits and restricts certain weapons,” the website explained. “But the United States has to apply the basic principles of International Humanitarian Law (IHL) and take all precautions to protect civilians. In the case of napalm and fuel air bombs, these are special precautions because these are area weapons, not specific weapons,” said Dominique Loye, Napalm, An American Biography | The Weapon That Dare Not Speak Its Name, 1975-2009 • 396

Red Cross advisor on weapons and international humanitarian law.\textsuperscript{13} In turn, \textit{The New York Times} noted Salon’s coverage as “the first to highlight an item from the \textit{Sydney Morning Herald} that reported the use of napalm by United States troops.” \textit{Times} editors published another Navy denial, and a correction, the next day.\textsuperscript{14}

Progress was relatively fast as American troops advanced toward Baghdad, but bridges caused delays. In late March, a crossing at the Saddam Canal in central Iraq proved especially problematic. Passage across the Tigris River north of the city of Numaniyah in April was also difficult. Napalm cleared both obstacles. “We napalmed both those (bridge) approaches,” Colonel Randolph Alles, commander Marine Air Group 11, told \textit{San Diego Union-Tribune} reporter James Crawley on 5 August 2003, five months after the events. “Unfortunately, there were people there because you could see them in the (cockpit) video. They were Iraqi soldiers there. It's no great way to die,” he added. “The generals love napalm,” Alles observed, “It has a big psychological effect.”\textsuperscript{15} Marine Corps Major General Jim Amos, who commanded Marine jet and helicopter units in the Iraq war and led the 3rd Marine Air Wing “confirmed aircraft dropped what he and other Marines continue to call napalm on Iraqi troops on several occasions,” according to Crawley.\textsuperscript{16}

Navy officials, confronted with this additional evidence, admitted in August 2003 that firebombs filled with a “fuel-gel mixture” had been used in Iraq, but distinguished them from

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{13} Laura McClure, compiler. “War of Words.” 22 March 2003: \url{Salon.com}.
\item \textsuperscript{14} Amy Harmon. “A NATION AT WAR: Weblogs; Facts Are In, Spin Is Out.” 25 March 2003 corrected 26 March 2003: \url{NYTimes.com}.
\item \textsuperscript{15} Crawley. “Officials confirm dropping firebombs on Iraqi troops.” 5 August 2003: \url{SignOnSanDiego.com}.
\item \textsuperscript{16} James W. Crawley. “Officials confirm dropping firebombs on Iraqi troops: Results are ‘remarkably similar’ to using napalm.” 5 August 2003: \textit{San Diego Union-Tribune}, \url{SignOnSanDiego.com}.
\end{itemize}
\end{footnotesize}
napalm. “During the war, Pentagon spokesmen disputed reports that napalm was being used, saying the Pentagon’s stockpile had been destroyed two years ago. Apparently the spokesmen were drawing a distinction between the terms ‘firebomb’ and ‘napalm,’” journalist Crawley explained. “If reporters had asked about firebombs, officials said yesterday they would have confirmed their use. What the Marines dropped, the spokesmen said yesterday, were ‘Mark 77 firebombs.’ They acknowledged those are incendiary devices with a function ‘remarkably similar’ to napalm weapons. Rather than using gasoline and benzene as the fuel, the firebombs use kerosene-based jet fuel, which has a smaller concentration of benzene,” he continued. “Many folks (out of habit) refer to the Mark-77 as ‘napalm’ because its effect upon the target is remarkably similar,” said Marine spokesman Colonel Michael Daily. Indeed, Public Affairs spokesman for Twenty-Nine Palms Marine base Captain Robert Crum told the Sydney Morning Herald a few days later, “The average young Marine may be unfamiliar with the technical nomenclature, and probably does refer to this munition [Mark-77] by the vernacular ‘napalm.’” The difference, Daily asserted, was that the newer formulation had “significantly less of an impact on the environment.”

Informed observers rejected the distinction. “You can call it something other than napalm but it is still napalm. It has been reformulated in the sense that they now use a different petroleum distil-

---

late, but that is it,” said John Pike, founder of the award-winning GlobalSecurity.org website, former director of the Federation of American Scientists Military Analysis program, and one of the world’s top experts on security issues. 22 “It’s Orwellian. They do not want the public to know. It’s a lie,” maintained Robert Musil, executive director of Physicians for Social Responsibility — an institution still expert on napalm 36 years after Reich and Sidel’s ground-breaking article in the New England Journal of Medicine. It “fits a pattern of deception” by U.S. authorities, Musil added. 23

European media organizations concurred. “Heavy Reproaches Against US Pentagon: Napalm Bombs In The Iraq War,” Germany’s ARD-TV network’s Monitor news program headlined on 7 August. “Napalm. The Horror-weapon from the Vietnam-war. It is internationally banned and outlawed, its use is forbidden by the Geneva-Conventions. But nevertheless, it was used in the Iraq-war by the U.S. army,” intoned an announcer. 24 Reporter Andrew Buncombe’s coverage in the U.K.’s national Independent newspaper was equally pointed. “US admits it used napalm bombs in Iraq” blared the headline:

American pilots dropped the controversial incendiary agent napalm on Iraqi troops during the advance on Baghdad. The attacks caused massive fireballs that obliterated several Iraqi positions.

---

22 Andrew Buncombe. “US admits it used napalm bombs in Iraq.” 10 August 2003: Independent.co.uk. Pike biography: GlobalSecurity.org. “John E. Pike — Director.” 2010: GlobalSecurity.org. See Crawley. “Officials confirm dropping firebombs on Iraqi troops.” 5 August 2003: SignOnSanDiego.com. See also Michele Norris. “Pentagon Defends Use of Toxic Agent in Iraq.” 18 November 2005: All Things Considered. NPR.org (Pike: “the claim that napalm was not used [by U.S. forces in Iraq in 2003] goes to the distinction between a Xerox and a photocopy. The trademark name was not used, but a different composition that has the same effect was used for napalm.”)


The Pentagon denied using napalm at the time, but Marine pilots and their commanders have confirmed that they used an upgraded version of the weapon against dug-in positions. They said napalm, which has a distinctive smell, was used because of its psychological effect on an enemy.

A 1980 UN convention banned the use against civilian targets of napalm, a terrifying mixture of jet fuel and polystyrene that sticks to skin as it burns. The US, which did not sign the treaty, is one of the few countries that makes use of the weapon. It was employed notoriously against both civilian and military targets in the Vietnam war.25

Buncombe reiterated the explanation offered to San Diego Union-Tribune reporter Crowley: “Officials said that if journalists had asked about the firebombs their use would have been confirmed. A spokesman admitted they were ‘remarkably similar’ to napalm but said they caused less environmental damage.” He concluded, “The revelation that napalm was used in the war against Iraq, while the Pentagon denied it, has outraged opponents of the war.”26

It took about two decades after America’s defeat in Vietnam for the arguments advanced by protesters in the late 1960s to percolate around the world, and coalesce into a near-universal antipathy to napalm backed by international law. During that time, military forces deployed the incendiary on every continent except North America, Australia and demilitarized Antarctica: jelly bombs fell in Africa, Asia, the Middle East, Latin America and Europe. Gradually, however, what started as articles, artworks, and protest signs in Redwood City, New York, Madison, Wisconsin and Cambridge, Massachusetts, among other locations, spread throughout popular culture and became a consensus. Civilians in the U.S. came to see napalm, with near-hysterical intensity, as a bogeyman. Combat deployments worldwide produced vituperation that increasingly outweighed tactical

---


benefits. Napalm became a public relations problem for officers. Development of alternate weapons technologies, including smart bombs and improved cluster munitions, highlighted the weapon’s relative costs. Military tactics started to change.

Ultimately, the U.S. government severed some of its public ties to its remarkable creation. On 4 April 2001, in a well publicized “last canister ceremony” at the Fallbrook Naval Weapons Station in San Diego, Navy officials bade a loud farewell to napalm. Presidents Bill Clinton and George W. Bush both recommended that the U.S. Senate ratify Protocol III to the C.C.W. On 22 January 2009, President Barack Obama signed it. In 67 years, napalm has moved from a position of heroic omnipotence to one of global infamy and regulation under international law backed by America.

In private, however, the United States has been more equivocal. President Obama added a diplomatic reservation to his signature on Protocol III that technically, arguably, rendered his commitment meaningless. American forces deployed napalm during the 2003 invasion of Iraq, but denied it. Napalm remains legal to use in combat under international law, and the arsenals of many countries are stocked with the gel.

Soldier of Fortune

Africa was the most common region for confirmed napalm attacks in the years after the Vietnam War. In Ethiopia, the Dergue, or “shadow,” junta, backed by the U.S.S.R., dropped napalm bombs repeatedly on Eritrean rebels and Somali forces from at least 1976 to 1985. “Whole villages have been devastated by saturation bombing raids — sometimes involving napalm — carried out

“"We walked across an acre of charred ruins and ashes,” British *Sunday Telegraph* journalist Norman Kirkham wrote in a 1978 description of an attack on the town of Garbo, in the Ogaden region, by Ethiopian and Cuban troops chasing retreating Somalis: “The attack had begun at breakfast time ... the green-and-brown camouflaged jet turned and began to descend again, this time followed by a MiG-21 loaded with napalm. The F-5 made four runs, spraying American cannon shells and rockets, while the MiG dived on the four corners of the village, dropping its deadly napalm in a neat rectangle. Within ten minutes, Garbo had been turned into an inferno. ... more than 90 died in the flames or were killed by the strafing. Others were hideously burned.”

In 1985, Edward Desmond reported for *Time,* “Civilians are regularly lectured on how to wipe burning napalm jelly from their skin.” In addition to the violence in Ethiopia, news reports mentioned napalm bombings in 1977 by aircraft from the racist

---


Rhodesian regime, and Cuban and Soviet napalm attacks against pro-western forces in Angola in 1978.\(^\text{30}\)

Napalm bombs fell in west, central and east Asia in the 1970s and 1980s. U.S. sources reported frequent use of napalm by Soviet troops in Afghanistan during the 1979-89 invasion and occupation.\(^\text{31}\) In 1983, in a more limited example, Thai troops dropped napalm on 150 Vietnamese soldiers entrenched along the Cambodian border: perhaps the first use of napalm in Indochina since 1975.\(^\text{32}\) Iraqi forces used napalm extensively against Kurdish citizens in the 1986-89 Anfal extermination campaign.\(^\text{33}\)

Latin America saw at least two post-Vietnam deployments. In 1980, El Salvador’s government used napalm against domestic insurgents. “Before the U.S. started helping us, we had to use napalm, because we didn’t have any other equipment. We bought it from Israel several years ago, and used it until 1981. If we hadn’t done that, I might not be sitting here today,” Colonel Rafael


\(^\text{31}\) Drew Middleton. “Soviet Troops Said to Test New Weapons in Afghanistan; Military Analysis New Weapons Used by Soviet.” 10 July 1980: NYTimes.com (“American sources said that the Soviets had used napalm widely but that no objective evidence was available that they had used poison gas.”). Robert Schulteis and Ken Olsen. “War of A Thousand Skirmishes.” 18 May 1987: Time.com. (“A few weeks ago, 18 guerrillas died here in a MiG attack, but this time the napalm and high explosives fell wide of the mark …”).


\(^\text{33}\) Paul von Zielbauer. “Kurds Tell of Gas Attacks by Hussein’s Military.” 23 August 2006: NYTimes.com. (“In addition to the conventional bombs and fiery napalm canisters dropped on villages from Iraqi military jets and helicopters …”).
Bustillo, head of the Salvadoran Air Force, told a 1983 U.S. fact-finding mission. In 1982, during the Falklands War, Argentine Pucara aircraft dropped two napalm bombs on British troops. Both missed. U.K. troops discovered 9,000 gallons of napalm in field mixing units when they captured the Goose Green airfield on East Falkland, and additional stocks at the airfield near the capital city, Stanley.

As napalm’s disrepute grew, combatants around the world frequently alleged its use by opponents. The accused quickly, and often fiercely, denied the charges: testimony to the weapon’s notoriety. Thus, in 1977, Polisario guerrillas claimed French forces had used napalm in Western Sahara. “Largely in the domain of fiction,” French Foreign Minister Louis de Guiringaud promptly, and carefully, commented in a Parliamentary address a few days later. Fretelin, the East Timorese independence movement, asserted in 1980 that Indonesia used napalm to burn crops. Jakarta denied the charge. In January 2006, President of newly independent East Timor Xanana Gusmao repeated the contention in a report to the United Nations, and added that civilians had been


targeted. The Washington Post recorded a categorical denial: “Indonesia’s defense minister, Ju-wono Sudarsono, challenged the report’s accuracy Friday, denying the country used napalm.” Chad made repeated claims that Libyan forces used napalm during fighting in the Sahara. In 1983, lending credence to the charges, officials presented a 43-year-old man they identified as a cap-tured Libyan Air Force pilot to reporters: “We were dropping napalm as well,” the man said. “Out-side, a crowd of 5,000 people surged towards him, hissing, shouting and calling for his execution. The guards, one of them holding a grenade launcher inches from the Libyan’s head, fought back the crowd before bundling him into a truck,” Alan Cowell reported for New York Times. Libya denied the attacks even took place, let alone that napalm was used. South Africa denied in the same year that it had used napalm against Angolan rebels. Russia denounced Chechen claims in

39 Debbie Elliott. “Death Tally May Rattle E. Timor-Indonesia Ties.” 21 January 2006: All Things Considered. NPR.org (“The report also charges that Indonesia used napalm and chemical weapons to poison food and water ...”).


1995, repeated in a Washington Post editorial, that it used napalm against civilians in the breakaway province.\textsuperscript{44}

By 1991, with the notoriety of napalm established, and Protocol III more than a decade old, British commanders planning Operation Desert Storm against Iraq concluded its reputation was tarnished to a point that trumped napalm’s military utility. American officials rejected this assessment. “British officials say that in light of its infamous reputation the allies do not intend to use it against Saddam’s troops. But napalm, which is most effective against massed troops out in the open, is among allied weapons stockpiled in the gulf, and U.S. officials do not rule out its use,” Time reported.\textsuperscript{45} Wisely: U.S. pilots dropped napalm bombs in the war to burn Iraqi defensive trenches filled with oil. “Much had been written about the inferno the Iraqis would create by filling trenches with burning oil. But in the Marines’ sector, U.S. planes had burned off the oil prema-


turely by dropping napalm,” George Church reported in *Time*.\(^{46}\) After the war, Iraqi authorities used napalm extensively to suppress a Shiite uprising in the south of the country.\(^{47}\)

**Judgment Day**

Judgment Day for napalm came on 18 November 1994 when Serbian commanders dropped a napalm bomb on the town of Bihać in northwest Bosnia and started a chain of events that confirmed the assessment of napalm by Britain’s Desert Storm planners.\(^{48}\) It was the second strike on Bihać, located in a United Nations declared “safe zone,” in 10 days, and far from the first Serbian challenge to the U.N. in the two-year-old conflict. But it was the first time napalm had been used.

“Serb forces, defying stern United Nations warnings, today crossed a deadly threshold in the Bosnian struggle by dropping napalm on a ‘safe area’ designated by the U.N. The incident in
northwest Bosnia was the first confirmed use of napalm in the 2 1/2-year war,” *Time* reported.49

“Many hot greetings. HOT. This is the beginning,” read a hand-written message, in the Cyrillic alphabet used by Serbians, found on a shell fragment.50 It appeared immaterial that the solitary firebomb did not explode, and no one was injured in the attack.51 Napalm, a monster whose very name now invoked images of barbaric brutality, had slouched back onto the world stage in a theater of war that was a center of global attention.52

World leaders responded immediately, and without equivocation. A U.N. Security Council vote the next day authorized the strongest military retaliation of the war. “We face a new threshold” that might “spawn a new spiral of war,” declared U.S. Secretary of State Madeline Albright.

“The flames of war in the Balkans have been fanned even more,” observed Russian delegate Sergei Lavrov. Sir David Hannay, the British U.N. representative, called the attacks “totally unacceptable.” Just three days later — it would have been sooner but for bad weather — jets from the United States, Britain, France and the Netherlands joined in “the largest air raid in Europe since the end of World War II and the biggest mounted by the [N.A.T.O.] alliance since it was established in 1949 to counter Soviet military power,” the *New York Times* reported.53 “NATO Punishes Serbs for Na-


52 “No one was injured, said Maj. Koos Sol, a United Nations military spokesman here. ‘They were lucky,’ he said, referring to the people of Bihać. ‘All three bombs landed in the center of town within 100 meters of one another.’” Chuck Sudetic. “Napalm and Cluster Bombs Dropped on Bosnian Town.” 19 November 1994: [NYTimes.com](http://NYTimes.com).

palm Attack,” *Time* headlined. Alliance warplanes, the magazine wrote, bombed “a base where Serbs equipped planes with napalm bombs used last week against the Bosnians in Bihac.”\(^{54}\) Napalm, and the reaction to it, took “the Western alliance’s political involvement in the Bosnian war to a new level,” in the estimation of *New York Times* reporter Roger Cohen.\(^{55}\)

**You Can’t Go Home Again**

Public opinion in the United States on civilian uses for napalm experienced a similar hardening as the 20th century progressed. Initially, many had high hopes that peaceful uses might be found for the incendiary gel. Gardeners, the Forest Service, civil aviation authorities, and soap manufacturers, some thought, might be particular beneficiaries. “The deadly flamethrower, already nemesis of the Jap fighter at Okinawa, is already in peacetime use, attacking water vegetation which impedes navigation. A special mixture, half gasoline, one quarter each of fuel oil and gasoline is destroying clogging alligator grass and water hyacinth,” a reporter recounted at the end of World War II. “The U.S. Forest Service has suggested using the flamegun for backfiring forest fires. Agriculturalists expect to employ it in modified form for burning over areas. The Pittsburgh municipal airport contemplates use of the flamethrower to remove hard-packed ice and snow on runways,” the article continued.\(^{56}\) “Napalm, that spelled death and destruction as an incendiary ingredient in wartime flame-throwers, will soon be used by the Army as a G-I liquid soap,” *The Science News-Letter* (now bi-weekly *Science News*) advised, in 1946. “Within a few months, the


\(^{56}\) Author unknown. “Chemical Warfare Discoveries Will Be Used in Peace: To Aid War Against Harmful Insects and Aquatic Vegetation.” No Date: Fieser Papers. HUGFP 20.3 Box 4. “ Scrapbook 1937-1960.” No page number.
War Department states, 50,000 gallons of a new quick-suds soap made of napalm will be available for everything from scrubbing barracks floors to G-I shampoos,” the periodical continued. “Napalm is also reported to have a limited use in some hospital applications,” it concluded, without elaboration.57

Napalm was indeed subsequently used to fight forest fires in remote areas. In 1982, for example, Forest Service helicopters dropped gel bombs to control a fire that had jumped into “wilderness so rugged that bulldozers could not be used,” according to an Associated Press report dated Happy Camp, California.58 Rangers have also used napalm to help regenerate Colorado forests.59 A 1989 attempt to use “small bags of napalm” dropped from a boat to burn oil spilled


from the Exxon Valdez tanker in Alaska, however, was unsuccessful. Pittsburgh airport administrators resisted temptation and chose more traditional sweeping and blowing machines.

Use of the weapon in proximity to civilians, however, has been met with resistance that intensified with each passing decade. In 1992, for example, opponents of a Navy firing range on the island of Vieques in Puerto Rico seized on reports of a napalm test — the first use of the gel at the range in a decade — as justification to re-launch anti-base protests dormant since the early 1980s. Critics cited napalm’s environmental toxicity, its brutal effects, and its use in Vietnam. “Napalm contains an incendiary material and gelatinous phosphorous that burns everything around it and adheres to skin. Between 1963 and 1968, the Unites States dropped nearly one hundred thousand tons of napalm on Vietnam. Just one ton of this combustible gelatin will burn a surface area equivalent to one and a half football fields in seconds,” opposition activist Robert Rabin wrote in a contemporary pamphlet. “The U.S. military has also tested napalm in Vieques. Napalm is jellied gasoline that sticks to human skin. Thousands of civilians were killed or maimed for life in Vietnam by Washington’s use of napalm,” base critics Rolland Girard and Ron Richards asserted in a 1998 piece in The Militant, the international Socialist Workers Party magazine. A 1999 report by a Special Commission on Vieques, appointed by Puerto Rico’s governor, included numerous findings


61 The Pittsburgh airport, four-time winner and recognized six times in the honorable mention category for the International Balchen/Post award for excellence in the performance of airport snow and ice control, uses eight plowing, sweeping and blowing machines that move side by side, followed by a snow thrower, to clear runways. A chemical truck follows and sprays anti-skid agent as needed. Pittsburgh International Airport. “ACAA Recognizes Success of Snow Removal Program at PIT.” 30 October 2009: PittAirport.com.


that lessened support for the base, according to the Washington Post, “in particular its disclosure that U.S. forces training in Vieques have used napalm and uranium-laced munitions during war games.”64 Protests by local citizens, including civil disobedience actions, forced the Navy to withdraw from the facility and close the nearby Roosevelt Roads Naval Base on 1 May 2003.65

Residents of Coos Bay, the largest city on Oregon’s coast, reacted even more intensely in 1999, when Navy officials announced plans to use napalm to burn fuel oil on a freighter grounded at a local beach. The Japanese vessel New Carissa, on its way to collect a load of wood chips, hit a sand bank about one mile from the town and just 150 yards from the Oregon Dunes National Recreation Area.

---


reaction Area, on 4 February. Fuel tanks loaded with 359,000 gallons of tar-like bunker oil used to power the ship began to leak four days later. Authorities declared an emergency and closed local oyster beds. Multitudes of seals, sea lions, otters, birds, and other wildlife, and Oregon’s $24 million-a-year Dungeness crab industry, faced disaster. An attempt to ignite the oil with hand grenades and buckets of gasoline failed.

Navy and Coast Guard officials announced a second try with 400 pounds of C-4 plastic explosives and 600 gallons of napalm: the largest planned burn of a waterborne oil spill in U.S. history.

Townspeople panicked. “You think napalm, and you think of Vietnam and half the country being burned up,” said Joyce Jansen, a City Hall secretary. “People were afraid for their children,” she added. Residents flooded the police and fire departments with phone calls: more than 100 to police alone from a community of perhaps 4,000 families. Some wondered whether they should flee to a larger town 80 miles inland, others asked if their children could be hit by flying debris as they walked home from school. “It is incredible, the rumors that are going around,” said Police Chief

---


67 Kim Murphy. “Navy Team Fails to Ignite Fuel Oil on Grounded Ship.” 11 February 1999: LATimes.com. See Jeff Barnard, Associated Press. “Cargo Ship Still Stuck in Oregon; demolitions experts turn to napalm.” 11 February 1999: News.Google.com (“After a brief flash and a plume of oily black smoke, a smoldering glow in two of the ship’s cargo holds was all there was to show for eight hours of preparations.”)

Of course, terror was not universal: some brave souls gathered at the beach with shirts that read “I got burned in Coos Bay.”

Just after sunset on 11 February 1999 a spectacular series of explosions, visible for 25 miles, shot flames hundreds of feet high over the ship, and rocked the town. “We’ve got a good hot fire going,” reported a command center spokesman. Ultimately, the decision to use napalm proved a mixed blessing: about 90 percent of the oil burned, but the ten percent that escaped produced one

---


of the worst oil spills in Oregon’s history. Moreover, the fire was so intense it split the ship in two and created a salvage problem so complex it required almost a decade to resolve.73

Similar public antipathy blocked proposals to use napalm to incinerate mountains of dead animals collected by health officials in the U.S. and U.K. after disease outbreaks. Napalm applied with a retail “Terra Torch” flamethrower could reduce an adult carcass to ash in about an hour, Nevada Department of Agriculture employee Ron Anderson reported after an anthrax epidemic in 2000.74 “It works very nice for diseases such as anthrax, because you get this bloody discharge which can have the spores in it … When you are done burning the carcass, then the area (with spores) around the carcass can be torched,” he elaborated.75 Traditional pyres made of surplus lumber, railroad ties, coal and tires required up to three days to burn animals, and cost far more, the U.K.’s New Scientist magazine reported in the midst of a 2001 foot and mouth disease epi-

73 Contractors floated the bow and attempted to tow it to sea for disposal. A storm snapped the tow cable, however, and the hulk drifted to shore. It had to be reflated and towed a second time. Finally, a destroyer and submarine sank it with explosive charges, shells from a deck gun, and a torpedo. Engineers could not float the stern, and had to build a system of fixed barges, cranes, and a cable car to cut it into pieces that could be removed. The process took nine years and engendered intense debate and numerous lawsuits over issues of cost, procedure, legal precedent, and environmental impact. Oregon Department of State Lands. “The Wreck of the New Carissa.” 16 March 2009: Oregon.gov.

A 1967 attempt by British authorities to use napalm bombs to burn the oil tanker Torrey Canyon, which ran aground near Land’s End, was even less successful. Relatively little of the oil burned. About 119,000 tons of crude polluted 120 miles of the Cornish coast and killed 15,000 sea birds. Reports that one-quarter of the bombs missed their target subjected the Royal Air Force and Royal Navy to ridicule. BBC. “On This Day: 1967: Bombs rain down on Torrey Canyon.” 18 March 1967 rpt. 29 March 2008: BBC.co.uk. Pollution statistics: BBC. “Torrey Canyon ‘lessons learned.’” 19 March 2007: BBC.co.uk.

74 Firecon, Inc. of Ontario, Oregon manufactured the devices. “Gel Fuel Terra Torch Model 1400.” No Date: Terra-Torch.com.

demic that left up to 60,000 animals rotting in fields and barns.‘Should not the use of napalm be considered urgently? Is the reason why it is not being considered … the fact that there are overtones of Vietnam that might not be acceptable to the public?’ Labour Member of Parliament Tam Dalyell, representative of Linlithgow in Scotland’s central lowlands agricultural district, demanded of Environment Minister Michael Meacher in the midst of the crisis. Meacher denied napalm’s public image dissuaded him from considering it. “I have no Vietnam-related inhibitions about napalm and I am perfectly prepared to look at its use. If it can make a contribution to the — I hope — rapidly decreasing number of fires in open fields, I am happy to take it on board,” he responded.

Scientists made a case on the merits. “Napalm sounds dangerous, but it is actually relatively easy and safe to use, and probably safer than either petrol or diesel alone,” Martin Hugh-Jones of the School of Veterinary Medicine at Louisiana State University in Baton Rouge, who also conducted carcass incineration experiments, told the New Scientist reporter. “There’s nothing mysterious about napalm,” Anderson told veterinary trade magazine DVM the following month, “It is the same equipment (and substance) they use in the U.S. Forest Service and the Bureau of Land Man-

---


agement when they want to control prescribed burning (wildfires).” As “Carcass Disposal: A Comprehensive Review,” produced in 2004 by the U.S. National Agricultural Biosecurity Center Consortium observed, “For most people, napalm conjures up images of warfare, destruction, and horrific human casualties. However, napalm has been used in a variety of peace-time applications, including the break up of oil spills and the destruction of anthrax-infected cattle carcasses in the US.”

Historical imagery, however, and the views of “most people,” to use the National Agricultural Biosecurity Center’s term, trumped the technocrats. Coverage of Anderson’s research in the British Independent newspaper tellingly misidentified his “Terra Torch” as a “terror torch” device: “Mr. Anderson said the terror torches came in various sizes and would be effective on sheep carcasses.” A BBC report on the debate chose “The Terror of War” photograph and an image of a soldier fleeing a giant fireball as its illustrations for the agricultural discussion. Its coverage began, “Mention of napalm immediately conjures images of jungle warfare, destruction and horrific human casualties. The photograph of a naked young girl fleeing a napalm attack became one of the most poignant images of the Vietnam War.” And concluded, “[T]he chemical’s devastating war-

---


83 BBC. “Napalm could aid carcass disposal.” 24 April 2001: BBC.co.uk.
time history and its public perception that [sic] may put ministers off using napalm. A spokesman for the Department of the Environment, Transport and the Regions said the use of napalm was unlikely.  

In the United States, “Carcass Disposal: A Comprehensive Review” appears to have been the last serious consideration given to a civilian application for napalm.

**Napalm train to nowhere**


As public opinion evolved, America’s napalm arsenal rusted in California. Eventually, some of the canisters spread over 67 acres — dubbed “Napalm Park” by base operatives — started to

---

leak. Environmentalists worried that carcinogens in the gel, now described by the Navy as “honey-like” after years in storage, might seep into the soil. A population of Stephens’ kangaroo rats, a protected endangered species, took up residence in some of the tens of thousands of wooden crates, and added to the complexity of the situation. Politicians began to make inquiries. In 1982, Navy officers decided to dispose of the stockpile.

Removing the gel proved exceptionally difficult. Officers tried to sell the 23 million pound reserve, but all three potential buyers located by the Defense Reutilization Marketing Office fell through. An on-site processing system built in 1988, the Palm Enterprises Treatment Facility, had to be abandoned the next year when distillation equipment proved unable to separate benzene

---


89 Southwest Division, NAVFACENGCOM. “Recycled Napalm Successfully Converted to Industrial Use.” RMP News. Fall, 2001: RRLLC.com.
and polystyrene from gasoline in sufficient quantities — a necessary precursor to disposal.\(^90\) Neighbors protested incineration proposals. “Burning this stuff and sending it up in the air is like getting bombed with napalm … The one thing you don’t want to do with this stuff is to hurt any more people,” Stormy Williams, co-founder of local group Desert Citizens Against Pollution, told a local newspaper in 1995.\(^91\) “What we’re talking about here basically is just gasoline and plastic, said Navy spokesman Richard Williamson; however, he acknowledged, “there is an emotional element involved because of its association with the Vietnam War.”\(^92\) Finally, the Navy awarded the non-profit Battelle Memorial Institute, administrator of seven national research laboratories, a $28 million contract to do the job.\(^93\) Engineers built a $5 million processing facility at Fallbrook and, in 1997, signed a $2.5 million contract with Pollution Control Industries (P.C.I.) in East Chicago, Indiana, to destroy the napalm, fittingly enough, by fire. “The napalm was to be squeezed out of the aging canisters like toothpaste and placed inside 6,000-gallon isocontainers aboard railroad cars … Pollution Control would accept the isocontainers, blend the napalm with a solvent so it would burn at a lower and more predictable heat level, and then ship it to a cement kiln, where it could


be burned as fuel, or to another site like a toxic waste disposal incinerator” Rick Lyman reported in the New York Times.\textsuperscript{94} A train loaded with 12,000 gallons of napalm was to depart California every weekday for two years.\textsuperscript{95}

Then came a political reaction that made the engineering challenges appear inconsequential. A few days before Christmas, Representative Rod Blagojevich, a freshman Democrat from Chicago, learned about the Navy’s contract with P.C.I. A storm of protest erupted. “My first objection was why wasn’t there public disclosure and why send it two-thirds of the way across the country and through a heavily populated area like Chicago?” Blagojevich told The New York Times. He hinted at environmental racism, because the train would pass near Chicago and end in poor, largely black and Hispanic, East Chicago, noted recent chemical fires at the plant and a recent $80,000 fine for state environmental and safety violations, and observed that P.C.I.’s chairman Kevin Prunsky, had pleaded guilty to providing false information to Federal officials in a case involving the disposal of hazardous waste in a Chicago neighborhood.\textsuperscript{96}

Napalm’s reputation, however, was the essential problem. “At the root of the controversy, most of those involved agree, was the ghastly image of napalm, symbolized for many Americans during the Vietnam War by the specter of flaming jungles and a photograph of a Vietnamese girl in naked panic after napalm bombs burned the clothes off her body,” reporter Pam Belluck wrote in the

\textsuperscript{94} Rick Lyman. “Much-Repudiated Napalm Finds Wary Acceptance, if Not Warm Welcome, in Texas,” 10 August 1998: NYTimes.com. See Mushrush et al. “Use of Surplus Napalm as an Energy Source.” 19 September 1998 rpt. 2000: 22 Energy Sources 150. InformaWorld.com. (“The huge amount of surplus napalm possessed by the military is too large to simply ignore or destroy by destructive methods such as incineration. … The energy content of the surplus napalm was calculated to be 18,383 Btu/pound.”)


“Ah, napalm. Lt. Col. Kilgore, the crazed character played by Robert Duvall in ‘Apocalypse Now,’ just loved the smell of the stuff in the morning, began a story on the controversy in the Chicago Tribune. Blagojevich, wrote reporter Mike Dorning, had “issued denunciations and summoned images of Hiroshima-scale explosions.” This is like the straw that broke the camel’s back,” said Betty Balanoff, a leader of Northwest Indiana Residents for Clean Air, which opposed the plan, “We’ve been talking to the Government about cleaning the place up and then they go and dump napalm here.”

Navy officers and P.C.I. executives fought back with community meetings, school visits, and press briefings and attempted to re-routed the proposed train through the district of Republican congressman Jerry Weller — who immediately objected. “Despite its reputation, napalm is safe to transport and more stable and less volatile than gasoline, which is commonly sent by railroad,” defense department officials told the Chicago Tribune. Company president Robert Campbell showed reporters a jar of napalm he kept on his desk. Thomas McGillis, materials manager for the firm, made a batch of napalm from “household items,” including styrofoam cups, and set it on fire.

---

100 Democratic congressman Bill Lipinski, who represented the Southwest side of Chicago and was a senior member of the House Transportation Committee, may have played a role in the proposed route adjustment. Mike Dorning. “Congressmen Getting Political Mileage Out Of Napalm Train.” 19 April 1998: ChicagoTribune.com.
to prove it was less flammable than gasoline. A Navy Inspector General review found no irregularities that warranted breaking the contract. Nonetheless, controversy became so intense that when Ku Klux Klan members applied to hold an unrelated rally in Cicero, Ill., officials initially denied the request partly because of rumors a napalm train was scheduled to pass nearby on the same day. For their part, San Diego congressmen Randy (Duke) Cunningham and Ron Packard pressed the Navy to begin shipments as soon as possible.

It was too much for P.C.I. On Friday 10 April, at the start of Easter weekend, attorneys for the firm faxed a latter to Battelle asking that it not send any napalm until “all matters are resolved.” On Monday, company lawyers complained that “the gantlet which P.C.I. has been forced through is beyond its contemplation of the project.” They requested that the Navy and Battelle “cease making further shipments and [to] recall all shipments already made.” P.C.I. wanted out. “We have been subject to an emotionally charged political confrontation that has toyed with the facts. … [Given] a negative connotation about napalm and its role in the Vietnam War, we at PCI were

---


fighting an uphill battle …” president Campbell told The Chicago Tribune.\(^{108}\) Public hysteria, he said, was to blame. “To us, it’s the same old, same old. ... It just happens to be that word and that picture of that 9-year-old Vietnamese,” the businessman told the New York Times.\(^{109}\)

But the napalm train had left the station: the first tank of incendiary gel departed for Indiana on Holy Saturday.\(^{110}\) “What we have here is one tank car of napalm carrying 12,000 pounds of napalm from a place in California to a place in Indiana. This is a carefully worked out plan by the

---


\(^{109}\) “Campbell said, he felt like he had come ‘full circle,’ because he started his career working for Dow Chemical and remembers looking outside his Rockefeller Center window when protesters were picketing against that company for manufacturing napalm.” Pam Belluck. “Napalm Disposal Plan Dissolves Under Debate, but Shipment Rolls On.” 15 April 1998: NYTimes.com.

Navy,” Assistant Secretary of Defense for Public Affairs Kenneth Bacon told reporters at a Tuesday afternoon briefing.\(^{111}\) Congressmen from Illinois and Indiana accused the Navy of trying to sneak napalm through their states during the holiday.\(^{112}\) “I think it was absolutely inappropriate for the United States Navy in the dead of night over this holiday weekend to begin the shipment of napalm,” said Indiana Congressman Pete Visclosky.\(^{113}\) When the train eventually returned to southern California, however, Congressmen Cunningham and Packard reacted with outrage, and demanded an investigation by the General Accounting Office.\(^{114}\)

Battelle upped the value of the contract to $10 million and reassigned it to the GNI Group of Deer Park, Texas — an industrial city on Houston’s Ship Channel with many petrochemical installations — in July. Before they received the contract, GNI officials organized a public meeting for Battelle and Navy officers to assess community sentiment.\(^{115}\) Texas representative, and House whip, Tom DeLay visited Fallbrook to satisfy himself, he said, that the shipments were safe.\(^{116}\)


About 10,000 gallons of napalm arrived two weeks later with “only the briefest flurry of complaint,” the New York Times reported.\textsuperscript{117} Local residents were glad to see it go. “I’ll believe it when it actually gets there, and we don’t see it returning,” one told CBS News. Navy officials kept the precise date of departure and route of the shipment a secret. “In light of the clamor sparked by the April shipment, neither the Navy, the prime contractor, GNI, nor the Burlington Northern Santa Fe railroad would specify what time the first train was scheduled to depart or what route it would take,” the broadcaster reported.\textsuperscript{118} “We took a lesson from what happened in Indiana,” said GNI vice president for regulatory affairs Bill Reeves. “We saw the politicians come out, saw the misinformation of what went around. We just felt that if we got this out to the public, quickly, it would be understood and, by and large, it was,” he continued.\textsuperscript{119} “We did as much as we could this time around to educate and inform the public and to make sure that any questions were answered in advance,” confirmed Lee Saunders, a Navy environmental affairs spokesperson.\textsuperscript{120} “The people of Houston deal with this kind of stuff all the time,” explained Robin Yocum, Battelle’s manager of media relations: “You say napalm to most people, and they picture the image of that little girl running down the road. But you explain to people in Houston that it’s just gasoline mixed with ben-


zene and styrene and they know right away what you’re talking about and what you’re dealing with.”

Residents said they simply had no choice. “People along the Ship Channel don’t feel they can do anything about it,” said LaNell Anderson, a Houston real estate agent and a member of Grandparents of East Harris County. “They feel powerless, as though they’ve been designed [sic] as a national sacrifice zone. You know, these toxic companies looked for the place with the least resistance and that’s why they came here.” Judy Starns, who lived in the working class community of Channel View, just across the water from the napalm processing facility, told the Times “We’ve already got a toxic soup around here … We’ve breathed, choked and slurped enough of that stuff that we’re wise and we’re fed up. California didn’t want it. Indiana didn’t want it. Just leave it to Texas.” As Deer Park City Manager Ron Crabtree dryly observed, “there’s an understanding here that this is a part of our economic base.”

Whatever the cost to Texas, napalm disposal proved a rich prize for GNI. “The increase in the revenues for the waste management services segment was primarily attributable to a major increase in the service provided to the U.S. Navy for the treatment of Napalm,” the company reported in a February 2000 S.E.C. filing.


ernment payment.\textsuperscript{126} By 2001, the overall cost for the disposal project had almost doubled from its original budget to $48 million.\textsuperscript{127} Processed material was delivered to the Baton Rouge, Louisiana plant of French chemical firm Rhodia to fuel industrial furnaces that required “high quality” fuel.\textsuperscript{128}

On 4 April 2001, acting Secretary of the Navy Robert Pirie Jr. declared an end to U.S. napalm. “At a low-key ceremony this morning at the Fallbrook Naval Weapons Station in San Diego County, the final two canisters of Vietnam-era napalm will be recycled and sent on their way to Texas and Louisiana,” reported the \textit{San Francisco Chronicle}.\textsuperscript{129} “Acres and acres of napalm bombs, gone. Recycled into fuel (and) aluminum casings,” Captain Thomas Boothe, who oversaw the project, told invited guests. Officials said the site would be restored to its native state: a habitat for kangaroo rats and California gnatcatchers. “Napalm, as a weapon, is now gone,” said Seal Beach commander Paul Bruno. “We can now say it is a part of history,” asserted Fallbrook Chamber of

\begin{footnotes}

\item[127] Shoshana Hebshi. “Napalm removal project wrapping up.” 4 February 2001: \texttt{NCTimes.com}.


\end{footnotes}
Commerce executive director Bob Leonard. “Good riddance,” said Pirie, “the public should be elated.”

**The Weapon That Dare Not Speak Its Name**

Perhaps the public would have been pleased if the U.S. really had eliminated napalm from its arsenal. In fact, it only erased the word from official discourse. After 2001, although American forces used napalm according to Professor Fieser’s definition — an incendiary weapon derived from any form of thickened petroleum; the kind was immaterial; gasoline, kerosene or benzene would all suffice — officers no longer called it “napalm.” When questioned about the December 2001 Battle of Tora Bora in Afghanistan, for example, General Tommy Franks replied, “We’re not using — we’re not using the old napalm in Tora Bora.” Ferocious denials by U.S. officials during the 2003 invasion of Iraq, even in the face of bluntly contradictory reports by journalists, underlined the potency of the subject and echoed the vituperative reactions of governments elsewhere accused of napalm use.

---


133 For denials see “Napalm Close Up: Kuwait and Iraq, February to April, 2003” introduction to this chapter. For reactions of other governments to charges of napalm use see the “Soldier of Fortune” section of this chapter.
America’s attempt to hide its napalm in plain sight by changing the meaning of the word produced in short order an international political incident that embarrassed the government of its closest ally, Great Britain. Over a longer period of time, the policy created public confusion that played into the hands of its critics. In January 2005, expectation mounted in the U.K. that Prime Minister Tony Blair would soon call an election. Labour Member of Parliament Harry Cohen, an early and vociferous opponent of Blair’s war policy, chose that time to ask Armed Forces Minister Adam Ingram if Mark-77 firebombs had been used by Coalition forces in Iraq, and if the weapon was comparable to napalm. Politics appeared to be a primary motivation for the question since U.S. Navy officers had stated 17 months earlier that their forces had used Mark-77s. Ingram confirmed the firebombs were comparable to napalm but, remarkably, denied they had been used: “The United States have confirmed to us that they have not used Mark 77 firebombs, which are essentially napalm canisters, in Iraq at any time. No other coalition member has Mark 77 firebombs in their inventory.”

There the sensitive matter rested as British politics swirled. Blair announced on 5 April that a General Election would be held on 5 May. On 20 April, as Ingram later testified, the minister was “made aware” of evidence MK-77s had indeed been used in Iraq. He “sought clarification

---


136 BBC. “Blair sets 5 May as election date.” 5 April 2005: BBC.co.uk.
from the Pentagon,” and did not publicize the information. Blair was re-elected with a scant three percent margin in the popular vote, 35.3 to 32.3 percent of the total tally, and lost much of his majority in Parliament. Iraq war policy was a key issue.

Ingram reversed both elements of his earlier answer on 13 June, six weeks after the vote. In a letter to Labour Member of Parliament Linda Riordan, he now confirmed MK-77 firebombs had been used in Iraq, but denied they were comparable to napalm:

The U.S. destroyed its remaining Vietnam era napalm in 2001 but, according to the reports for I Marine Expeditionary Force (I MEF) serving in Iraq in 2003, they used a total of 30 MK 77 weapons in Iraq between 31 March and 2 April 2003, against military targets away from civilian areas. The MK 77 firebomb does not have the same composition as napalm, although it has similar destructive characteristics. The Pentagon has told us that owing to the limited accuracy of the MK 77, it is not generally used in urban terrain or in areas where civilians are congregated.

---


138 Michael White and Alan Travis. “Labour’s majority slides away.” 6 May 2005: Guardian.co.uk. See BBC. “Blair Wins Historic Third Term - Majority of 66.” 5 May 2005 rev. 9 September 2005: BBC.co.uk (35.3 to 32.3 percent).


An uproar ensured. War opponents, and foes of Blair, charged conspiracy. Officials pleaded incompetence, and bad information from their allies.\textsuperscript{141} Recriminations flew. On 24 June, the BBC reported:

> Defence Secretary John Reid said American officials in Baghdad had given the wrong information. He claimed it was ‘cock up’ not conspiracy. He told ITV’s Jonathan Dimbleby programme: “First of all, they didn’t use napalm. They used a firebomb. It doesn’t stick to your skin like napalm, it doesn’t have the horrible effects of that. Secondly, we have never used anything that even approximates to what they were using.”\textsuperscript{142}

Labour Member of Parliament Alice Mahon, who submitted the initial question jointly with Cohen, was outraged. “It is a ‘disgrace’ that British ministers say they did not know US forces had used napalm-style fire bombs in Iraq,” she told the BBC. “She said Mark 77 bombs were simply a more sophisticated version of napalm bombs which still ‘melt people,’” the broadcaster added.\textsuperscript{143} That the deployment was minuscule compared to previous wars — tens of bombs with thousands of pounds of napalm, versus thousands of tons of napalm in, for example, Vietnam — seemed immaterial: mere mention of its name conjured a terrifying bogey.

If “napalm” had no definition, its meaning could expand as well as contract. An extended debate over napalm use by U.S. troops during attacks on the Iraqi city of Fallujah in 2004 was a case

\begin{itemize}
\item[\textsuperscript{141}] In response to a Freedom of Information Act request submitted in July, the Ministry of Defence wrote “The information on which the earlier [January] assurances given to Parliament that MK 77 Firebombs had not been used was sourced direct from Baghdad. A UK official working in Baghdad contacted the Baghdad Combined Operations Centre asking for clarification of whether MK 77 Firebombs had been used in Iraq. A US Officer working in that centre provided the assurance that they had not. We understand that the assurance was given orally. That information was conveyed back to the UK by telephone conversation.” Susie Myatt to Michael Lewis. “Request for Information – incendiary bombs.” 2 August 2005: Ministry of Defence. 1. IraqAnalysis.org. See Colin Brown. “US Lied to Britain Over Use of Napalm in Iraq War,” 17 June 2005: The Independent. 25 January 2011: CommonDreams.org.
\item[\textsuperscript{142}] BBC. “Minister Slammed on Napalm Error.” 24 June 2005: BBC.co.uk.
\item[\textsuperscript{143}] BBC. “Minister Slammed on Napalm Error.” 24 June 2005: BBC.co.uk.
\end{itemize}
in point. In 2007, U.K. playwright Jonathan Holmes extrapolated from the media reports reviewed above to assert in his antiwar drama *Fallujah* that U.S. troops, in addition to the engagements at Safwan Hill and against bridges, had also used napalm in the city.\(^{144}\) This spectacular claim, combined with a celebrity cast, helped garner enormous publicity for the play during its London run.

“The denunciations of the United States are severe, particularly in the scenes that deal with the use of napalm in Falluja, an allegation made by left-wing critics of the war but never substantiated,” Jane Perlez wrote in a *New York Times* review.\(^{145}\) “Incendiary Weapons Are No ‘Allegation’” New York-based media monitor Fairness & Accuracy in Reporting (FAIR) responded a few weeks later in an Action Alert to its members.\(^{146}\) The group’s analysis conflated napalm, white phosphorus, and incendiary weapons in general.\(^{147}\) (White phosphorus is not generally considered an incendiary weapon under international law.)\(^{148}\) FAIR wrote: “If Perlez meant to say that the U.S. military had only confirmed the use of a napalm-like weapon elsewhere in Iraq, not in Fallujah, while the only

---


\(^{147}\) U.S. authorities first asserted white phosphorus had been used only for illumination at Fallujah, but later, when confronted with contradictory evidence from one of its own publications, admitted it had been used to drive enemy fighters from cover in a tactic nicknamed “shake and bake.” *New York Times.* “Shake and Bake.” 29 November 2005: [NYTimes.com](http://NYTimes.com).

\(^{148}\) “Thermite (or thermate) munitions, flame throwers, and napalm are incendiary weapons, but weapons with incidental incendiary effects, such as white phosphorus and small arms tracer ammunition, are not.” Parks. “Means and Methods of Warfare.” 2006: 38 *George Washington Int’l. Law Rev.* 521-22. General Peter Pace, chairman of the Join Chiefs of Staff, perhaps added to the confusion, and underlined how critical fine distinctions of nomenclature have become under intense public scrutiny, when he observed at a press briefing in response to the *Times* editorial, “White phosphorus … It is not a chemical weapon, it is an incendiary” (but not, briefers elaborated, an incendiary weapon as defined by Protocol III of the C.C.W.) U.S. Department of Defense. “Press Briefing (Nov. 29, 2005).” In American Society of International Law. “U.S. Defends Use of White Phosphorus Munitions in Iraq.” April 2006: 100 *The American Journal of International Law* 2. 487. [JSTOR.org](http://JSTOR.org).
incendiary weapon admitted to have been used in Fallujah was white phosphorus, then that’s a very slender technicality.” A 2005 documentary broadcast on Italian state broadcaster RAI Television News similarly mixed clips of napalm bombardments in Vietnam — including the attack that wounded Kim Phúc — with testimony about white phosphorus attacks in Fallujah, and echoed FAIR’s sweeping conclusion about napalm use. “Calling what was used in Fallujah ‘napalm’ may have greater emotional impact than calling it WP [white phosphorus]. Napalm raises images of Vietnam and, especially, that tragic 1972 photograph of a naked little girl, running down a street, screaming in agony from napalm burns,” observed New York Times Public Editor Clark Hoyt in an assessment of the controversy that was itself so complicated it required two lengthy columns to clarify even in part. “The war in Iraq has stirred up such passion that something very valuable is in danger of getting lost — facts,” he concluded.

149 Fairness & Accuracy in Reporting. “Incendiary Weapons Are No ‘Allegation.’” 11 June 2007: FAIR.org. In a follow-up alert, FAIR distinguished between napalm and white phosphorus — “WP [white phosphorus] is not napalm at all, which FAIR did not argue. Rather, the point was that a chemical agent with potentially lethal effects was used in a battle in a major Iraqi city” — but repeated its claim that the matter was a “slender technicality.” Fairness & Accuracy in Reporting. “NY Times Responds on Fallujah Weapons.” 20 July 2007: FAIR.org.


Extraordinary publicity still accompanies the barest mention of “napalm.” When an obscure “jihadist” group posted a crude “napalm recipe” on its website in May 2009, for example, CBS News highlighted the story on its Internet Terror Monitor service: “A group linked to the ‘Global Islamic Resistance’ called the ‘Abu Mus’ab al Suri Brigades,’ distributed a new seven-page illustrated document that suggested an easy recipe for the making of Napalm. The recipe says it can be produced using common household items, such as soap and sugar. The manual was distributed on several jihadi Internet forums today along with videos showing the kind of damage this destructive substance can cause.”

Reserving judgment

America ultimately determined its interest lay with the world, at least in theory, insofar as regulation of napalm and incendiary weapons was concerned. Its chief diplomat called the country to this judgment on 7 December 1996, a full 55 years after Japan’s attack on Pearl Harbor drew the nation into World War II and helped to produce napalm. “Certain military concerns” about Proto-

---

col III which had necessitated “further study by the interagency community” for 14 years, President Bill Clinton’s Secretary of State Warren Christopher announced, had been resolved.\(^\text{154}\)

Clinton and Christopher’s “resolution” was for the United States to sign the protocol but reserve the right to ignore it. “Incendiary weapons have significant military value, particularly with respect to flammable targets that cannot so readily be destroyed with conventional explosives,” Clinton wrote in his Letter of Transmittal to the Senate, perhaps with one eye on ongoing United Nations inspections for weapons of mass destruction in Iraq.\(^\text{155}\) “At the same time, these weapons can be misused in a manner that could cause heavy civilian casualties. In particular, the Protocol prohibits the use of air-delivered incendiary weapons against targets located in a city, town, village, or other concentration of civilians, a practice that caused very heavy civilian casualties in past conflicts,” the president continued. Therefore, he suggested a reservation:

The Executive Branch has … developed a specific condition that would, in our view, make it [Protocol III] acceptable from a broader national security perspective.

---


This condition consists of a proposed reservation that would reserve the right to use incendiaries against military targets located in concentrations of civilians where it is judged that such use would cause fewer casualties and less collateral damage than alternative weapons. A good example of this would be the hypothetical use of incendiaries to destroy biological agents in an enemy storage facility where explosive devices might simply spread the agents with disastrous consequences for the civilian population.\textsuperscript{156}

Defense Department attorneys suggested in accompanying commentary that efficiency might also be an appropriate reason to evade the law: “Certain flammable military targets are also more rapidly destroyed by incendiaries. For example, a fuel depot could require up to eight times the bombs and sorties to destroy using only high explosives rather than incendiaries. Such an increase means a significantly greater humanitarian risk of collateral damage.”\textsuperscript{157} As a general principle,


\textsuperscript{157} Department attorneys favored the term “proportionality:” “The United States must retain its ability to employ incendiaries to hold high-priority military targets such as these at risk in a manner with the principle of proportionality which governs the use of all weapons under existing law.” Department of Defense, Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics. “Tab (B). The Article-by-Article Analysis of Incendiary Weapons Protocol.” Message from the President of the United States Transmitting Protocols to the 1980 Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons …. 7 January 1997: Government Printing Office. 32-33: 3-4. C.C.W. Treaty_State.gov. Also at Department of Defense, Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics. “Article-by-Article Analysis of the Protocol on Prohibitions or Restrictions on the Use of Incendiary Weapons Annexed to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects (Protocol III).” Treaty Compliance. No Date: DoD.mil. As Parks observed in 1990, under certain circumstances commanders barred from using incendiary weapons may be forced to “employ artillery fire or an air-delivered high explosive munition that would be less accurate or more destructive than an air-delivered incendiary weapon, resulting in greater collateral civilian casualties or damage to civilian objects. Only time will tell whether the prohibition contained in Article 2(2) has increased protection for innocent civilians near military objectives.” Parks. “The Protocol on Incendiary Weapons.” 1990: 279 International Review of the Red Cross. 548.
Clinton wrote, America should reserve “the right to use incendiaries against military objectives located in concentrations of civilians where it is judged that such use would cause fewer casualties and less collateral damage than alternative weapons.”

Senators remained unconvinced. Protocol III languished before the Committee on Foreign Relations for the next decade. Republican George W. Bush followed the policy of his Democratic predecessor and supported ratification when he took office in 2001. Committee members, however, were equally bipartisan in opposition: Chairman Joe Biden of Delaware, a Democrat, made no more progress on incendiary weapons regulation when he led the committee from 2001 to 2003 than Republicans Jesse Helms of North Carolina or Richard Lugar of Indiana, who held the gavel for the rest of the period from 1997 to 2007. Barack Obama’s committee membership after January 2005, following his election as Senator from Illinois, made no apparent difference.

---


159 The U.S. Constitution requires that the Senate ratify treaties submitted by the President by a two-thirds vote. Government of the United States. Constitution of the United States. Article II. Section 2. No Date: Archives.gov.

160 U.S. Senate Committee on Foreign Relations. “History of the Committee.” U.S. Senate Committee on Foreign Relations. No Date: Senate.gov.

Nations united

As Washington meditated, the world moved. No fewer than 99 states had endorsed Protocol III by 1999.\textsuperscript{162} American diplomats found it increasingly difficult to negotiate within the C.C.W. framework because they could not commit to arguably its most important provision.

Moreover, vast coalitions of states and non-governmental organizations bypassed the United Nations entirely at the turn of the millennium to enact worldwide bans on land mines and cluster weapons. These agreements stood in pointed contrast to the inaction of the Convention on Certain Conventional Weapons signatories. An International Campaign to Ban Landmines, established in 1992, united international advocacy groups Handicap International, Human Rights Watch, medico international, the Mines Advisory Group, Physicians for Human Rights and the Vietnam Veterans of America Foundation.\textsuperscript{163} Just five years later, 156 countries — not including the U.S. — signed the 1997 Mine Ban Treaty.\textsuperscript{164} Protocol II of the C.C.W. was superseded, as a practical matter, for signatories. Campaigners shared the 1997 Nobel Peace Prize.\textsuperscript{165}

In the summer of 2006, news coverage of fighting between Israel and its opponents in southern Lebanon drew attention to the dangers of cluster munitions: weapons that scatter hundreds, or thousands, of bomblets or grenades, many of which do not explode until years later, over vast areas. A global coalition similar to that organized to take action against land mines produced an even more rapid response. In 2007, at a summit meeting in Oslo, Norway and 46 other states,


\textsuperscript{163} International Campaign to Ban Landmines. “Campaign History” No Date: ICBL.org.

\textsuperscript{164} International Campaign to Ban Landmines. “States Parties” No Date: ICBL.org.

\textsuperscript{165} International Campaign to Ban Landmines. “About us.” No Date: ICBL.org.
supported by a Cluster Munitions Coalition of more than 350 non-governmental organizations, called for a new treaty to ban the weapons. A remarkable 107 countries — again not including the U.S. — signed the Convention on Cluster Munitions in Dublin on 30 May 2008. United Nations Secretary-General Ban Ki-moon called it “a major advance for the global disarmament and humanitarian agendas.” The convention came into force under international law on 1 August 2010. CCM participants, who had not yet even drafted a cluster weapons protocol, found themselves preempted.

“America stands for something.”

U.S. politicians rediscovered an interest in Protocol III as the campaign against cluster weapons accelerated. In February 2007, as diplomats in Oslo launched their initiative, George W. Bush

---

166 Cluster Munition Coalition. “What is the Cluster Munition Coalition.” No Date: StopClusterMunitions.org. “Cluster munitions are large weapons which are deployed from the air and from the ground and release dozens or hundreds of smaller submunitions. Submunitions released by air-dropped cluster bombs are most often called ‘bomblets,’ while those delivered from the ground by artillery or rockets are usually referred to as ‘grenades.’ … [T]heir widespread dispersal means they cannot distinguish between military targets and civilians so the humanitarian impact can be extreme … Many submunitions fail to detonate on impact and become de facto antipersonnel mines killing and maiming people long after the conflict has ended. Cluster Munition Coalition. “The Problem.” No Date: StopClusterMunitions.org.


170 In 2008, 97 countries and 10 non-governmental groups gathered in Geneva to discuss expanding the C.C.W. to cover cluster weapons (a total of 104 countries had declared their support for the Cluster Weapons Convention’s comprehensive ban at the time) but reached no conclusion. Jeff Abramson. “Senate Mulls C.C.W. Edits; Cluster Munitions Debated.” May 2008: ArmsControl.org.
placed the protocol on his administration’s annual treaty priority list.¹⁷¹ In August, the American Bar Association, voice of the U.S. legal establishment, made its passage official policy of the association, and threw its lobbying weight behind it. “U.S. ratification would further the United States’ humanitarian objectives without compromising the appropriate use of important military technologies,” the lawyers wrote.¹⁷² Finally, more than a decade after Clinton first submitted the protocol to the Senate, and as representatives from across the globe made plans to depart for the cluster weapons signing ceremony in Dublin, Foreign Relations Committee staffers convened the first hearings on legal controls for U.S. incendiary weapons on 15 April 2008.¹⁷³

Testimony was a legalistic marvel. On the one hand, participants asserted Protocol III would have no immediate impact because America already complied with its terms. “U.S. ratification of these treaties will not change U.S. military practice in any way, shape, or form. Let me repeat that. Our military already complies in practice with all five treaties before this committee today. Formal U.S. ratification of these treaties would do nothing — nothing to change or alter our current military practices,” Pennsylvania Senator Robert Casey, who chaired the hearing and was the only

¹⁷¹ Jeffrey Berger, Assistant Secretary of State for Legislative Affairs, United States Department of State. “Letter to the Honorable Joseph R. Biden, Jr., Chairman, Committee on Foreign Relations, United States Senate.” 7 February 2007: State.gov.


senator to attend, said in his opening statement. “[T]hese measures are already consistent with U.S. practice,” agreed State Department Legal Advisor John Bellinger. Indeed, Department of Defense Deputy General Counsel for International Affairs Charles Allen observed that Protocol III “reconfirms the legality of military use of incendiary weapons for targeting specific types of military objectives.” Ratification, he suggested, would “provide clearer support for U.S. practice, given past controversies surrounding incendiary weapon use.”

Any potential future impact, witnesses asserted, could be circumvented by the suggested reservation. “In this reservation, we would reserve the right to use incendiary weapons against military objectives, but only where it is judged that such use would actually reduce the risk of civilian and friendly force casualties and collateral damage than alternative,” Allen observed. As further protection, Bellinger recommended a further “understanding” that “U.S. military personnel cannot be

---


judged on the basis of information that subsequently comes to light” be attached to the protocol:

Any decision by any military commander, military personnel, or any other person responsible for planning, authorizing or executing military action shall only be judged on the basis of that person’s assessment of the information reasonably available to the person at the time the person planned, authorized, or executed the action under review, and shall not be judged on the basis of information that comes to light after the action under review was taken.

This language, related “minor concerns that relate to ambiguities in the language of the treaty,” was “entirely consistent with the goals of the convention,” the legal advisor told senators

On the other hand, witnesses argued ratification would realign the U.S. with global norms, strengthen its international relations, and improve the chances cluster munitions could be regulated under the C.C.W. — rather than banned under the Cluster Weapons Convention, which the U.S. rejected. “[F]ormal Senate approval and entry into force by the United States will set an important example and bolster U.S. leadership when it comes to promulgating universal adherence to law of war treaties. It is difficult for the United States to persuade other nations to adhere to humanitarian and cultural practices when we refuse to formally join the types of treaties that are before the committee today … and will allow us to participate fully in relevant international meetings

---


on the implementation of these treaties,” Casey said.  

“Becoming a party to these treaties also will significantly strengthen our negotiating leverage and our credibility in our work on other law of war treaties, to the extent that other States ask why they should cede to U.S. positions if we do not ratify those treaties after they do so,” Bellinger testified. He elaborated:

“[W]e go into these negotiations, people listen to us, they change their positions in response to the United States because they think we’re doing the right thing. But, if we then never ratify, ourselves, they sort of feel we’ve pulled the football away and it does mean that, the next go-round, they are going to be less likely to compromise. And all of us have heard that in negotiations, where we say, ‘Would you please change the language in this provision?’ and they’ll say, ‘Well, we think you’re right, it makes sense to me, but, you know, last time you asked us to change something, you said, if we change that, then you would become a party, but then you don’t.’ So, the credibility that comes to the United States not only with doing a good job in the negotiations, but then, essentially keeping our faith with the expectations, is very important for us to go forward with these treaties in order to maintain that leadership position in the world.”

---


Bellinger and Allen elaborated: “[T]he current draft of the Oslo text would significantly complicate cooperation between the militaries of State Parties and non-State Parties in missions in which the use of cluster munitions may be effective and appropriate. Regardless of the outcome of the Oslo process, the C.C.W. is better positioned to take effective steps to address the humanitarian concerns associated with the use of cluster munitions in a context that recognizes their military value.” John B. Bellinger and Charles A. Allen. “Responses of Legal Adviser John Bellinger and Deputy General Counsel Charles Allen to Questions Submitted for the Record by Senator Casey.” Christopher Dodd. “XIII. Annex II. — Treaty Hearing of April 15, 2008.” An Amendment and Three Protocols to the 1980 Conventional Weapons Convention. 11 September 2008: U.S. Senate Exec. Report 110-22. 42. FAS.org.
“America stands for something,” concluded Joint Chiefs of Staff senior strategist Brigadier General Michelle Johnson.183

Committee members agreed. They voted without dissent to report Protocol III favorably to the Senate, subject to Clinton’s reservation and the proposed understanding, on 29 July 2008.184 Committee members, echoing Bellinger’s argument, stressed the importance of U.S. credibility in a global community in the report that accompanied the measure to the Senate floor: “Joining these treaties would put the United States in a better position, however, to persuade other countries to adhere to humanitarian practices in armed conflict. Moreover, U.S. ratification is important because the United States loses credibility when it does not formally become a party to the very treaties it has championed.” In a possible nod to potential future C.C.W. cluster weapon discussions, they observed “U.S. ratification would set an important example and would make it possible for

---


U.S. officials to participate fully in relevant international meetings regarding, for example, the implementation of these treaties.”\(^{185}\)

Senators unanimously ratified Protocol III, without debate, on 23 September 2008, along with 77 other treaties — the largest number of international accords approved by the Senate on a single day since 1910.\(^{186}\) Law of war pacts among the agreements, including the Protocol III accord, represented “a renewed effort to assert U.S. leadership in the international community on law of war matters. They are also an example of the U.S. Government’s public diplomacy efforts to portray the U.S. military as a law-abiding member of the international community,” Special Assistant to the Army Judge Advocate General for Law of War Matters Dick Jackson declared in the Army Lawyer journal, produced at Army headquarters. Ratification, he continued, “helps restore U.S. leadership in the law of war.”\(^{187}\)

President Obama signed the treaty into law on 21 January 2009, his first full day in office.\(^{188}\) He offered no comment, and traditional news media gave no coverage to the accord. Perhaps the highest profile mention of the event was on the Undiplomatic blog of former diplomat and human rights worker Charles J. Brown. He echoed Jackson’s assessment — albeit in far more pointed lan-

---


\(^{188}\) Obama also approved the other C.C.W. Protocols which the U.S. had not yet endorsed — IV, on “blinding laser weapons,” and V, on the “explosive remnants of war” — an endorsed an amendment to the convention that expanded its scope to “non-international armed conflicts.” U.S. Department of State. “Media Note: ‘U.S. Joins Four Law of War Treaties.” 23 January 2009: [State.gov](http://state.gov).
guage — in a post appropriately titled “Most Underreported Story of the Week: CCW.” Brown wrote, “[T]his is yet another repudiation of Bush. The Convention is an annex to the Geneva Convention, one largely uncontroversial outside of the Cheney-Bolton-Whack-job wing of the Republican Party. This represents not merely a willingness to work within existing international norms, but also a promise to adhere to the laws of war — a view with which the Bushies [were] vehemently (and notoriously) disagreed. Somewhere, John Bolton and David Addington are developing facial tics.” A total of 107 countries had approved Protocol III by the end of 2010. Law had finally caught up with napalm in the country of its birth, at the age of 66.

A debatable proposition

Or had it? After an initial period of silence, perhaps a result of the lack of news coverage, the European Union body charged with overseeing C.C.W. issues raised concerns in December about the U.S. “reservation and understanding” attached to Protocol III. Under the 1969 Vienna Convention on the Law of Treaties, nations are deemed to have accepted reservations they do not object to within 12 months. The UN’s depositary notification for America’s reservation was dated 5 February 2009. After a “whirlwind of correspondence,” according to one European diplomat, 17

---


192 Article 20(5): “[A] reservation is considered to have been accepted by a State if it shall have raised no objection to the reservation by the end of a period of twelve months after it was notified of the reservation or by the date on which it expressed its consent to be bound by the treaty, whichever is later.” United Nations. Vienna Convention on the Law of Treaties. 1969: UN.org.
states, including France, Germany, Spain and the United Kingdom, filed objections between 1 and 5 February.\textsuperscript{193}

Complaints asserted a range of legal and diplomatic principles. France observed that because of its reservation, “despite the assurances given by the United States of America, it cannot guarantee the protection of civilians, which is the \textit{raison d’être} of the Protocol.” Germany objected to the understanding that “would leave the decision of whether or not the respective norms of the Protocol should be applied to the discretion of a military commander.” Britain offered only “to consider the U.S. position as not counter to the object and purpose of the treaty if it could be interpreted narrowly enough.”\textsuperscript{194}

Nonetheless, all of the European nations, with the exception of Denmark, allowed Protocol III to come into effect between their states and the United States, subject to their objections. Denmark’s ambassador commented only that her country, despite its complaints, “has not expressed any intention precluding the entry into force of Protocol III.”\textsuperscript{195}

Thus, confusion reigns. Some states assert that America as a matter of law is bound by the terms of Protocol III as written, whatever its unique national reservations, understandings and declarations. Others maintain that the U.S. interpretation of the treaty will be adopted by others over time, and therefore “means that use of incendiary weapons in civilian areas is not completely forbidden anymore.”\textsuperscript{196}

A verdict on napalm appears to have been rendered in the court of global public opinion, and perhaps also under international law. American leaders, despite gestures of acceptance, have yet fully to acknowledge either.
CONCLUSION

Napalm’s invention is a story of scientific discovery as old as American ingenuity and as modern as the military-academic complex: relatively obscure Harvard chemists with a few million dollars created a weapon in a Cambridge, Massachusetts basement that annihilated dozens of Japanese cities three years later, and helped win World War II. Their achievement is especially remarkable when compared to the contemporaneous Manhattan Project, managed by some of the world’s most celebrated scientists, that cost tens of billions of dollars, took longer, and destroyed fewer cities.

After 1945, napalm’s power gave it, like America, worldwide influence. Governments in Greece, Korea, Cuba, Israel, Peru, Bolivia, and many other countries, often armed by the United States, bombarded their opponents with the gel to devastating effect. Criticism, if it occurred at all, was fleeting.

Vietnam changed this paradigm. For the first time, napalm’s horrific effects on civilians, especially children, received sustained national attention in the United States. A grass-roots protest movement against the incendiary that began in 1965 and spread to campuses across the country, linked weapon, war and nation so effectively, and received such wide publicity, that napalm came to symbolize for many all that was objectionable about U.S. involvement in Vietnam. The 1972 “The Terror of War” photograph of nine-year-old Kim Phúc, burned naked as she ran to escape fighting, became an icon. America’s defeat in 1975 took napalm’s reputation with it.

Cultural arbiters, particularly Hollywood film-makers, broadcast the message conceived by activists and students across the country and around the world. Movies, songs, artworks, books and articles produced during and after the Vietnam War made napalm a global synonym for
American brutality. Diplomats and international lawyers, who initially showed little interest in the
gel, contributed to the process. Starting in the early 1970s, they convened conferences and drafted
rules to limit deployment of napalm and other incendiary weapons. United Nations delegates
adopted many of their proposals in 1980. Development of alternate weapons that accomplished
tasks once assigned to napalm eased acceptance of the new strictures by military commanders.
President Barack Obama, after decades of national prevarication, committed the United States to
this global consensus, subject to an extensive reservation, on 18 January 2009.

Napalm is rarely used today, despite its utility, and its use is denied by those who do deploy it.
World War II’s “best weapon used in the Pacific” has become The Weapon That Dare Not Speak Its
Name. America, history’s most prolific user of napalm, dropped about 17,000 tons of the gel on
Japan, 32,500 tons on Korea, and perhaps 400,000 tons on Vietnam — but used just 30 napalm
bombs, that collectively weighed 11 tons, on Iraq in 2003.1 And Pentagon officials denied that they contained “napalm.”2

Unlike poison gas, expanding bullets, and other forbidden weapons of war, international law permits the use of napalm against combatants. Law of war expert W. Hays Parks summed up recent thinking as follows: “[G]overnments have been more willing to promulgate protections for civilian populations than they have been to determine that a weapon causes ‘unnecessary suffering’ in its lawful employment against enemy combatants.” He elaborated, “Governments have not found that particular weapons cause unnecessary suffering or have indiscriminate effects as such. Any weapon may be used illegally. A criminal act does not make the weapon illegal. Similarly, virtually any weapon has the potential to be used in an indiscriminate manner. That does not make the

---

1 Japan: “Brave new world” section of Chapter II. Korea: “Cooking oil” section of Chapter III. Vietnam: Clodfelter. *Warfare and Armed Conflicts*. 2nd Ed. 2002: McFarland & Co. 784. (“U.S. and South Vietnamese aircraft dropped 400,000 tons of napalm (making up 10% of all munitions expended by fighter-bomber sorties during the war). This compares to 14,000 tons dropped by American aircraft in the Second World War (two-thirds of it in the Pacific Theater) and 32,557 tons dumped out onto the hills of Korea, 1950-53.”). See “People have this thing about being burned to death” section of Chapter IV (some data suggest significantly more napalm was used during the Vietnam War: perhaps twice as much, when deployments by South Vietnamese forces are combined with those of the U.S.). See also “The Weapon That Dare Not Speak Its Name” section of Chapter VII (the 30 MK-77 bombs British Armed Forces Minister Adam Ingram said the U.S. used in Iraq in 2003 weighed 750 pounds each: 11.25 tons in total).

2 The U.S. deployments in Iraq appear to be the most recent use of napalm in battle. Sudan, a pariah nation whose leader is the first sitting head of state indicted by the International Criminal Court, may, however, have deployed an improvised form of the munition more recently (it too denies that it uses “napalm.”) See Eric Reeves “Sudan and the US Sudan Peace Act.” 8 October 2002: SudanReeves.org. (“The use of napalm-loaded barrel bombs dropped from high-flying Antonov bombers would be a continuation of the indiscriminate aerial assaults on civilians throughout the areas of conflict in southern Sudan. Napalm, at least in its cruder forms, is easily manufactured using gasoline and rubber/tire parts with a detonator. The effect is thoroughly indiscriminate, burning everything in a radius extending from bomb’s point of impact. Given the notorious inaccuracy of Antonovs (retrofitted Russian-built cargo planes from which barrel-bombs are simply rolled out the back cargo bays), these napalm bombs are yet another means of civilian terror.”)
weapon indiscriminate as such, nor lead to the conclusion that the weapon has ‘indiscriminate effects.’”³

Critics of incendiary weapons lament this status quo. As early as 1958, one year before he was awarded the Nobel Peace Prize, Philip Noel-Baker observed, “If there is to be any disarmament worthy of the name, the fire weapons must be abolished. Their manufacture, and the training of troops to use them, must be wholly prohibited. These prohibitions can be made effective by the same machinery of inspection and control that is required to enforce the abolition of poison gas.”⁴ No significant movement for battlefield regulation of napalm, however, has developed.⁵

Behind the broad themes of this history lie poignant personal stories. Napalm’s prime mover, Louis Fieser, saw his public image damaged as opinion turned against his creation. “We thought you were a great guy, and now you’re a bum,” he summarized his correspondence in a 1967 comment to The New York Times.⁶ This assessment is an over-simplification. Toward the end of his life, the renowned scientist wrote that he considered teaching his greatest achievement, and generations of students applauded his pedagogy. He co-authored best-selling textbooks that explained chemistry to legions of pre-medical students and researchers. Through his laboratory work, he elu-

---


⁴ Noel-Baker. The Arms Race. 343.


cidated processes important to contemporary medicine. Fieser unwaveringly asserted that he and his colleagues envisioned that napalm would be used against things, not people, and certainly not “babies and Buddhists.” He likened his laboratory work to the role of a gun manufacturer, and denied culpability for unanticipated uses of his creation. Kim Phúc, for one, agreed in principle. “The rules comes from the people who are using it,” she said of napalm: “A knife can be used for good, in the hands of the people who are using it. If you are using that to destroy people, it is so wrong. So terrible, so evil.” This argument, however, is hard to square with Fieser’s participation in incendiary experiments on Indiana farm houses and replicas of German and Japanese residences in 1942. “It is difficult to imagine what happens when 42 lbs. of burning gel is plastered all over the inside of a sturdy wooden barn: flames bursting out of the windows, blasting open the door, belching forth at the eaves and then through the roof. In a matter of minutes what remained of the structure collapsed into a burning heap,” he wrote of his July observations at the Jefferson Proving Ground in Indiana. Difficult though it may be to picture such a scene, Professor Fieser needed no imagination.

At the other end of napalm’s arc, historian Bruce Cumings interviewed Korean Pak Jong Dae in Pyongyang in the summer of 1989 for Thames Television. A direct hit from napalm caught Pak, and about 20 other members of a North Korean bridge repair crew, almost 40 years earlier during the war. He was the sole survivor. Burns left him no face, just a scar stitched together by dozens of operations, one good eye, and damaged lips that slurried his words. A shrunken claw with bent fingers fused to scar tissue served for a hand. He carried himself, Cumings wrote, with “a curiously

---

7 28 April 2011: interview with the author.

8 Fieser. The Scientific Method. 50-51.
proud sort of politeness and humility.” Pak said, “Everybody has his youth which is precious and important. … My youth has gone with thirty-six operations. I had a lot of laughter and hopes for the future. I had two hands with which I could play the accordion. All these the bomb took away from me … I do not think there should be any more victims like me in this world. Never again. Never in this world a victim like me.” Thames put this statement at the end of its broadcast. Boston public television station WGBH dropped it, without explanation, when it showed the documentary.10

Kim Phúc — she translates her name as “Golden Happiness” — became napalm’s best known victim. In a 2011 interview from Toronto, where she defected from Vietnam with her husband in 1992, she said the only way forward for victims of napalm is through forgiveness:

As a little girl, do you think I deserved that? I was nine. I knew nothing about war. I knew nothing about pain. But then suddenly that bomb dropped.

I grew up for a long time with hatred, and anger, and bitterness. Even now, speaking with you, I still have the pain, on my back. I got really deep burns, they burned to the bone. My challenges are every day, whenever the weather changes.

I really hated my life, and I hated everyone who caused my suffering. Even the people who were normal, I hated them. I was envious of them. Especially other girls. I felt that I was an ugly girl. I never thought that I would get married, have a boyfriend, or a child. That is more important than that I deal with scars on my body.

The doctors and nurses mended my skin, but inside another napalm burned within me. Medication could not help. Doctors could not help. No one could help me heal my heart from hatred, from anger.

She continued:

All that suffering led me to the point that I wanted to die. But I couldn’t die. But it was so hard to live with that hardship. Deep down, I was seeking to a purpose for


my life: why I didn’t die, and why I have to suffer. Why am I alive like that, with hatred and anger and bitterness. Then I found in the Bible that it said “love thy enemy.”

Finally, I turned my back to pray for my enemies who caused my suffering. The more I prayed for my enemies, the softer my heart became. I had cursed them to death. But now I am not doing that any more. I pray for them. All the hatred is gone. I just live. I count my blessings. I forgive those who caused my suffering. When I learned that lesson about forgiveness, my heart was soft. I felt like I was free. It was like heaven on earth for me.

Of the present, she said:

My physical [sic.] is still have a lot of scars. Of course, the pain comes back very often. But in my heart, I feel there are no more scars on my heart. No more hatred. I feel so great. I got the answer, why that little girl, nine years old, is still alive. I am so grateful God has let me be alive. God has let me learn. Now I count every single minute in my life to be a blessing. Faith and forgiveness are much more powerful than napalm could ever be.11

Kim Phúc’s older son, Thomas, is 17, her second, Stephen, is 13. She manages the Kim Foundation International to aid child victims of war.12

Napalm’s civilian victims have been heard. Antipathy to the sticky incendiary that burns to the bone, defined by American activists and students, confirmed by the U.S. experience in Vietnam, publicized by Hollywood and other image makers, and codified by international law, is so strong the social costs of its deployment now outweigh its lethal advantages in most cases. America’s

11 28 April 2011: interview with the author. See Kim Phuc. “The Long Road To Forgiveness.” 30 June 2008: This I Believe. NPR.org (“If that little girl in the picture can do it, ask yourself: Can you?”). See also Omara-Otunnu. “Napalm Survivor Tells of Healing After Vietnam War.” University of Connecticut Advance. 8 November 2004: Advance.UConn.edu. (“In 1996, during a Veterans Day ceremony in Washington, D.C., Phuc met a former pilot who helped coordinate the airstrike on her village. The two embraced and she told him she forgave him. They have stayed in touch.”)

commanders, like those of virtually every nation, find themselves increasingly constrained in their use of one of their most formidable weapons.
BIBLIOGRAPHY


Bell, Daniel. *The First Total War: Napoleon’s Europe and the Birth of Warfare as We Know It.* 2007: Houghton Mifflin.


Bohning, James J. “Interview with Hoyt C. Hottel at Massachusetts Institute of Technology. 17 November and 2 December 1995.” *Oral History Transcript #0025.* 2010: Chemical Heritage Foundation.

Bond, Horatio, ed. *Fire and the Air War: A compilation of expert observations on fires of the war set by incendiaries and the atomic bombs, wartime fire fighting, and the work of the fire protection engineers who helped plan the destruction of enemy cities and industrial plants.* 1946: National Fire Protection Association International.


Fincher, David. Fight Club. 1999: Twentieth Century Fox Film Corporation.


Garrow, David J. *Bearing the Cross: Martin Luther King, Jr., and the Southern Christian Leadership Conference.* 1986: William Morrow. 543


__________. Hague Convention. “Convention With Respect to the Laws and Customs of War on Land.” 18 October 1907: Avalon.Yale.edu. In Bevans, Charles I., Comp. *Treaties and Other In-


Hersh, Seymour M. Chemical and Biological Warfare: America’s Hidden Arsenal. 1968: The Bobbs-Merrill Company.


__________. The Bay of Pigs. 2008: Oxford.


Melman, Seymour, Dir. of Research, Clergy and Laymen Concerned About Vietnam. In the Name of America: The conduct of the war in Vietnam by the armed forces of the United States as shown by published reports Compared with the Laws of War binding on the United States Government and on its citizens. January 1968: The Turnpike Press.


Rust, Kenn. C. *Twentieth Air Force Story ... In World War II*. 1979: Historical Aviation Album.


Silber, Glenn and Barry Alexander Brown, Dir.s and Prods. The War At Home. 1979: Catalyst Media.


