



## **Memorandum to Convention on Conventional Weapons Delegates The Human Suffering Caused by Incendiary Munitions**

**Human Rights Watch and Harvard Law School's International Human Rights Clinic  
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### **Introduction**

Although the drafters of Protocol III to the Convention on Conventional Weapons (CCW) sought to reduce the human suffering associated with incendiary munitions, armed forces continue to use them at great cost to civilians. In a November 2010 memorandum to CCW delegates, Human Rights Watch and Harvard Law School's International Human Rights Clinic (IHRC) called on states parties to revisit Protocol III to address this concern. States parties should amend the protocol's language to make it more effective in addition to ensuring compliance with its rules and increasing efforts to universalize the protocol.<sup>1</sup> This memorandum supplements the November one by elaborating on the facts motivating our call for better law: incendiary munitions cause horrific injuries and death and have been used repeatedly since the adoption of Protocol III in 1980.

Protocol III allows ongoing use of incendiary munitions in ways harmful to civilians due to definitional loopholes and narrow regulations. Its definition, which looks only at the primary design of a munition, fails to cover some incendiary munitions, such as white phosphorus, that are not "primarily designed" as weapons yet cause unacceptable civilian harm. In addition, the protocol's key regulations apply only to use in populated areas and are weaker for ground-launched than for air-dropped models.<sup>2</sup>

Regardless of their type, targeting, and delivery mechanism, however, incendiary munitions cause cruel and lasting injury to people as well as start fires that can destroy property. The

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<sup>1</sup> Human Rights Watch and Harvard Law School International Human Rights Clinic (IHRC), *Memorandum to Convention on Conventional Weapons Delegates: The Need to Re-Visit Protocol III on Incendiary Weapons*, November 2010, <http://www.hrw.org/en/news/2010/11/22/memorandum-ccw-delegates>.

<sup>2</sup> In their November 2010 memorandum, Human Rights Watch and IHRC presented several options for amending Protocol III including adopting an effects-based definition and banning or more strongly regulating the weapons. *Ibid.*, pp. 9-10.

munitions produce exceptionally painful thermal and respiratory burns, which can lead to complications such as shock, infection, and asphyxiation. People who survive often suffer long-term physical and psychological damage.

While more than 180 models of incendiary weapons exist,<sup>3</sup> the effects of those with two types of chemical substances—napalm<sup>4</sup> and white phosphorus—exemplify the specific humanitarian problems this class of weapons presents. This memorandum details the harm they cause and examines cases of past use. A sticky substance, napalm spreads and continues to burn as victims try to wipe it off their skin and their clothing. Despite Protocol III, which was largely a response to the horrors of napalm in the Vietnam War and other conflicts, states and non-state armed groups continue to use it. Argentina, El Salvador, Libya, Russia, Serb nationalists, and Turkey, among others, have reportedly used napalm since adoption of the protocol. These cases highlight the need for a stronger protocol that better stigmatizes the munitions as well as for renewed universalization efforts.

The most controversial incendiary munitions today are those containing white phosphorus. These munitions often have a broad area effect, which increases the risk of their being used indiscriminately. They also cause particularly severe injuries, including burns that penetrate to the bone and can reignite days later, and produce poisoning that leads to organ failure and death. Armed forces have defended certain white phosphorus munitions as necessary items for battlefield obscuring, marking and signaling, and illuminating. White phosphorus used in Afghanistan, Gaza, Iraq, Lebanon, and Somalia, however, has killed and seriously injured numerous civilians.

Treaties generally impose regulations or bans on munitions for one of two reasons. The munitions may cause serious injury and unnecessary suffering, that is they are excessively cruel to humans. Alternatively, or in addition, they may be indiscriminate, that is they fail to distinguish between combatants and civilians. When reviewing Protocol III, states should take into account the humanitarian concerns incendiary munitions raise under each of these categories and consider how best to address them.

## The Harmful Effects of Incendiary Munitions

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<sup>3</sup> See generally Leland S. Ness and Anthony G. Williams, eds., *Jane's Ammunition Handbook 2007–2008* (Surrey, UK: Jane's Information Group Limited, 2007); and Duncan Lennox, ed., *Jane's Air Launched Weapons* (Surrey, UK: Jane's Information Group Limited, 1999).

<sup>4</sup> This paper is using the term napalm to refer to weaponized flammable liquids, which will be described in more detail below.

Incendiary munitions may contain any of a number of chemical compounds, such as napalm, white phosphorus, thermite, and chlorine trifluoride, and can be used for a variety of purposes. Some incendiaries are designed to burn materiel and personnel, others are meant to penetrate plate metal, and still others are intended to create smokescreens or to provide illumination. Despite these differences, incendiary munitions share one characteristic: they burn at a very high temperature. As a result, whatever the type, incendiary munitions pose grave risks to civilians.

Incendiary munitions can cause thermal and chemical burns, respiratory damage, shock, asphyxiation, and carbon monoxide poisoning, often leading to a slow death. Victims who survive their initial injuries may suffer from intense pain, severe infections, organ failure, lowered resistance to disease, lifelong deformity and disability, psychological trauma, and an inability to reintegrate into society.

### *Thermal Burns*

Incendiary munitions can produce serious thermal burns through the action of their chemical agents or through secondary fires. Severe burn injuries have been called “the greatest trauma to which the body can be exposed,” in part because the affected skin is a vital organ.<sup>5</sup> Usually extremely painful, burn injuries are also typically slow to heal and difficult to treat, especially in war zones lacking adequate medical facilities for civilian casualties. Recovery often takes weeks or months, and daily changing of dressings can be extremely painful. Many victims die, and those who survive are left physically and psychologically scarred.<sup>6</sup>

Incendiary munitions produce burns of all sorts, but their burns can reach the level of fourth or fifth degree because of their extreme depth and coverage. Such burns go beyond destroying the skin, which in itself can leave terrible scarring and deformities. Fourth- and fifth-degree burns involve extreme damage to the muscles, ligaments, tendons, nerves, blood vessels, and even bones.<sup>7</sup>

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<sup>5</sup> Stockholm International Peace Research Institute, *Incendiary Weapons* (Cambridge, Massachusetts: The MIT Press, 1975), p. 136 (quoting G. Liljedahl Birke, “Studies on burns: XV,” *Acta Chirurgica Scandinavica*, Supplement 422 (1971) p. 5).

<sup>6</sup> UN Department of Political and Security Council Affairs, “Napalm and Other Incendiary Weapons and All Aspects of Their Possible Use,” Report of the Secretary-General, A/8803/Rev.1, 1973, p. 30.

<sup>7</sup> *Ibid.*, p. 31. First-degree burns, such as mild sunburn, affect the epidermis—the outer layer of skin. Second-degree burns, such as those caused by a splash of boiling water, reach below the outer layer of skin to damage the dermis underneath, often causing blisters. Third-degree burns destroy the full thickness of skin, including nerve endings, hair follicles, and sweat glands. Underlying fat and muscle tissue can coagulate, leaving terrible scarring and deformities.

While incendiary munitions can cause significantly worse injuries, even third-degree and deep second-degree burns on just 10 to 15 percent of the skin's surface can profoundly affect the entire body. Effects include shock, irregular circulation, and severe infection of the burn area, which can carry over to other parts of the body. Burn victims often experience a loss of appetite, exacerbating their weakened state. The resulting malnutrition can be extreme, especially where medical facilities are rudimentary or lacking. Deep burns will heal only after removal of dead tissue through surgery or natural processes.<sup>8</sup>

### *Respiratory Damage*

Incendiary munitions are likely to cause not only thermal burns but also respiratory injuries resulting from heat and smoke. Inhalation of hot gas and combustion products can cause respiratory burns and other pulmonary complications including inhalation injuries, pneumonia, and the accumulation of fluid in the lungs.<sup>9</sup> Victims may choke on the swelling and inflammation of their respiratory passages or be unable to breathe because of damage to the lungs or other tissues. Damage to the respiratory tract can further lead to severe infection. Incendiary munitions often produce carbon monoxide and other noxious gasses, and victims can die from carbon monoxide poisoning. Smoke inhalation can cause additional long-term respiratory problems. These dangers are more severe when incendiaries are used in confined spaces.

### *Long-Term Effects and Permanent Damage*

Burn injuries from incendiary munitions often cause lasting physical and psychological disabilities. Permanent physical damage can include loss of function in the hands due to intense scarring and damage,<sup>10</sup> contractures (restriction of underlying muscles and joints by superimposed scars or inadequate grafts), and loss of strength and activity. Less tangible damage includes psychological trauma and an inability to assume former roles in society.<sup>11</sup> The burn event itself is often prolonged and especially painful. Treatment of severe pain with drugs can result in dependency and later withdrawal symptoms. Isolation during treatment, and being forced to “confront ... the sight of one’s own naked and burned body ... and the

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<sup>8</sup> UN Department of Political and Security Council Affairs, “Napalm and Other Incendiary Weapons and All Aspects of Their Possible Use,” p. 32.

<sup>9</sup> Stockholm International Peace Research Institute, *Incendiary Weapons* (Cambridge: The MIT Press, 1975), pp. 142-43.

<sup>10</sup> UN Department of Political and Security Council Affairs, “Napalm and Other Incendiary Weapons and All Aspects of Their Possible Use,” p. 35. Hands suffer particular damage from napalm because, as discussed below, victims try to wipe the sticky substance off their body.

<sup>11</sup> Stockholm International Peace Research Institute, *Incendiary Weapons*, p.146.

stench of one's own rotting flesh" can be particularly horrifying.<sup>12</sup> Victims sometimes find that they are socially shunned because of their severe scarring and disfigurement, which can lead them to withdraw from society. For those able to afford it, reconstructive surgery can take years and often involves the painful process of harvesting skin from healthy areas of the body to graft onto burn sites.

## Napalm

Napalm is perhaps the best known incendiary substance. The shocking consequences of its use after World War II were major factors motivating the adoption of Protocol III. The continued use of napalm highlights the need for a stronger and more widely universalized legal instrument on incendiary munitions.

### *The Munitions and The Harm They Cause*

The term napalm covers various thickened or gelled flammable liquids used in military applications.<sup>13</sup> While often dropped in bombs, napalm can be ground launched by weapons such as flamethrowers.<sup>14</sup> Although differences in chemical composition make modern types of napalm easier to use, all forms are similar in function and in effects on people. Napalm is sticky and is delivered in large globs over a target area. The burning substance clings to skin and clothing, and victims are likely to spread it over their bodies, particularly onto their hands, as they try to wipe it off.

Napalm creates terrible suffering for its victims. Immediate deaths usually result from systemic hyperthermia (overheating of the blood), or from asphyxiation due to lung or airway injury or to oxygen starvation after the burning napalm exhausts the oxygen in an enclosed space. As with victims of other burn injuries, those who survive initial contact with napalm are at serious risk of dying from shock, malnutrition, infection, and respiratory complications after they have been treated. Burn injuries in survivors are most prevalent on the unclothed areas of the body—hands, feet and legs, and head and face—and the thin layer of tissue on

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<sup>12</sup> *Ibid.*, p. 149.

<sup>13</sup> A variety of substances are referred to as "napalm" despite the lack of naphthalene and palmitate from which the original form of napalm derived its name. The more modern Napalm-B is a mixture of benzene, gasoline, and polystyrene. Global Security, "Napalm," <http://www.globalsecurity.org/military/systems/munitions/napalm.htm> (accessed March 5, 2011).

<sup>14</sup> For example, Russia has developed an incendiary RPO-Z infantry rocket flamethrower. Anna E. Wildegger-Gaissaier, "Aspects of Thermobaric Weaponry," *Military Technology*, vol. 28, no.6 (2004), p.125. The United States has reportedly deployed the M202A1 Flame Assault Shoulder Weapon (FLASH) in Afghanistan. The FLASH "is four-barreled bazooka firing rockets loaded with an incendiary mixture," originally napalm and now triethylaluminum. David Hambling, "U.S. Denies Incendiary Weapon Use in Afghanistan," *Wired*, May 15, 2009, <http://www.wired.com/dangerroom/2009/05/us-incendiary-weapon-in-afghanistan-revealed/#> (accessed March 17, 2011).

these areas means that the underlying muscles, tendons, and even bones are often damaged.

Napalm is especially likely to induce shock, a condition in which blood is poorly circulated to parts of the body. The resulting lack of oxygen to major organs can be fatal. Unlike other thermal burns, even second-degree burns from napalm on a relatively small percentage of the skin can cause shock, perhaps because of the intense pain of napalm burn injuries.<sup>15</sup>

The experiences of Kim Phuc, the girl in the famous Vietnam War-era photograph, offer heart-wrenching evidence of the excruciating and long-lasting injuries caused by napalm, which Phuc described as “the most terrible pain you can imagine.”<sup>16</sup> Her biographer writes: “Her first memory of the engulfing fires was the sight of flames licking her left arm, where there was an ugly, brownish-black gob. 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.”<sup>17</sup> On the way to the hospital, she could not escape “the gut-wrenching stench of burned flesh.”<sup>18</sup> Phuc survived thanks to six months of quality care in a specialized hospital, but her already agonizing injuries required treatments—wound cleansing, skin grafting, and physical therapy—that were in themselves almost unbearable. Daily cleansing, which one of her doctors compared to being “flayed alive,” was particularly difficult to bear. “The nurses undid Phuc’s old dressing, then took a hand-held showerhead to chip away at the dead and infected skin and tissue, using scissors if necessary, all the while trying to ignore the inhuman screams escaping from Phuc.”<sup>19</sup> When she finally returned home, she felt the social as well as lingering physical impacts of her disfigurement: “[C]hildren recoiled. Adults would shake their heads: ‘Poor you,’ they moaned.”<sup>20</sup> Phuc’s lifelong ordeal was just beginning.

### *Napalm Case Studies Since 1980*

Despite Protocol III’s adoption in 1980, states and non-state armed groups have repeatedly used napalm in civilian areas, often at great humanitarian cost. For instance, in 1983, the government of Chad accused Libya of dropping “fragmentation and napalm bombs on the towns of Faya-Largeau, Oum-Chalouba and Kalait, causing considerable loss of innocent

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<sup>15</sup> UN Department of Political and Security Council Affairs, “Napalm and Other Incendiary Weapons and All Aspects of Their Possible Use,” p. 33.

<sup>16</sup> “Vietnam: War in the Sky,” *Life*, <http://www.life.com/gallery/23073/image/53372352#index/o> (accessed March 18, 2011).

<sup>17</sup> Denise Chong, *The Girl in the Picture*, (New York: Penguin Group, 1999), pp. 66-67.

<sup>18</sup> *Ibid.*, pp. 70-71.

<sup>19</sup> *Ibid.*, pp. 94-95.

<sup>20</sup> *Ibid.*, p. 120.

life.” The government reported 200 deaths and more than 300 injuries, “some by phosphorus and napalm bombs,” from August 8 to 9 alone.<sup>21</sup> The United States told the UN Security Council that Faya-Largeau was “subjected to vicious bombardment by Libyan war planes manned by Libyan pilots—indiscriminate bombardment with napalm and high explosives on civilian as well as military targets.”<sup>22</sup> Libya denied these allegations.<sup>23</sup> In March 2011, Human Right Watch researchers observed stockpiles of napalm containers and associated igniter components in abandoned ammunitions storage facilities in eastern Libya.

The Soviet Union and Argentina, both of which would become states parties to Protocol III, also used napalm in the 1980s. On February 25, 1980 during a battle near Kabul, Afghanistan, Soviet aircraft used napalm on rebel units of the army of the Democratic Republic of Afghanistan.<sup>24</sup> Five years later, during a June 1985 offensive in Afghanistan’s Kunar Valley, Soviet forces made “extensive use of napalm to clear strong points, villages, and brush.”<sup>25</sup> On May 28, 1982, during the Battle of Goose Green in the Falkland Islands conflict, Argentine aircraft dropped napalm bombs when trying to attack British troop concentrations.<sup>26</sup> The Soviet Union and Argentina consented to be bound by Protocol III in 1982 and 1995, respectively.

Napalm has been used in non-international as well as international armed conflicts. During the civil war in El Salvador in the early 1980s, guerillas alleged that the government used napalm.<sup>27</sup> A report from the US humanitarian organization Medical Aid for El Salvador made similar accusations “based on testimony from refugees and medical examinations of burn victims.”<sup>28</sup> In 1983, a US doctor described treating incendiary burns from phosphorus and

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<sup>21</sup> Statement of Korom Ahmed, secretary of state for foreign affairs and co-operation of Chad, 2463rd Meeting of the Security Council, UN Doc. S/PV.2463, August 11, 1983, para 23.

<sup>22</sup> Statement of the United States, 2464th Meeting of the Security Council, UN Doc. S/PV.2464, August 11, 1983, para. 32.

<sup>23</sup> Libyan People’s Bureau, “Letters to the Editor: Conflict in Chad,” *Financial Times*, August 15, 1983.

<sup>24</sup> Anthony H. Cordesman and Abraham R. Wagner, *Lessons of Modern War, Volume III: The Afghan and Falklands Conflicts* (Boulder: Westview Press, 1991), p. 36.

<sup>25</sup> *Ibid.*, p. 54.

<sup>26</sup> *Ibid.*, p. 255.

<sup>27</sup> “Salvador Affirms It Has Napalm,” *New York Times*, October 8, 1984, <http://www.nytimes.com/1984/10/08/world/salvador-affirms-it-has-napalm-san-salvador-oct-7-reuters-high-salvadoran.html> (accessed March 26, 2011). See also Statement of Rep. Conyers, “Continuing Human Rights Abuses in El Salvador,” *Congressional Record: Extensions of Remarks*, vol. 131, September 26, 1985, p. 25257.

<sup>28</sup> Wayne Biddle, “Salvador Officer Said to Have Told of Napalm Use,” *New York Times*, October 9, 1984, <http://www.nytimes.com/1984/10/09/world/salvador-officer-said-to-have-told-of-napalm-use.html> (accessed March 26, 2011). See also UN Commission on Human Rights, “Final Report of the Special Representative on the situation of human rights in El Salvador, José Antonio Pastor Ridruejo,” E/CN.4/1985/18, February 1, 1985, para. 133.

possibly napalm.<sup>29</sup> Although the Salvadoran minister of defense acknowledged the country stockpiled about 25 napalm bombs, the government maintained that they had not been used.<sup>30</sup> The head of the El Salvadoran air force, however, admitted using napalm prior to 1981.<sup>31</sup> El Salvador would consent to be bound by Protocol III in 2000.

Napalm use continued in the 1990s. In November 1994, nationalist Serb aircraft from the Republic of Serbian Krajina dropped several napalm bombs in the Bihac safe area in northwest Bosnia.<sup>32</sup> The UN Security Council condemned the bombing,<sup>33</sup> though the bombs malfunctioned and there were no casualties.<sup>34</sup> There were also a number of allegations that Turkey used napalm against Kurds in Iraq in the 1990s. Agence France Press reported on such allegations in 1991, citing doctors' reports that "[n]ine of the 35 people taken to hospital were in serious or critical condition—three children, four women and two men. Two of them had burn marks on their arms and back and were in 'critical condition.'"<sup>35</sup> According to Reuters, doctors identified at least three patients' burns as having been caused by napalm.<sup>36</sup> *The Independent* reported that "Turkish napalm bombs and strafing runs killed at least three Iraqi Kurdish bystanders."<sup>37</sup>

Not enough information is available to prove definitively that Protocol III would have prohibited all of the above incidents of napalm use if they were committed by states parties. Nevertheless, the case studies show the need to universalize the incendiary weapons protocol. They also demonstrate the importance of ensuring it is strong enough to prohibit states parties from committing such attacks and to stigmatize the munitions so that states not party hesitate to use them in the future.

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<sup>29</sup> Michael Kieran, "Villas Murdered, Churches say," *The Globe and Mail*, March 19, 1983.

<sup>30</sup> "Salvador Affirms It Has Napalm," *New York Times*.

<sup>31</sup> Statement of Rep. Oberstar, "El Salvador Report," *Congressional Record—House*, vol. 29, May 26, 1983, p. 14057.

<sup>32</sup> Chuck Sudetic, "Napalm and Cluster Bombs Dropped on Bosnian Town," *New York Times*, November 19, 1994. See also "Report of the Secretary-General Pursuant to Security Council Resolution 959 (1994)," U.N. Doc. S/1994/1389, December 1, 1994, para. 15.

<sup>33</sup> Statement of the President of the Security Council, U.N. Doc. S/PRST/1994/69, November 18, 1994.

<sup>34</sup> Chuck Sudetic, "Napalm and Cluster Bombs Dropped on Bosnian Town," *New York Times*; and Letter from the Permanent Representative of Bosnia and Herzegovina to the United Nations, to the President of the Security Council, U.N. Doc. No. S/1994/1309, November 18, 1994.

<sup>35</sup> "Civilian Sites Hit in Turkish Air Raid, Says Iraqi Paper," Agence France Press, October 12, 1991.

<sup>36</sup> Kurt Schork, "Turkish Cross-Border Raids Anger Iraqi Kurds," Reuters, October 15, 1991.

<sup>37</sup> "Kurdish Guerrillas Raise Tension with Killing Raid in South-East," *The Independent* (London), October 26, 1991. In 1997, a Kurdish group accused Turkey of bombing its positions in northern Iraq with napalm. "Clashes between Kurdish factions Escalate in Northern Iraq," Associated Press, October 26, 1997; and "Iraqi Kurdish Group Says Turkish Jets Pound Positions," Associated Press, October 30, 1997.



## White Phosphorus

The use of white phosphorus munitions in several recent armed conflicts highlights the shortcomings of existing international law on incendiary munitions. Their use over the past decade in Afghanistan, Gaza, Iraq, Israel, Lebanon, and Somalia both illustrates the civilian harm they cause and exposes the deficiencies of Protocol III. White phosphorus munitions generally fall through the cracks of Protocol III's definition of incendiary weapons because states claim they are designed primarily to serve as smokescreens and to illuminate targets and thus Protocol III does not cover them even if they are used as weapons.<sup>38</sup> In addition, many models are ground launched so even if the protocol applied to them, it would not regulate all their use. Regardless of the munitions' intended purpose, however, they have had the same effects as weapons defined as incendiary by the protocol and have produced significant civilian suffering.

### *The Munitions and The Harm They Cause*

White phosphorus is a chemical substance that ignites when exposed to atmospheric oxygen at temperatures above 30° C (84° F) and continues to burn while exposed to oxygen until it is exhausted. The chemical reaction creates intense heat of about 815° C (1500° F) and produces light and a thick chemical smoke. Phosphorus oxides react with moisture in the air to produce a smoke cloud of phosphorus-containing acids. The smoke is impenetrable to infrared optics, making it especially effective for protecting tanks from guided missiles. In addition, the chemical properties of white phosphorus make it useful for creating smokescreens to shroud troop movements; illuminating areas; marking and signaling; providing tracers for ammunition; and detonating mines, fuel supplies, and ammunition caches.<sup>39</sup>

The properties of white phosphorus enable other applications. It can also be used to “smoke out” enclosures and to target people or materiel.<sup>40</sup> Burning phosphorus creates chemical

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<sup>38</sup> The US Department of Defense, for example, has stated, because white phosphorus is “primarily designed and used for illumination and screening purposes, it is not an ‘incendiary weapon’ as defined in Protocol III.” The Department of Defense has also said that even if it were covered by the protocol it could “lawfully be used for anti-personnel purposes.” US Department of Defense Answers to Questions from Senator Leahy, enclosure 2, p. 5 (facsimile to Human Rights Watch, June 12, 2009). Israel, which is not party to Protocol III, has stated that it does not consider white phosphorus used as a smokescreen to be covered by the protocol. Israel Ministry of Foreign Affairs, “The Operation in Gaza: Factual and Legal Aspects,” July 2009, <http://www.mfa.gov.il/NR/rdonlyres/E89E699D-A435-491B-B2Do-017675DAFEF7/0/GazaOperationwLinks.pdf>, (accessed March 11, 2011), p. 147.

<sup>39</sup> The US Army, for example, states that it uses white phosphorus shells primarily for incendiary, marking, obscuring, and screening purposes and that white phosphorus can be used for its anti-materiel and antipersonnel incendiary effects. US Department of Defense Answers to Questions from Senator Leahy, Enclosure 2, p. 2 (facsimile to Human Rights Watch, June 12, 2009).

<sup>40</sup> See, for example, US Department of Defense Answers to Questions from Senator Leahy, enclosure 2, pp. 2, 7.

smoke and fire that drives sheltered persons outside where they can be attacked with high explosive and fragmenting munitions. Use of white phosphorus to flush out enemy combatants and others is controversial because of the nature of the injuries it produces. As an anti-materiel munition, white phosphorus can be used on vehicles, unoccupied bunkers, buildings, and weapons systems.<sup>41</sup>

White phosphorus can cause horrific injuries to humans no matter how it is used. It is highly soluble in fat, and thus in human flesh. When it comes in contact with skin, it causes severe thermal and chemical burns, often down to the bone.<sup>42</sup> These injuries are slow to heal and prone to infection. Because white phosphorus burns when exposed to oxygen, wounds that have been cleaned and dressed can reignite when the dressings are removed. If all fragments of white phosphorus are not removed, it can exacerbate wounds after treatment. Doctors may uncover already-treated wounds to find that they have grown larger and deeper. White phosphorus can also enter the bloodstream through the burns and cause multiple organ failure. For this reason, burns on only 10 percent of the body are often fatal.<sup>43</sup> Throughout the lengthy period of treatment, victims remain at risk of death.

### *White Phosphorus Case Studies from the Past Decade*

#### **A Deadly Smokescreen: Gaza**

White phosphorus can seriously harm civilians even when used as a smokescreen, one of the purposes that allows states to claim it escapes Protocol III's definition. During military operations from December 27, 2008 to January 18, 2009, the Israel Defense Forces (IDF) fired approximately 200 ground-launched white phosphorus munitions in the air over populated areas of Gaza.<sup>44</sup> These munitions killed and injured civilians and damaged civilian

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<sup>41</sup> See, for example, *Ibid.*, enclosure 2, p. 2; "Declassified Data Reveals Insurgent Use of White Phosphorus," Combined Joint Task Force-101, Operation Enduring Freedom news release #002, May 11, 2009.

<sup>42</sup> David J. Barillo, Leopoldo C. Cancio, and Cleon W. Goodwin, "Treatment of White Phosphorus and Other Chemical Burn Injuries at One Burn Center over a 51-Year Period," *Burns*, vol. 30 (2004), p. 450. See also Lisandro Irizarry, "CBRNE – Incendiary Agents, White Phosphorus," <http://emedicine.medscape.com/article/833585-overview> (accessed October 21, 2009).

<sup>43</sup> "Identification of Explosive White Phosphorus Injury and Its Treatment," signed by Dr. Gil Hirshorn, colonel, head of the Trauma Unit, Headquarters of the Chief Military Medical Officer, Ref. Cast Lead SH9 01293409 (original Hebrew on file at Human Rights Watch); "Exposure to White Phosphorus," signed by Dr. Leon Fulls, Ministry of Health War Room, January 15, 2009, Ref. Cast Lead SH9 01393109 (original Hebrew on file at Human Rights Watch); and Global Security, "White Phosphorus," <http://www.globalsecurity.org/military/systems/munitions/wp.htm> (accessed November 6, 2010).

<sup>44</sup> Amos Harel, "IDF Probes Improper Use of White Phosphorus Shells in Gaza," *Haaretz*, January 21, 2009, <http://www.haaretz.com/print-edition/news/idf-probes-improper-use-of-phosphorus-shells-in-gaza-strip-1.268545> (accessed March 11, 2011).

structures, including a school, a market, a humanitarian aid warehouse, and a hospital.<sup>45</sup> The IDF relied particularly on 155mm M825E1 artillery shells, which send burning phosphorus wedges 125 meters in all directions, giving them a broad area effect.<sup>46</sup> The Israeli Ministry of Foreign Affairs stated that the IDF used the shells only to create smokescreens.<sup>47</sup>

If smokescreening was the intended aim, then the IDF possessed alternatives to the highly incendiary white phosphorus: namely, 155mm smoke projectiles, which produce equivalent visual screening properties without incendiary and destructive effects. Smokescreens generated by smoke artillery can be deployed more easily over a wider area than white phosphorus with no risk of fires or burns to civilians. The IDF possesses smoke artillery; Israel Military Industries (IMI) manufactures the M116A1 155MM shell.<sup>48</sup>

Although the total number of Palestinians killed and injured by white phosphorus in Gaza remains unknown, the serious impact on civilians and civilian objects is clear. In six representative cases documented by Human Rights Watch, white phosphorus shells, burning white phosphorus wedges, or the resulting fires killed 12 civilians, including three women and seven children, one of them a 15-month-old baby. Burns or smoke inhalation wounded dozens more. Human Rights Watch also encountered cases of civilians who were injured from stepping on white phosphorus remnants up to 12 days after major hostilities had stopped.<sup>49</sup>

When an explosion threw Mohammad al-Haddad, 25, from his car, he sustained third-degree burns to his legs, hands, and forehead as well as a broken jaw. Naviz Abu Sha'baan, director of the burns unit at al-Shifa hospital, told Human Rights Watch that al-Haddad's burn injuries appeared consistent with wounds caused by white phosphorus. "We think it's from white phosphorus because the burns are very deep," he said. "We already excised burnt tissue and now his wounds are getting worse. When we saw him the first time the wounds

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<sup>45</sup> Human Rights Watch, *Rain of Fire: Israel's Unlawful Use of White Phosphorus in Gaza*, March 2009, <http://www.hrw.org/en/reports/2009/03/25/rain-fire>, p.1.

<sup>46</sup> *Ibid.*, p.3.

<sup>47</sup> See e.g., Israel Ministry of Foreign Affairs, "The Operation in Gaza: Factual and Legal Aspects," July 2009, <http://www.mfa.gov.il/NR/rdonlyres/E89E699D-A435-491B-B2D0-017675DAFEF7/o/GazaOperationwLinks.pdf> (accessed on March 11, 2011), p.129; James Hider and Sheera Frenkel, "Israel Admits Using White Phosphorus in Attacks on Gaza", *The Times* (UK), January 24, 2009, [http://www.timesonline.co.uk/tol/news/world/middle\\_east/articles5575070.ece](http://www.timesonline.co.uk/tol/news/world/middle_east/articles5575070.ece) (accessed March 11, 2011).

<sup>48</sup> Ness and Williams, eds., *Jane's Ammunition Handbook 2007-2008*, p. 644. See [http://www.janes.com/extracts/extract/jah/jah\\_0462.html](http://www.janes.com/extracts/extract/jah/jah_0462.html) (accessed March 6, 2009). See also Human Rights Watch, *Rain of Fire*, p. 13.

<sup>49</sup> Human Rights Watch, *Rain of Fire*, p. 3.

were more superficial than they are now. We've got to operate again tomorrow to excise more tissue.”<sup>50</sup>

According to several media reports, white phosphorus seriously injured Sabbah Abu Halima, 45, in the bedroom of her home in Atatra, where she watched her daughter-in-law “melt away.”<sup>51</sup> She was brought to al-Shifa hospital with what appeared to be mild burns to her right forearm, left lower leg and feet.<sup>52</sup> Staff wiped and bound the wounds “but two days later ... when we opened the bandages we found her wounds still smoking and much, much bigger. Her arm was down to the bone and tendons, that is all that is left,” said Dr. Abu Sha’baan.<sup>53</sup> “A bad odor came from the wounds and smoke continued to come out of them for many hours.... We took out a piece of foreign matter that a colleague identified as white phosphorous.”<sup>54</sup>

Dr. Abu Sha’baan reported to journalists that 60 to 70 patients in his unit died from severe burns. Patients with relatively small burn injuries died unexpectedly. In one case, burning material sprayed from a patient’s wounds, causing an anesthetist to suffer minor injuries. In another, a three-year-old girl was sent for a scan because of a head wound: “After about two hours she came back, we opened the wound, and smoke came out from the wound.” Surgeons used forceps to pull out a substance from the wound that was “like dense cotton and it started to burn.... The piece continued to burn until it disappeared.” The child later died.<sup>55</sup> Dr Ahmed Almi from the al-Nasser hospital in Khan Yunis also described serious injuries and chemical burns, with victims covered in a white powder that continued to burn long after initial exposure.<sup>56</sup>

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<sup>50</sup> Ibid., p.38.

<sup>51</sup> Ethan Bronner, “Outcry Erupts Over Reports That Israel Used Phosphorus Arms on Gazans”, *New York Times*, January 21, 2009, [http://www.nytimes.com/2009/01/22/world/middleeast/22phosphorus.html?\\_r=1&ref=middleeast](http://www.nytimes.com/2009/01/22/world/middleeast/22phosphorus.html?_r=1&ref=middleeast) (accessed March 11, 2011).

<sup>52</sup> “Gaza Phosphorus Burn Victim Saw ‘Bright Stars’ Fall,” *The Jordan Times*, January 23, 2009, <http://www.jordantimes.com/?news=13728> (accessed March 11, 2011); Bronner, “Outcry Erupts Over Reports That Israel Used Phosphorus Arms on Gazans,” *New York Times*.

<sup>53</sup> Tim Butcher, “Gaza Phosphorus Casualties Relive Israel’s Three-Week War,” *The Telegraph* (UK), January 23, 2009, <http://www.telegraph.co.uk/news/worldnews/middleeast/israel/4325805/Gaza-phosphorus-casualties-relive-Israelis-three-week-war.html> (accessed March 11, 2011); “Gaza Phosphorus Burn Victim Saw ‘Bright Stars’ Fall,” *The Jordan Times*.

<sup>54</sup> Bronner, “Outcry Erupts Over Reports That Israel Used Phosphorus Arms on Gazans,” *New York Times*.

<sup>55</sup> Rory McCarthy, “Gaza Doctors Struggle to Treat Deadly Burns Consistent with White Phosphorus,” *The Guardian* (UK), January 20, 2009, <http://www.guardian.co.uk/world/2009/jan/21/gaza-phosphorus-israel> (accessed March 11, 2011).

<sup>56</sup> Fida Qishta, Mustafa Khalili, and Michael Tait, “White Phosphorus in Gaza: the Victims,” *The Guardian* (UK), January 19, 2009, <http://www.guardian.co.uk/world/video/2009/jan/19/gaza-phosphorus-victim> (accessed March 11, 2011).

While Gaza is the best documented case of the civilian suffering white phosphorus can cause, comparable harm likely occurred in other places where white phosphorus munitions have been used, including those described below.<sup>57</sup>

### **Dangerous Weapons from Ground or Air: Iraq and Lebanon**

Even though white phosphorus munitions may be “primarily designed” for other purposes, armed forces have also used them as weapons against military objects, reportedly inflicting harm on civilians in the process. After initial denials, the US Department of Defense admitted that its forces used ground-launched white phosphorus directly on enemy combatants in Fallujah, Iraq, in November 2004.<sup>58</sup> Colonel Barry Venable explained:

When you have enemy forces that are in covered positions that your high explosive artillery rounds are not having an impact on, and you wish to get them out of those positions, one technique is to fire white phosphorus ... rounds into the position because the combined effects of the fire and smoke, and in some cases the terror brought about by the explosion on the ground, will drive them out of the holes so that you can kill them with high explosives.<sup>59</sup>

The effects of this use were not as well documented as those in Gaza, but witnesses nonetheless reported injuries consistent with white phosphorus. Jeff Englehart, a US Marine who spent two days in Fallujah during the battle, said later he saw “the burned bodies of women and children.”<sup>60</sup> A resident described to a journalist “weird bombs that put up smoke like a mushroom cloud” and said he watched “pieces of these bombs explode into large fires that continued to burn on the skin even after people dumped water on the burns.” A

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<sup>57</sup> Chechnya is another case where white phosphorus was allegedly used as a smokescreen. The Russian military used white phosphorus rounds extensively during the 1994-1995 battle for Grozny, the capital city of the Chechen Republic, reportedly to create smokescreens to hide troop movements in urban combat. Twenty to twenty-five percent of the artillery shells and mortars fired were smoke or white phosphorus rounds. Although white phosphorus’s efficacy as an obscurant was reportedly the main reason behind the military’s use of these munitions, Russia also recognized the benefit of the toxicity of white phosphorus smoke, which could “readily penetrate protective[] mask filters.” Lester W. Grau, “Changing Russian Urban Tactics: The Aftermath of the Battle for Grozny,” INSS Strategic Forum, no. 28, July 1995, <http://fmso.leavenworth.army.mil/documents/grozny.htm> (accessed March 11, 2011); and Global Security, “White Phosphorus.”

<sup>58</sup> “US Used White Phosphorous in Iraq,” *BBC News*, November 16, 2005, [http://news.bbc.co.uk/2/hi/uk\\_news/politics/4441822.stm](http://news.bbc.co.uk/2/hi/uk_news/politics/4441822.stm) (accessed March 11, 2011).

<sup>59</sup> *Ibid.*

<sup>60</sup> Andrew Buncombe and Solomon Hughes, “The Fog of War: White Phosphorus, Fallujah and Some Burning Questions,” *The Independent* (UK), November 15, 2005, <http://www.independent.co.uk/news/world/americas/the-fog-of-war-white-phosphorus-fallujah-and-some-burning-questions-515345.html> (accessed March 11, 2011).

doctor told the same journalist that he “treated people who had their skin melted.”<sup>61</sup> US use of white phosphorous in Iraq, like Israeli use in Gaza, exemplifies the civilian harm that ground-launched models can cause.

Air-dropped white phosphorus munitions can be similarly deadly, even when used on military targets. Israel appeared to acknowledge using white phosphorus bombs as incendiary weapons during its conflict with Hezbollah in 2006.<sup>62</sup> The Israeli government did not specify where and against what types of targets white phosphorus munitions were used, although during the war foreign media outlets reported that Lebanese civilians suffered severe injuries.<sup>63</sup> Dr. Hussein Hamud al-Shel of Dar al-Amal hospital in Ba'albek, Lebanon, described seeing three corpses “entirely shriveled with black-green skin,” which was reportedly consistent with phosphorus injuries.<sup>64</sup>

### **Proliferation of White Phosphorus Munitions: Somalia, Israel, and Afghanistan**

A total of 29 countries have produced 182 different types of incendiary weapons, including white phosphorus, according to respected international sources,<sup>65</sup> and these munitions have proliferated to a range of states and non-state armed groups. Major military powers have not been the only users of white phosphorus munitions. A UN report accused the Ethiopian military of using white phosphorus bombs in an April 2007 battle against the Shabaab in the Shirkole area of Mogadishu, Somalia. The attacks killed 15 Shabaab fighters and 35 civilians in the city. Residents described seeing a “fireball” and said that the bodies of victims were “melted.” The Ethiopian government has called the accusation “baseless,” though UN monitors provided bomb scene photographs and evidence from soil samples indicating that the soil at the impact area had 117 times the normal amount of phosphorus.<sup>66</sup>

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<sup>61</sup> Ibid.

<sup>62</sup> Minister Jacob Edery told a Knesset member, “The IDF made use of phosphorous shells during the war against Hezbollah in attacks against military targets in open ground.” Meron Rappaport, “Israel Admits Using Phosphorus Bombs during War in Lebanon,” *Haaretz*, October 22, 2006, <http://www.haaretz.com/news/israel-admits-using-phosphorus-bombs-duringwar-in-lebanon-1.203078> (accessed November 16, 2010).

<sup>63</sup> Ibid.

<sup>64</sup> Ibid.

<sup>65</sup> See generally Ness and Williams, eds., *Jane's Ammunition Handbook 2007–2008*; Lennox, ed., *Jane's Air Launched Weapons*.

<sup>66</sup> Jeffrey Gettleman, “A U.N. Report on Somalia Accuses Eritrea of Adding to the Chaos,” *New York Times*, July 27, 2007, <http://www.nytimes.com/2007/07/27/world/africa/27somalia.html> (accessed March 11, 2011); Monitoring Group on Somalia, “Report of the Monitoring Group on Somalia pursuant to Security Council Resolution 1724 (2006),” S/2007/436, July 17, 2007, [http://www.un.org/ga/search/view\\_doc.asp?symbol=S/2007/436](http://www.un.org/ga/search/view_doc.asp?symbol=S/2007/436), pp.12-13 (accessed March 11, 2011).

Non-state armed groups have also reportedly acquired and used ground-launched white phosphorus munitions. Israel has accused Palestinian militants of occasionally firing small numbers of white phosphorus shells into Israel.<sup>67</sup> In May 2009, the US military announced that it was aware of at least 44 incidents of Taliban militants storing and using white phosphorus munitions in attacks against Western forces in Afghanistan. These attacks included a number of incidents in which Afghan civilians and NATO troops had received severe burns.<sup>68</sup> The United States stated that the Taliban used white phosphorus in improvised explosive devices (IEDs) as well as in mortar and rocket attacks.<sup>69</sup> Qari Mohammad Yousuf, a spokesman for the Taliban, denied such use.<sup>70</sup>

As in other conflicts, the use of white phosphorus munitions has caused severe harm to civilians in Afghanistan. The Associated Press reported that eight-year-old Razia's skin was a scaly red, her hair would never grow back, and most of her left ear was burned off after a white phosphorus shell ripped through her home in the Tagab Valley of Kapisa. When she reached the operating room, white powder covered her skin, and the oxygen mask on her face started to melt. Flames appeared when US military doctors tried to scrape away the dead tissue.<sup>71</sup> A US military spokeswoman acknowledged that in this case it was unclear whether US troops or Taliban fired the shell, indicating that both sides of the conflict have been using white phosphorus.<sup>72</sup> The incident therefore exemplifies both the proliferation of white phosphorus munitions and the harm that they can cause to civilians.

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<sup>67</sup> Yaakov Lappin and Yaakov Katz, "Police: Terrorists Fired 2 Phosphorus Shells into Israel," *Jerusalem Post*, September 15, 2010, <http://www.jpost.com/MiddleEast/Article.aspx?id=188206> (accessed March 17, 2011); "Israel: Phosphorus Bombshells Launched from Gaza," *Christian Science Monitor*, September 15, 2010, <http://www.csmonitor.com/World/Global-News/2010/0915/Israel-Phosphorus-bombshells-launched-from-Gaza> (accessed March 17, 2011); Maayana Miskin, "Israeli Complaint to UN over Phosphorous Fire," *Arutz Sheva*, September 16, 2010, <http://www.israelnationalnews.com/News/News.aspx/139669> (accessed March 17, 2011); and Ilana Curiel, "Phosphorus Mortar Shell Detected in Negev," *Ynetnews.com*, January 14, 2009, <http://www.ynetnews.com/articles/0,7340,L-3656311,00.html> (accessed March 17, 2011).

<sup>68</sup> "Reported Insurgent White Phosphorus Attacks and Caches," Combined Joint Task Force-101, CENTCOM press release, May 11, 2009, <http://www.centcom.mil/press-releases/reported-insurgent-white-phosphorus-attacks-and-caches> (accessed March 17, 2011). See also "Taliban 'Used White Phosphorus,'" *BBC News*, May 11, 2009, <http://news.bbc.co.uk/2/hi/8045012.stm> (accessed March 11, 2011); "U.S. Accuses Afghan Militants of Using White Phosphorus," *The Guardian* (UK), May 11, 2009, <http://www.guardian.co.uk/world/2009/may/11/taliban-phosphorus-attacks-afghanistan> (accessed March 11, 2011); Michael Evans, "Taliban Using White Phosphorus, Some of It Made in Britain," *The Times* (UK), May 12, 2009, <http://www.timesonline.co.uk/tol/news/world/asia/article6269646.ece> (accessed March 11, 2011).

<sup>69</sup> CJ2-Foreign Disclosure Office, Combined Joint Task Force-101, "Reported Insurgent White Phosphorus Attacks and Caches in Regional Command-East, 2003-Present," May 11, 2009. See also Evans, Using White Phosphorus, Some of It Made in Britain," *The Times* (UK).

<sup>70</sup> Sayed Salahuddin, "Afghan Taliban deny Using White Phosphorus," Reuters, May 12, 2009, <http://in.reuters.com/article/2009/05/12/afghanistan-phosphorous-idINISL47384020090512> (accessed March 11, 2011).

<sup>71</sup> Jason Straziuso and Evan Vucci, "Scarred by White Phosphorus, Afghan Girl Claws from Death's Edge at US military Hospital," Associated Press, June 23, 2009.

<sup>72</sup> *Ibid.* See also "Afghanistan: NATO Should 'Come Clean' on White Phosphorus," Human Rights Watch news release, May 8, 2009, <http://www.hrw.org/en/news/2009/05/08/afghanistan-nato-should-come-clean-white-phosphorus>.

## Conclusion

Incendiary munitions have produced severe and unacceptable civilian suffering in conflicts around the world. Whatever their designated “primary” purpose, munitions with white phosphorus, napalm, and other incendiary agents have caused a host of injuries to humans that are extremely painful, difficult to treat, often fatal, and even in the best cases frequently entail severe and long-lasting psychological and social harm. States and non-state armed groups have continued to use these munitions because the international community has failed to generate clear legal prohibitions and sufficient stigma against them.

To address these problems, states parties must not only press harder for universalization of and compliance with Protocol III. States must also revisit the text of Protocol III and strengthen provisions that are now more than 30 years old. As discussed in the November 2010 Human Rights Watch/IHRC memorandum to CCW delegates, the protocol suffers from a narrow, design-based definition of incendiary weapons that leaves states parties room to argue that their munitions, notably ones including white phosphorus, are not covered. In addition, even if munitions fall under the definition, the protocol merely regulates their use and has weaker rules for ground-launched than for air-dropped models.<sup>73</sup>

Urgent action is needed in light of the egregious and ongoing harms of incendiary weapons. At the Fourth Review Conference of the CCW in November 2011, states parties should adopt a mandate to review and amend Protocol III. They should aim to complete their work by the end of 2012.

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<sup>73</sup> Human Rights Watch, *Memo to Convention on Conventional Weapons Delegates: The Need to Re-Visit Protocol III on Incendiary Weapons*.