

Investigating the legality of White Phosphorus as an inhumane weapon of war ?

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0 Introduction

White phosphorus (WP) is a highly toxic compound produced from phosphate-containing rocks. WP is structurally made up of discrete tetrahedral P₄ molecules which react with atmospheric dioxygen (Fig 1), resulting in **spontaneous combustion** upon exposure to air.

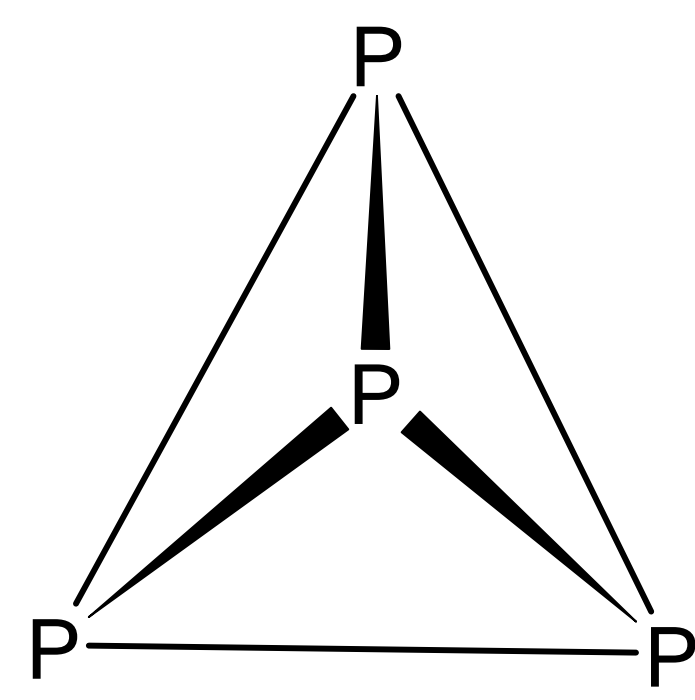


Fig 1 molecular structure of WP

The aim of this research is to discuss the environmental and physiological consequences of using WP, and to analyse its legality regarding military practices, thus questioning if WP should be classed as an **inhumane weapon of war**.

1 History of White Phosphorus: What has history taught us ?

WP was used in the match-stick industry in the early 19th century. Medical journals in the late 1850s reported a new 'industrial disease' illustrating slow progression of exposed jawbone. European countries began to ban WP matches in 1872 – A complete ban was not put in place until 1910, **over 50 years after the emergence of medical reports citing the dangers!**

2 Military uses of WP

- Flares attached to parachutes for illumination.
- Canisters which decrease on ground burn and emit smoke or contain WP –soaked wedges for smoke screens .
- Buster rounds which may have an instant detonating fuse or a time fuse.¹

WP has previously been used in military '**shake and bake**' missions, specifically in the Battle of Fallujah and the Falklands War.²



Fig 2 A shell from Israeli artillery explodes over Aita al-Shaab, south Lebanon, Sunday, Oct. 15, 2023. (AP Photo/Hussein Malla)

3 WP and the Environment

- WP bombs release phosphorus pentoxide which reacts with moisture to form phosphoric acid and could be transported via wind.
- Fire produced from the combustion of WP will not only destroy the biodiversity of land/forest, but also host a multitude of socio-economic consequences.³

Russia's use of WP against Ukraine in 2022 has caused extensive contamination and the environmental damage is currently being investigated.

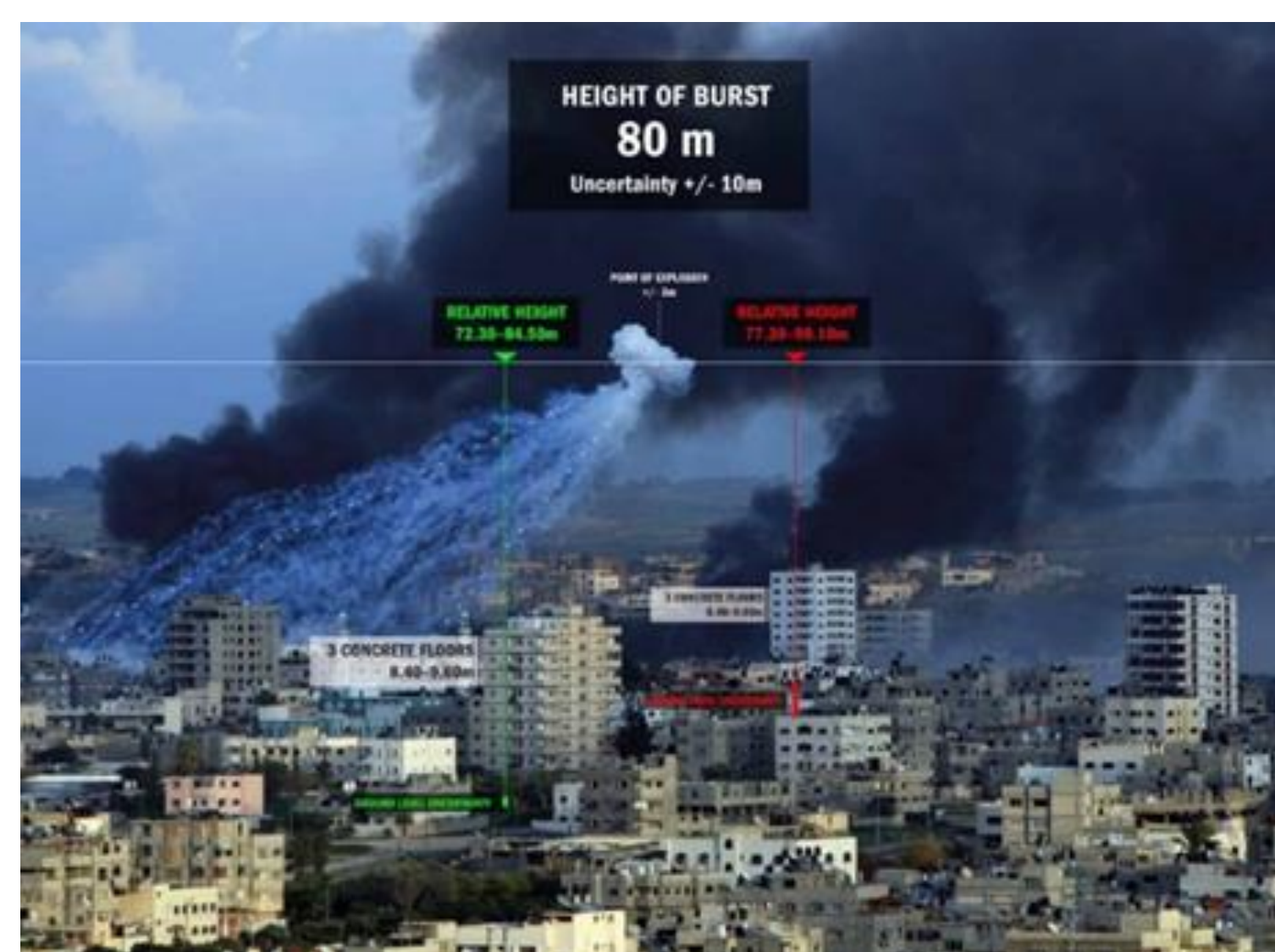


Fig 3 'Height of burst' calculations over an image of Rafah, Gaza, 2009 (Iyad El Baba/UNICEF/SITU Research/Forensic Architecture)

3.1 WP and Human Health

- Exposure causes severe burns, respiratory distress, delayed-onset lung oedema, corneal burns/perforation, ocular irritation, photophobia and metabolic changes.⁴
- Naim et al notes evidence towards a positive correlation between WP exposure and birth defects.⁵

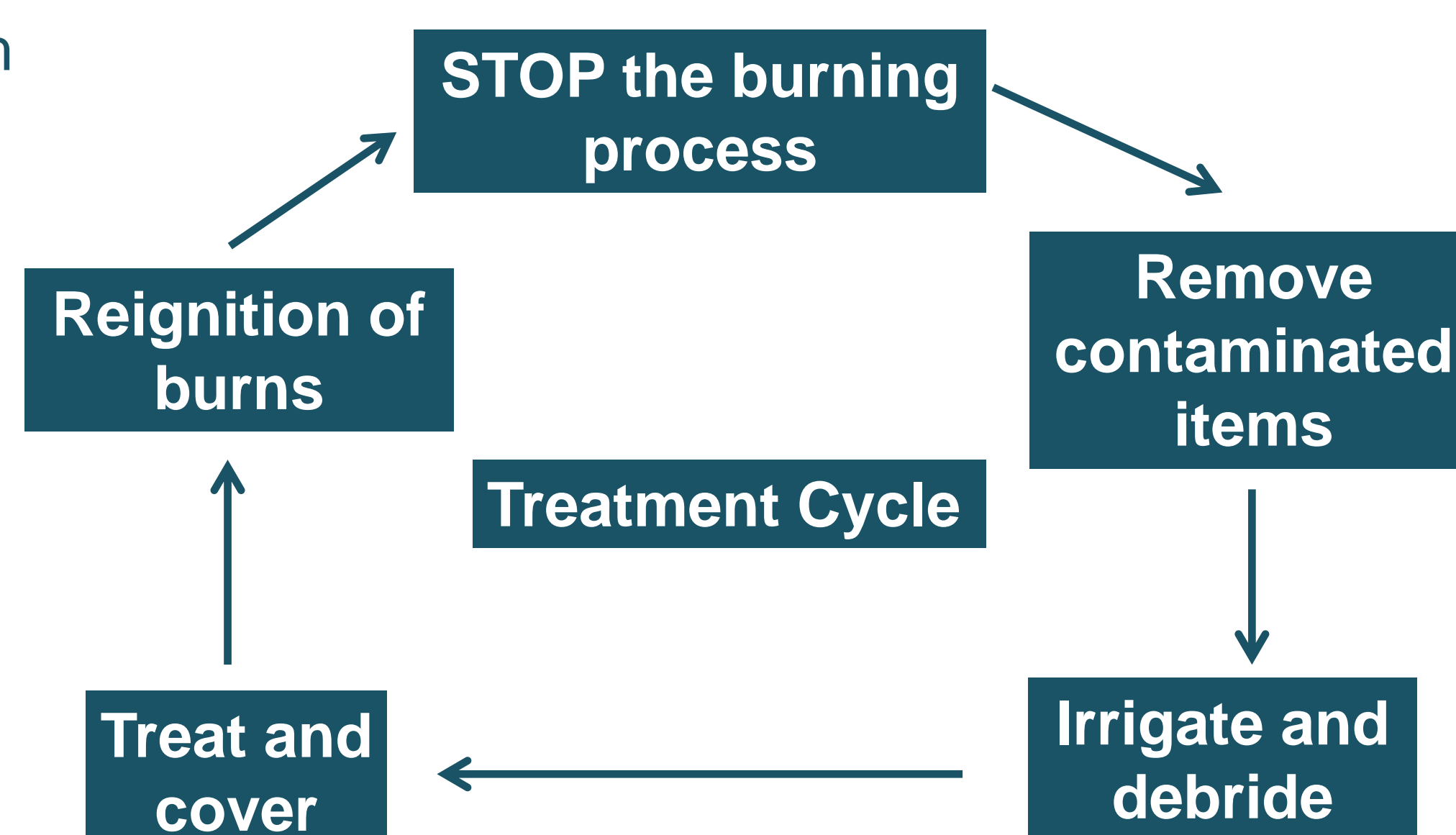


Fig 4 Treatment cycle of WP burns



Fig 5 Airbursts of artillery-fired white WP fall over the Gaza city port, October 11, 2023. (Mohammed Adeb)

4 Legal Analysis

4.1 Convention on Certain Conventional Weapons – Adopted 1980, entered into force 1983

Protocol III – Prohibits the use of incendiary weapons, within a concentration of civilians, of which are primarily designed to set fire to objects and cause burns to personnels.

- Does **NOT** cover weapons which have an **INCIDENTAL** incendiary effect.
- WP's **primary** design is for smoke.

4.2 Chemical Weapons Convention – Adopted 1992, entered into force 1997

- WP produces an incendiary response to **oxygen** not to **life processes** .
- Burns are acquired via its thermal not toxic properties.
- WP may produce liver/kidney abnormalities and metabolic changes and thus in that instance is altering '**life processes**'.

4.3 Stockholm Convention on Persistent Organic Pollutants- Adopted May 2001, entered into force May 2004

Inclusion may be argued due to its ability to remain for extended periods of time, its wide distribution and its ability to accumulate in fatty tissues of humans and wildlife.

4.4 Customary International Humanitarian Law

Rule 14 Principle of Proportionality

- It is not the specific weapon but how the weapon is used.
- Under rule 14 WP could legally be dispersed if **there is no risk of incidental loss of civilian life or injuries to civilians**.

5 What defines a weapon as inhumane?

Inhumane weapon - Unnecessary suffering/superfluous injury or may have indiscriminate effects against civilians.

1. WP produces long term life altering injuries
2. WP in soil and water has shown negative environmental consequences and poses risk to future generations.
3. Can WP be used discriminately? - WPs highly unpredictable heterogeneous spatial distribution complicates this.

References:

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2. Tessier J, 2007

3. Abu Al Hayja, 2023

4. Al Barqouni LN, 2010
5. Naim A, Al Dalies H, 2012

Acknowledgements:

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