International Review of the Red Cross (2015), **97** (899), 621–645.
The human cost of nuclear weapons
doi:10.1017/S1816383116000291

INTERNATIONAL REVIEW of the Red Cross

The human costs and legal consequences of nuclear weapons under international humanitarian law

Louis Maresca and Eleanor Mitchell*
Lou Maresca is Senior Legal Adviser at the Legal Division of the ICRC.
Eleanor Mitchell was a Legal Intern at the Legal Division of the ICRC at time of writing.

Abstract

The potential use of nuclear weapons has long been a global concern. This article highlights the principal rules of international humanitarian law (IHL) governing the conduct of hostilities applicable to nuclear weapons, and the issues and concerns that would arise were such weapons ever to be used again, in particular the severe and extensive consequences for civilians, civilian objects, combatants and the environment.

In recent years, increased attention has been paid to the humanitarian consequences of nuclear weapons. Based on what has been learned from extensive research on the humanitarian and environmental effects of nuclear weapons since they were first used in 1945, and the accompanying implications for IHL, it seems appropriate to conclude that the use of nuclear weapons in or near a populated area would amount to an indiscriminate attack and that there should also be a presumption of illegality with regard to the use of nuclear weapons outside such areas.

* The views expressed in this article are those of the authors and do not necessarily reflect those of the ICRC. The authors would like to thank Knut Dörmann, Kathleen Lawand, Iris Müller, Thomas De Saint Maurice and Laurent Gisel for their input and comments during the article's preparation.

Keywords: nuclear weapons, international humanitarian law, deterrence, disarmament, humanitarian consequences.

The use of nuclear weapons and IHL: Worth a further look

Much has been written about the compatibility of nuclear weapons with international humanitarian law (IHL), and it might be easy to conclude that nothing new can be said on the subject. However, recent developments have brought renewed attention to this issue. In 2010, the States party to the Treaty on the Non-Proliferation of Nuclear Weapons (Non-Proliferation Treaty, NPT) expressed their "deep concern at the catastrophic humanitarian consequences of any use of nuclear weapons" and reaffirmed "the need for all States at all times to comply with applicable international law, including international humanitarian law".[1] This marked the first time that the NPT States Parties had collectively acknowledged the relevance of IHL for nuclear weapons. In addition, recent international conferences have shed further light on the effects of nuclear weapons in humanitarian terms and the risks associated with their intentional or accidental detonation. The findings presented at these conferences have highlighted the catastrophic humanitarian consequences of the use of nuclear weapons and have led the president of the International Committee of the Red Cross (ICRC), Peter Maurer, to call for "a reassessment of nuclear weapons by all States in both legal and policy terms".[2]

This article will highlight the principal rules of IHL applicable to nuclear weapons and the issues and concerns that would arise were such weapons ever to be used again. Any analysis in this area must begin with the observation that IHL does not expressly prohibit the use of nuclear weapons. This contrasts with several other categories of arms about which there are serious concerns in humanitarian terms, and whose use is prohibited by specific IHL rules and instruments.[3]

That said, IHL does contain a range of general rules regulating the conduct of hostilities which are customary in nature and apply to all weapons used in armed conflict. Of particular relevance are (a) the rule of distinction; (b) the prohibition on indiscriminate attacks; (c) the prohibition on disproportionate attacks; (d) the prohibition on area bombardment; (e) the obligation to take precautions in attack; (f) the prohibition on using weapons of a nature to cause superfluous

1 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Final Document, Vol. 1, UN Doc. NPT/CONF.2010/50, 2010, p. 19.

2 Peter Maurer, "Nuclear Weapons: Ending a Threat to Humanity", speech to the Geneva Diplomatic Corps, 15 February 2015, available in the "Reports and Documents" section of this issue of the *Review*.

3 These include expanding bullets, exploding bullets weighing less than 400 grams, chemical and biological weapons, munitions that have fragments not detectable by X-ray, blinding laser weapons, anti-personnel mines and cluster munitions.

injury or unnecessary suffering; and (g) the rules on the protection of the natural environment. Also relevant are the rules and limitations on belligerent reprisals. The issues to which the use of nuclear weapons would give rise under each of these rules will be discussed below.

In this discussion, it would be remiss not to take account of the International Court of Justice's (ICJ) 1996 Advisory Opinion on *The Legality of the Threat or Use of Nuclear Weapons* (Nuclear Weapons Advisory Opinion).[4] In this decision, issued twenty years ago, the ICJ recognized the "unique characteristics" of nuclear weapons, which "render the nuclear weapon potentially catastrophic".[5] It also highlighted that "[t]he destructive power of nuclear weapons cannot be contained in either space or time".[6] In light of these and other observations, the Court concluded that the use of nuclear weapons would "generally be contrary to the rules of international law applicable in armed conflict, and in particular the principles and rules of humanitarian law".[7] However, the Court could not conclude definitively that the use of nuclear weapons would be unlawful in all circumstances. It left open the question of whether they may be lawful in "an extreme circumstance of self-defence in which the very survival of a State would be at stake".[8]

This conclusion was controversial, not least amongst the members of the ICJ themselves: the Court's decision was adopted only on the casting vote of the ICJ president, and each of the fourteen judges felt the need to append a Declaration, Separate Opinion or Dissenting Opinion. As many capable scholars have considered the Nuclear Weapons Advisory Opinion in detail, this article will not do so.[9] Nevertheless, and despite the passage of time, a number of the Court's observations remain relevant. As a result, the article will occasionally draw on the Advisory Opinion and the pleadings of States made during the case in the course of the discussion.

The humanitarian concern: The catastrophic consequences of nuclear weapons

Before examining the use of nuclear weapons under the rules of IHL, it is necessary to provide a brief outline of their effects. As noted above, the ICJ found nuclear

4 ICJ, *The Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion, *ICJ Reports 1996*, 8 July 1996 (Nuclear Weapons Advisory Opinion).
5 *Ibid.*, para. 35.
6 *Ibid.*
7 *Ibid.*, para. 105(2E).
8 *Ibid.*
9 See, for example, articles contained in the thematic issue of the *International Review of the Red Cross* on "Nuclear Weapons: The Advisory Opinion of the International Court of Justice on the Legality of Nuclear Weapons under International Humanitarian Law", Vol. 79, No. 823, 1997; Daniel Thurer, "The Legality of the Threat or Use of Nuclear Weapons: The ICJ Advisory Opinion Reconsidered", in *Volkerrecht und die Dynamik der Menschenrechte: Liber Amicorum Wolfram Karl*, Wien, 2012; Shabtai Rosenne, "The Nuclear Weapons Advisory Opinion of 8 July 1996", *Israel Yearbook on Human Rights*, Vol. 27, 1997.

weapons to be unique in that they release a combination of immensely powerful forces, namely powerful blast waves, intense heat in the form of thermal radiation, and high amounts of ionized radiation. Their detonation also creates residual radioactive particles (so-called nuclear fallout) with the potential to spread over great distances.[10] These features give nuclear weapons the capacity for incredible destructive power and severe and widespread consequences for human health, civilian structures and the environment.

Studies have shown that the detonation of a nuclear weapon would cause widespread death, injury and damage, especially if it occurred in or near a populated area.[11] There would be extensive casualties from severe burns and blunt force trauma which would occur in the moments after the detonation, as a result of blast effects and the release of thermal radiation. As these effects cause fuel and flammable substances to explode or burn, fires and firestorms are also likely to develop, creating large numbers of additional causalities.[12] Furthermore, many of those who survive the heat and blast effects will later fall victim to radiation sickness, which may not manifest itself until days or weeks after the explosion.[13] Radioactive fallout could be carried considerable distances downwind to other countries or territories; as a result, people outside the immediate area of the blast would face an increased risk of developing certain cancers, such as leukaemia and thyroid cancer, which may only manifest themselves decades later.[14] Information recently published by the International Committee of the Red Cross (ICRC) and the Japanese Red Cross Society indicates that today, some seventy years after the dropping of the atomic bombs on Hiroshima and Nagasaki, the Japanese Red Cross hospitals in those cities treat several thousand victims each year for cancers and illnesses attributable to the 1945 atomic bombings of those cities.[15] The health of children born to survivors in the years following their direct exposure to the blasts is also being monitored. If it is found that exposure to radiation damaged the genes of their parents, as it has done in animal studies, hereditary transmission of radiation effects will be another long-term concern and there may be another generation of victims requiring long-term treatment.[16]

10 United Nations (UN) Department of Disarmament Affairs, *Comprehensive Study on Nuclear Weapons*, Report of the Secretary General, UN Doc. A/45/373, 1991, pp. 71–73.

11 *Ibid.*, pp. 76–80; British Medical Association, *The Medical Effects of Nuclear War*, John Wiley and Sons, Chichester, 1983, pp. 45–56 (looking at estimations of casualties of a nuclear attack on the United Kingdom); Frederic Solomon and Robert Q. Martson (eds), *The Medical Implications of Nuclear War*, National Academy Press, Washington D.C. 1986.

12 UN Department of Disarmament Affairs, above note 10, p. 82.

13 *Ibid.*, pp. 82–84.

14 The extent of radiation illness from fallout will depend on a variety of factors. These include where the detonation occurred (high in the air or close to the ground), the yield of the weapon, local wind patterns and weather conditions, and whether individuals in the area of fallout are able to remain sheltered, especially during the initial days following the explosion, when radioactivity would be most intense.

15 ICRC and Japanese Red Cross Society, "Long-Term Health Consequences of Nuclear Weapons: 70 Years On, Red Cross Hospitals Still Treat Thousands of Atomic Bomb Survivors", Information Note No. 5, July 2015.

16 *Ibid.*

To compound the situation, assessments undertaken by the ICRC have highlighted that there is a lack of capacity in most countries and at the international level to adequately respond to a nuclear detonation, and to provide assistance that would benefit a substantial portion of survivors in the aftermath.[17] The ICRC has estimated that loss of life and the medical needs of the wounded and sick are likely be enormous, with an overwhelming number of people in need of immediate treatment for severe and life-threatening wounds.[18] Yet such treatment or assistance is unlikely to be available in the short term, as most local medical personnel would be dead or wounded and most local medical facilities would be destroyed or unable to function. Access to the area is likely to be severely hindered by debris and damage to infrastructure, and the operations of assistance providers are likely to be restricted due to concerns about the health risks of exposure to ionizing radiation.[19] A 2014 study by the United Nations Institute for Disarmament Research (UNIDIR) raised similar concerns and highlighted the lack of planning and capacity on the part of the United Nations system to respond to such situations.[20]

Studies have also highlighted the impact of a nuclear detonation on the environment, and in particular the effects on the atmosphere and the climate, with potentially serious consequences for humans, plants and wildlife.[21] They have detailed the possibility that even a limited nuclear exchange could result in reduced sunlight and rainfall, and cause depletion of the ozone layer. Such consequences, it has been argued, would affect farming and food production, causing famine in many parts of the world and putting many millions of people – potentially a billion – at risk of starvation.[22]

17 Gregor Malich, then Head of ICRC NRBC Operational Response Unit, "Challenges in Responding to the Use of Nuclear Weapons", presentation made to the Conference on the Humanitarian Impact of Nuclear Weapons, Oslo, 4–5 March 2013, available at: www.regjeringen.no/globalassets/upload/ud/vedlegg/hum/hum_malich.pdf (all internet references were accessed in December 2015). See also Robin Coupland and Dominique Loye, "Who Will Assist the Victims of Use of Nuclear, Radiological, Biological or Chemical Weapons – and How?", *International Review of the Red Cross*, Vol. 89, No. 866, 2007, pp. 329–344; Robin Coupland and Dominique Loye, "International Assistance for Victims of Use of Nuclear, Radiological, Biological or Chemical Weapons: Time for a Reality Check?", *International Review of the Red Cross*, Vol. 91, No. 874, 2009, pp. 329–340; Gregor Malich, Robin Coupland and Johnny Nehme, "Chemical, Biological, Radiological or Nuclear Events: The Humanitarian Response Framework of the International Committee of the Red Cross", in this issue of the *Review*.

18 G. Malich, above note 17.

19 R. Coupland and D. Loye, "Who Will Assist the Victims …?", above note 17, p. 335. Depending on the levels of radiation, protective measures may have to be implemented which could include maintaining safe distances from contaminated areas, limiting the number of aid workers and time spent in such areas, and avoiding direct contact with contaminated matter.

20 John Borrie and Tim Caughley, *An Illusion of Safety: Challenges of Nuclear Weapon Detonations for the United Nations Humanitarian Coordination and Response*, UN, Geneva, 2014.

21 See Mark A. Harwell and Thomas C. Hutchinson, *Environmental Consequences of Nuclear War*, Vol. 2: *Ecological and Agricultural Effects*, 2nd ed., Wiley, New York, 1989; Owen B. Toon, Alan Robock and Richard Turco, "Environmental Consequences of Nuclear War", *Physics Today*, December 2008; Committee on the Atmospheric Effects of Nuclear Explosions, *The Effects on the Atmosphere of a Major Nuclear Exchange*, National Academy Press, Washington, DC, 1985.

22 Ira Helfand, *Nuclear Famine: A Billion People at Risk*, Physicians for the Prevention of Nuclear War and Physicians for Social Responsibility, International Press, Somerville, MA, 2012.

Although much of this information was available and discussed during the Cold War, it received renewed attention at three international conferences on the humanitarian impact of nuclear weapons held in 2013 and 2014. These meetings, which took place in Oslo (Norway), Nayarit (Mexico) and Vienna (Austria), were the first multilateral gatherings devoted to discussing the consequences of nuclear weapons solely in humanitarian terms, and reaffirmed many of the existing concerns about the use of nuclear weapons. Although more fully discussed in other articles in this edition of the *Review*, the main conclusions drawn from these conferences include the following:[23]

- The use of nuclear weapons, even on a limited scale, could have severe and potentially long-lasting consequences for human health and well-being, the environment, the climate, food production and socioeconomic development.
- The health effects can last for decades and even impact the children of survivors through genetic damage to their parents.
- There is no effective or feasible means of assisting a substantial portion of survivors in the immediate aftermath of a nuclear detonation, while adequately protecting those delivering assistance in most countries or at the international level.
- Accidental nuclear weapon detonations remain a very real danger. Malfunctions, mishaps, false alarms and misinterpreted information have nearly led to the intentional or accidental detonation of nuclear weapons on numerous occasions since 1945.[24]
- These effects of a nuclear detonation, irrespective of the cause, would not be constrained by national borders and could have regional and even global consequences.[25]

These findings reinforce the earlier research on the issue, as well as the conclusions of the ICJ about the features that make nuclear weapons unique and "potentially catastrophic". They also play a central role in evaluating nuclear weapons under IHL.

23 Select conclusions drawn from the Chair's Summaries of each conference. See Conference on the Humanitarian Impact of Nuclear Weapons, Oslo, 3–5 March 2013, Chair's Summary, available at: www.regjeringen.no/en/aktuelt/nuclear_summary/id716343/; Second Conference on the Humanitarian Impact of Nuclear Weapons, Nayarit, 13–14 February 2014, Chair's Summary, available at: www.reachingcriticalwill.org/images/documents/Disarmament-fora/nayarit-2014/chairs-summary.pdf; Vienna Conference on the Humanitarian Impact of Nuclear Weapons, Vienna, 8–9 December 2014, Report and Summary Findings of the Conference, available at: http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/vienna-2014/ChairSummary.pdf. See also Alexander Kmentt, "The Development of the International Initiative on the Humanitarian Impact of Nuclear Weapons and Its Effect on the Nuclear Weapons Debate", in this issue of the *Review*.

24 See also Eric Schlosser, *Command and Control: Nuclear Weapons, the Damascus Accident and the Illusion of Safety*, Penguin Press, New York, 2013; Patricia Lewis, Heather Williams, Benoit Pelopidas and Sasan Aghlani, *Too Close for Comfort: Cases of Near Nuclear Use and Options for Policy*, Chatham House, London, 2014.

25 In this regard, the use of nuclear weapons can also raise issues under the law of neutrality, the customary rules of which would be applicable. See Nuclear Weapons Advisory Opinion, above note 4, paras 88–90.

Assessing the use of nuclear weapons through the lens of IHL

As mentioned above, IHL does not explicitly prohibit the use of nuclear weapons. However, IHL does contain general rules that apply to the use of weapons during armed conflict. For the most part, these are rules of customary international law applicable in both international and non-international armed conflicts, and as such are binding on all States and parties involved in the fighting. Many of these rules have also found expression as treaty law in the first Additional Protocol to the Geneva Conventions of 1977 (AP I).[26]

The customary status of these rules is important because, upon ratifying AP I, France, the United Kingdom and several other States – mainly NATO members – submitted declarations or reservations to the effect that the new rules introduced in AP I were understood to apply only to conventional arms; thus, they were not intended to regulate or prohibit nuclear weapons.[27] This view was also expressed in a number of written submissions to the ICJ in relation to its Nuclear Weapons Advisory Opinion.[28] Although the Court did not substantively address the issue of AP I's application to nuclear weapons, it confirmed that all States are bound by the pre-existing customary rules of IHL to which AP I merely gave expression.[29]

As customary law, such rules would govern the use of nuclear weapons by any State in an international armed conflict. Similarly, customary law would govern the use of nuclear weapons by any State or – should it acquire them – non-State armed group in the context of a non-international armed conflict.

Since the adoption of AP I and the Nuclear Weapons Advisory Opinion, the practice of nuclear-armed States has confirmed that general IHL principles and rules on the conduct of hostilities are relevant to the use of nuclear weapons. The 2013 US secretary of defence's report on the nuclear employment strategy of the United States specifies:

> The new guidance makes clear that all plans must also be consistent with the fundamental principles of the Law of Armed Conflict. Accordingly, plans will, for example, apply the principles of distinction and proportionality and seek to minimize collateral damage to civilian populations and civilian objects. The United States will not intentionally target civilian populations or civilian objects.[30]

26 Protocol Additional (I) to the Geneva Conventions of 12 August 1949 and relating to the Victims of International Armed Conflicts, 1125 UNTS 3, 8 June 1977 (entered into force 7 December 1978) (AP I).

27 These include Belgium, Canada, Germany, Italy, the Netherlands and Spain. The declarations of these countries can be found on the ICRC's IHL database, available at: www.icrc.org/applic/ihl/ihl.nsf/vwTreatiesByCountry.xsp.

28 See, for example, the written statements of the Netherlands, the Solomon Islands, the United Kingdom and the United States.

29 Nuclear Weapons Advisory Opinion, above note 4, para. 84; Stefan Oeter, "Means and Methods of Combat", in Dieter Fleck (ed.), *The Handbook of Humanitarian Law in Armed Conflicts*, 3rd ed. Oxford University Press, Oxford, 2013, pp. 158–160; Yves Sandoz, Christophe Swinarski and Bruno Zimmerman (eds), *Commentary on the Additional Protocols*, ICRC, Geneva, 1987 (ICRC Commentary), para. 1852.

30 US Secretary of Defence, Nuclear Employment Strategy of the United States specified in Section 491 of 10 USC, June 2013, pp. 4–5.

Similarly, the UK *Joint Service Manual* of 2004 states that "[t]he legality of their [nuclear weapons] use depends upon the application of the general rules of international law, including those regulating the use of force and the conduct of hostilities".[31] Despite the UK declaration made when ratifying AP I, the *Joint Service Manual* goes on to identify a range of IHL rules on the conduct of hostilities whose application to nuclear weapons is not explicitly excluded.[32] For the most part, these rules follow or use wording similar to the relevant rules of AP I.[33] This contrasts with the *Manual*'s rules for the protection of the environment, which the *Manual* clearly indicates "do not have any effect on and do not regulate or prohibit the use of nuclear weapons".[34]

The ICRC study *Customary International Humanitarian Law* (ICRC Customary Law Study) offers, to date, the most comprehensive overview of customary IHL rules, including rules on the conduct of hostilities.[35] Although the study did not propose a specific rule on nuclear weapons, it is an appropriate source for the general customary rules on the conduct of hostilities applicable to the use of nuclear weapons.[36]

The rule of distinction

The rule of distinction is a fundamental tenet of IHL and is the foundation on which other IHL requirements regulating the conduct of hostilities are built. It is, in the words of the ICJ, a cardinal principle of IHL.[37] This rule requires the parties to an armed conflict to distinguish at all times between civilians and combatants and between military objectives and civilian objects.[38] Attacks may only be directed against combatants or military objectives. All members of the armed forces of a party to the conflict, except medical personnel and chaplains, are combatants.[39] Military objectives are those "objects which by their nature, location, purpose or use make an effective contribution to military action and whose partial or total destruction, capture or neutralization in the circumstances ruling at the time, offers a definite military advantage".[40]

It follows from this rule that, in areas where civilians and civilian objects are mixed with combatants and military objectives, the attacking party must do

31 UK Ministry of Defence, *Joint Service Manual of the Law of Armed Conflict*, Joint Service Publication No. 383, 2004, p. 117 n. 82, which directs the reader to Chapter 5 of the *Manual* on the conduct of hostilities.
32 *Ibid.*, Chapter 5.
33 *Ibid.* See for example, Chapter 5.23, p. 68, and Section D on precautions in attack, p. 81.
34 *Ibid.*, Chapter 5.29.3, p. 76.
35 See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law*, *Vol. 1: Rules*, Cambridge University Press, Cambridge, 2005 (ICRC Customary Law Study).
36 In particular, the rules for the protection of the civilian population. For a discussion on the customary status of the rules for the protection of the natural environment, whose customary status has been objected to by some States, see below.
37 Nuclear Weapons Advisory Opinion, above note 4, para. 78.
38 ICRC Customary Law Study, above note 35, Rule 1, p. 3, and Rule 7, p. 25; AP I, above note 26, Art. 48.
39 ICRC Customary Law Study, above note 35, Rule 3, p. 11; AP I, above note 26, Art. 43.
40 ICRC Customary Law Study, above note 35, Rule 9, p. 29; AP I, above note 26, Art. 52(1).

everything feasible to verify that targets are military objectives,[41] and must not launch attacks using means and methods of warfare that are of a nature to strike military objectives and civilians or civilian objects without distinction. Likewise, it cannot treat as a single military objective a number of clearly separated and distinct military objectives located in a city, town, village or other area with a similar concentration of civilians. Such attacks are classified as indiscriminate, and are discussed below in more detail.

In accordance with the rule of distinction, the use of a nuclear weapon must be directed at a specific military objective. Such a requirement has clear implications for any use, whether employed in offence or defence. Recently released target lists prepared during the Cold War show that nuclear weapons were often envisioned for use against population centres,[42] and writers on this issue continue to include or perceive this as part of possible use today.[43] With the potential exception of employing a nuclear weapon in the context of a belligerent reprisal (discussed below in more detail), directing a nuclear weapon against a city, village or other grouping of civilians or civilian objects would contravene the rule of distinction.[44]

The prohibition on indiscriminate attacks

As mentioned above, attacks of a nature to strike military objectives and civilians or civilian objects without distinction are "indiscriminate" attacks and are prohibited. IHL identifies several kinds of attacks as indiscriminate.[45] These include those:

- that are not directed at a specific military objective;
- that employ a method or means of combat which cannot be directed at a specific military objective; or
- that employ methods or means of combat the effects of which cannot be limited as required by IHL;

and consequently, in each such case, that are of a nature to strike military objectives and civilians or civilian objects without distinction.[46] Disproportionate attacks and

41 See ICRC Customary Law Study, above note 35, Rule 16, p. 55; AP I, above note 26, Art. 57(2)(a)(i).

42 Scott Shane, "1950's U.S. Nuclear Target List Offers Chilling Insight", *The New York Times*, 22 December 2015. The full archive of declassified US Cold War target lists can be accessed at: https://nsarchive.gwu.edu/nukevault/ebb538-Cold-War-Nuclear-Target-List-Declassified-First-Ever/.

43 Jonah Friedman, "Countervalue v. Counterforce", *Center for Strategic and International Studies blog*, 2 June 2011, on file with authors; Thérèse Delpech, *Nuclear Deterrence in the 21st Century: Lessons from the Cold War for a New Era of Strategic Piracy*, Rand Corporation, Santa Monica, CA, 2012, pp. 35–37; Farah Zhara, "Pakistan's Road to a Minimum Nuclear Deterrent", *Arms Control Today*, 1 July 1999, available at: www.armscontrol.org/print/516.

44 See also S. Oeter, above note 29, p. 146: "On an abstract level one can only state that a strategy of 'massive retaliation' – at least in the form of a threat of first strike or of escalation – is probably not compatible with the general principles of distinction and the prohibition of indiscriminate warfare. A retaliatory operation against a population centre would only be permissible if it constituted a preemptive strike qualifying as a military reprisal."

45 ICRC Customary Law Study, above note 35, Rule 12, pp. 40–41; AP I, above note 26, Art. 51(4).

46 ICRC Customary Law Study, above note 35, Rule 12, pp. 40–41; AP I, above note 26, Art. 51(4).

attacks undertaken by "area bombardment" are also classified as indiscriminate attacks under IHL, and are discussed below.

The first prong of the rule on indiscriminate attacks prohibits attacks which are not directed at a specific military objective. This covers situations where no effort is made in the course of the attack to discriminate as required by the rule of distinction. Firing or targeting blindly is forbidden. The attacker should at the very least have precise and recent information as to the nature and location of the specific objective to be targeted to ensure that it is a military objective.[47]

The second and third prongs of the rule focus specifically on the means and methods of warfare used, and are therefore most relevant for assessing the compatibility of nuclear weapons with the prohibition on indiscriminate attacks. With regard to means of warfare, those that can in no circumstances be directed at a specific military objective, or that produce effects which cannot be limited by IHL, may be considered under customary IHL as weapons that are indiscriminate by nature, the use of which would inevitably constitute an indiscriminate attack.[48] This will be the main focus of analysis for this section.

Are nuclear weapons indiscriminate by nature? The first question to be addressed is whether nuclear weapons can be "directed at a specific military objective" as required by the second prong of the rule. In short, is there any feature in their design or construction that would render such weapons incapable of being properly targeted? Before the ICJ, both the United States and the United Kingdom argued that modern nuclear weapons can be targeted with sufficient precision to satisfy this requirement.[49] Today, commentators appear to accept this conclusion as nuclear weapons typically incorporate precision guidance features or are delivered much like traditional gravity bombs; thus, there is a reasonable expectation that the weapons can be directed to the intended target.[50]

The second – and central – question in considering whether nuclear weapons are indiscriminate by nature, and one which applies irrespective of whether the nuclear weapons are precision-guided or not, is whether they

47 ICRC Commentary, above note 29, para. 1952, p. 620.

48 ICRC Customary Law Study, above note 35, Rule 71, p. 247. See also Stuart Casey-Maslen, "The Use of Nuclear Weapons under Rules Governing the Conduct of Hostilities", in Gro Nystuen, Stuart Casey-Maslen and Annie Golden Bersagel (eds), *Nuclear Weapons under International Law*, Cambridge University Press, Cambridge, 2014, pp. 97–103.

49 Letter dated 20 June 1995 from the Acting Legal Adviser to the Department of State, together with the Written Statement of the Government of the United States of America, p. 23, available at: www.icj-cij.org/docket/files/95/8700.pdf; letter dated 16 June 1995 from the Legal Adviser to the Foreign and Commonwealth Office of the United Kingdom of Great Britain and Northern Ireland, together with Written Comments of the United Kingdom, p. 52, available at: www.icj-cij.org/docket/files/95/8802.pdf. In its written statement, the United States argued that "[s]ince nuclear weapons can be directed at a military objective, they can be used in a discriminate manner and are not inherently indiscriminate": letter dated 20 June 1995, *ibid.*, p. 23. The United Kingdom similarly asserted that "[m]odern nuclear weapons are capable of far more precise targeting and can therefore be directed against specific military objectives". Letter dated 16 June 1995, *ibid.*, p. 52.

50 See, e.g., Robert Chatham, "Tactical Nuclear Weapons", *The Reporter*, Vol. 37, No. 2, 2010, p. 44 (noting that "[n]uclear weapons, particularly battlefield tactical devices, can be directed at specifically military targets"); S. Casey-Maslen, above note 48, p. 111 (describing this proposition as "relatively uncontroversial" in light of the accuracy of modern delivery mechanisms).

produce effects that cannot be "controlled or limited" as required by IHL (the third prong of the rule on indiscriminate attacks). These terms are not specifically defined in IHL, but several military documents employ the phrase "uncontrollable effects" when speaking about indiscriminate weapons. In a 1976 pamphlet on the conduct of armed conflict and air operations, the US Air Force highlighted that the term "uncontrollable" "refers to effects which escape in time or space from the control of the user as to necessarily create risks to civilian persons or objects excessive in relation to the military advantage anticipated".[51] The South Africa National Defence Force has also highlighted that "[w]eapons which are likely to … affect both civilians and combatants, without distinction, and whose harmful effects go beyond control, in time or place, are illegal *per se*".[52] The ICJ also made observations pointing in this direction when it concluded that "[t]he destructive power of nuclear weapons cannot be contained in either space or time", although it did not define those terms.[53] Nevertheless, these references imply that compliance requires geographical and temporal limits on the effects of the weapon, and precludes too great an element of unpredictability.

It should be noted that the application of this rule to specific weapons is somewhat difficult to assess in practice. The one type of weapon widely agreed as having uncontrollable effects is biological weapons. A variety of other weapons are also perceived as indiscriminate by nature, but State practice rarely specifies whether this is because they cannot be properly targeted, because their effects are uncontrollable, or both.[54]

A primary issue here is whether the forces released by a nuclear weapon, and the effects of those forces, can be sufficiently limited to the specific military objective targeted such that the discrimination required by the rule of distinction can be made and the respect and protection provided by IHL assured.[55]

Perhaps the most significant concern is the spread of radioactive fallout, which has been identified as "the most fundamental difference between nuclear

51 US Department of the Air Force, *International Law: The Conduct of Armed Conflict and Air Operations*, US Air Force Pamphlet No. 110-31, 1976, ss. 6-3(c) (although this pamphlet indicates that it does not necessarily reflect official US government policy).

52 South Africa National Defence Force, *Revised Civic Education Manual*, 2004, Chapter 4, ss. 56(f).

53 Nuclear Weapons Advisory Opinion, above note 4, para. 35: "[The Court] also notes that nuclear weapons are explosive devices whose energy results from the fusion or fission of the atom. By its very nature, that process, in nuclear weapons as they exist today, releases not only immense quantities of heat and energy, but also powerful and prolonged radiation. According to the material before the Court, the first two causes of damage are vastly more powerful than the damage caused by other weapons, while the phenomenon of radiation is said to be peculiar to nuclear weapons. These characteristics render the nuclear weapon potentially catastrophic. The destructive power of nuclear weapons cannot be contained in either space or time. They have the potential to destroy all civilization and the entire ecosystem of the planet."

54 The ICRC Customary Law Study, above note 35, cites States as identifying the following weapons as being potentially indiscriminate: chemical, biological and nuclear weapons; anti-personnel landmines; mines; poison; explosives discharged from balloons; V-1 and V-2 rockets; cluster bombs; booby traps; Scud missiles and Katyusha rockets; incendiary weapons; and environmental modification techniques.

55 This includes the respect and protection outlined in the rule of distinction as well as the general principle outlined in AP I, Art. 51(1), that "[t]he civilian population and individual civilians shall enjoy general protection against dangers arising from military operations."

and conventional weapons".[56] The severity and spread of radioactive particles will depend on the yield of the weapon and where it is detonated (ground burst, air burst or underwater), as well as a range of geographic, climatic and meteorological factors. These latter elements are generally beyond the control of the parties to the conflict, making the spread of radiation nearly impossible to constrain. Thus, the short- and long-term health effects of nuclear weapons could cross international borders, impacting neighbouring States and many more people than those in the area initially affected by the blast. The scale and dispersion of such radiation has been highlighted in a number of studies. One recent presentation highlighted that the ground-burst detonation of a 200-kiloton bomb would spread and potentially impact the health of civilians over hundreds of kilometres.[57] In another study, it was found that 75% of the 100,000 estimated casualties from the detonation of a 10-kiloton earth-penetrating nuclear weapon would be caused by nuclear fallout.[58] As indicated above, the impact of radiation on human health can be long-term, with illness and cancers occurring years or even decades after exposure.

Such effects raise serious concerns in light of the inherent difficulties in controlling or limiting them in space and in time. These consequences would arguably qualify nuclear weapons as weapons that are indiscriminate by nature, the use of which cannot be reconciled with the prohibition on indiscriminate attacks.

Even if, for the sake of argument, nuclear weapons were not to be considered indiscriminate by nature, they can still offend the prohibition on indiscriminate attacks as a result of the circumstances in which they are used. The prohibition on indiscriminate attacks takes into account the fact that means and methods of warfare which can be used legitimately in some situations could, in other circumstances, be of a nature to strike military objectives and civilians and civilian objects without distinction. In light of the blast, thermal and radiation effects and the areas over which these effects are spread, nuclear weapons may still contravene this rule, certainly when used in populated areas.

56 Nuclear Weapons Advisory Opinion, above note 4, para. 35.

57 Matthew McKinzie, Erwin Polriech, Dèlia Arnold, Christian Maurer and Gerhard Wotawa, "Calculating the Effects of a Nuclear Explosion at a European Military Base", presentation made to the Vienna Conference on the Humanitarian Impact of Nuclear Weapons, 8 December 2014, available at: www.bmeia.gv.at/fileadmin/user_upload/Zentrale/Aussenpolitik/Abruestung/HINW14/Presentations/HINW14_S1_Presentation_NRDC_ZAMG.pdf. Also see the article by Hans M. Kristensen and Matthew McKinzie in this issue of the *Review*.

58 National Research Council Committee on the Effects of Nuclear Earth-Penetrator and Other Weapons, *Effects of Nuclear Earth-Penetrator and Other Weapons*, National Academies Press, Washington, DC, 2005, pp. 75–80. See also Victor W. Sidel, H. Jack Geiger, Herbert L. Abrams, Robert W. Nelson and John Loretz, *The Threat of Low-Yield Earth-Penetrating Nuclear Weapons to Civilian Populations: Nuclear "Bunker Busters" and Their Medical Consequences*, International Physicians for the Prevention of Nuclear War, 2003; Robert W. Nelson, "Low-Yield Earth Penetrating Nuclear Weapons", *Science and Global Security*, Vol. 10, 2002 (citing examples of very low-yield (>1kt) bunker-busting bombs spreading fatal doses of radiation to tens of thousands of people if detonated in or near a populated area).

The prohibition on disproportionate attacks

The prohibition on disproportionate attacks, also known as the rule of proportionality, prohibits attacks that may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects or a combination of these that would be excessive in relation to the concrete and direct military advantage anticipated.[59] As mentioned above, attacks violating this rule are considered a particular form of indiscriminate attack. It is worth noting that this rule regulates attacks directed against military objectives and will involve an assessment, undertaken before the decision to launch an attack, of the military advantage expected from the operation and the expected incidental civilian harm. The relevant advantage must be military, concrete and direct, and must not be remote, long-term or hypothetical.[60]

The incidental harm and damage that must be factored in when making the excessiveness assessment includes, in the first instance, immediate effects such as direct civilian casualties and damage to civilian objects. In addition, it is generally accepted that the assessment must consider the attack's "reverberating" effects – that is, the indirect second- and third-tier consequences – when these are foreseeable.[61] This is drawn from the wording of the rule of proportionality ("may be expected to cause incidental loss") and the general principle of IHL whereby civilians "enjoy general protection against the dangers arising from military operations".[62]

As indicated above, the use of a nuclear weapon will have extensive immediate and long-term consequences, especially if used against military objectives located in or near populated areas. One recent study examined the impact of the air-burst detonation of a 20-kiloton nuclear weapon over a European capital city.[63] While the effects can be influenced by a number of factors, it was estimated that the blast radius of a weapon would extend more than 5 kilometres from the epicentre of the explosion and that thermal heat would be distributed across some 4.5 kilometres, with tens of thousands of people

59 ICRC Customary Law Study, above note 35, Rule 14, p. 46; AP I, above note 26, Art. 51(5)(b).

60 ICRC Commentary, above note 29, para. 2209.

61 See, e.g., Cordula Droege, "Get Off My Cloud: Cyber Warfare, International Humanitarian Law and the Protection of Civilians", *International Review of the Red Cross*, Vol. 94, No. 886, 2012, pp. 572–573 (describing it as "largely undisputed" that reverberating effects must be taken into account and that "it is reasonable to argue that foreseeable damages, even if they are long-term, second- and third-tier damages, must be taken into account"); Michael Schmitt and Eric Widmar, "On Target: Precision and Balance in the Contemporary Law of Targeting", *Journal of National Security Law and Policy*, Vol. 7, No. 379, 2014, p. 405.

62 See, e.g., C. Droege, above note 61, p. 572; Marco Sassòli and Lindsey Cameron, "The Protection of Civilian Objects: Current State of the Law and Issues *de Lege Ferenda*", in Natalino Rozitti and Gabriella Venturini (eds), *The Law of Air Warfare: Contemporary Issues*, Eleven International Publishing, The Hague, 2006, p. 65; Robin Geiss, "The Conduct of Hostilities in Asymmetric Conflicts", *Journal of International Law of Peace and Armed Conflict*, Vol. 23, No. 3, 2010, p. 122.

63 Elin Enger and Thomas Vik, Norwegian Defence Research Establishment, "Scenario of a Nuclear Detonation", presentation to the Conference on the Humanitarian Impact of Nuclear Weapons, Oslo, 4 March 2013, available at: www.regjeringen.no/globalassets/upload/ud/vedlegg/hum/hum_enge.pdf.

swiftly killed or injured in the moments following the detonation.[64] Massive destruction of civilian buildings and infrastructure would also be expected.[65]

Although this will be influenced by the yield of the weapon and the environment in which it is used, extensive casualties can also result from the fires and firestorms that are likely to occur and burn uncontrollably in the immediate aftermath of the explosion. The course and duration of such forces are difficult to predict, and limiting the casualties and damage caused by the fires would be nearly impossible. In Hiroshima and Nagasaki, for example, fires burned without restraint for hours in the aftermath of the atomic bomb detonation, and many thousands who survived the initial blast were subsequently killed or injured by the conflagration. In Hiroshima alone, the firestorm subsequent to the atomic bomb detonation covered approximately 4 square kilometres.[66]

The immediate casualties and damage caused by the blast wave and thermal heat of a nuclear detonation would clearly need to be taken into account in the assessment of proportionality. In addition, the foreseeable casualties from ionizing radiation and radioactive fallout in the days, weeks and months following the attack must also be appraised. One may question the extent to which casualties that occur years or even decades after the attack are properly to be taken into account in applying the rule, but a good-faith application would surely require it. As was indicated earlier,[67] such effects are clearly foreseeable given that the long-term effects of radiation exposure on human health have been widely studied, and in light of the experiences of Hiroshima and Nagasaki, where thousands of people died from the consequences of ionizing radiation in the months and years following the explosion of the atomic bombs dropped over those cities. Today, such casualties could not be considered remote or speculative.

It should also be noted that the rule of proportionality does not set or imply a temporal limit on the incidental damage to be considered when applying it. During the discussions on the rule of proportionality and the long-term effects of unexploded and abandoned ordnance (referred to in that context as explosive remnants of war) that took place between 2000 and 2003 amongst the States party to the Convention on Certain Conventional Weapons, such a limitation was never raised, yet the impact of such ordnance was widely known to last years and in some cases decades. In these discussions, States and experts seemed to accept that the rule of proportionality encompassed a forward-looking, long-term element. Finally, viewing these consequences through the general principle of IHL that seeks to protect civilians against the dangers arising from military operations

64 By comparison, the atomic bomb dropped on Hiroshima was estimated to have a yield of 16 kilotons and the radius of destruction from the blast forces was estimated at 1.6 kilometres, with an additional 11 square kilometres destroyed by subsequent fires and firestorms. Some 70,000–80,000 people, including some 20,000 soldiers, were killed during this time. See, Committee for the Compilation of Materials on Damage Caused by the Atomic Bombs in Hiroshima and Nagasaki, *Hiroshima and Nagasaki – the Physical, Medical and Social Effects of the Atomic Bombings*, Basic Books, New York, 1981, pp. 55–56.

65 *Ibid.* In Hiroshima it is estimated that buildings and infrastructure across some 12 square kilometres of the city were destroyed.

66 *Ibid.*, pp. 55–56.

67 See the discussion on the humanitarian consequences of nuclear weapons above.

would further argue for including the casualties and damage expected to occur in the long term.

In light of such impacts, the concrete and direct military advantage to be gained from the use of a nuclear weapon would have to be of paramount value and importance to justify such a high and foreseeable level of death, injury and destruction. In reality, it seems particularly hard to imagine any such advantage arising from an attack in or near a populated area. Indeed, based on what is today known about the effects of nuclear weapons, it can be asserted that the use of nuclear weapons against a military objective located in or near a populated area would contravene the prohibition on disproportionate attacks.

The prohibition on area bombardment

Another form of indiscriminate attack is "area bombardment", which is defined under IHL as "attacks by bombardment by any method or means which treats as a single military objective a number of clearly separated and distinct military objectives located in a city, town, village or other area containing a similar concentration of civilians or civilian objects".[68] This rule is intended to outlaw practices such as "carpet bombing", "saturation bombing" and similar attacks, which were employed in World War II and in later conflicts with severe consequences for civilian populations.

Much of the discussion about this rule has focused on the meaning of "clearly separated and distinct". There are no specific criteria assigned to these terms in IHL, and as a result their determination remains a somewhat subjective assessment. Yet, when the distance between two or more military objectives is sufficient for them to be attacked separately, taking into account the means available, they must be engaged individually.[69] Where the distance is not sufficient to render them clearly separated and distinct, other relevant rules, such as the rule of proportionality and the rule on feasible precautions, remain applicable.

The prohibition on area bombardment has not often been discussed in relation to nuclear weapons and is not specifically referred to in the Nuclear Weapons Advisory Opinion.[70] This may be because the use of a nuclear weapon in a populated area would raise a host of concerns in relation to other prominent IHL rules regulating the conduct of hostilities, as discussed above. Nevertheless, under this prohibition, the principal concerns relate to the wide-area blast and thermal heat effects of nuclear weapons: features which may make a nuclear weapon particularly appealing as an efficient means to collectively destroy multiple military objectives. The rule prohibiting area bombardment would

68 ICRC Customary Law Study, above note 35, Rule 13, p. 43; AP I, above note 26, Art. 51(5)(a).

69 ICRC Commentary, above note 29, para. 1975.

70 But see Louise Doswald-Beck, "International Humanitarian Law and the Advisory Opinion of the International Court of Justice on the Legality of the Threat or Use of Nuclear Weapons", *International Review of the Red Cross*, Vol. 79, No. 823, 1997; S. Casey-Maslen, above note 48, pp. 107–108.

preclude such use in any populated area when the objectives are clearly separated and distinct from each other.

The obligation to take precautions in attack

Parties to an armed conflict are required to take constant care in the conduct of military operations to spare the civilian population and civilian objects.[71] The particular precautions required by IHL with respect to attacks include doing everything feasible to verify that targets are military objectives[72] and taking all feasible precautions in the choice of means and methods of warfare with a view to avoiding, or in any event minimizing, incidental civilian casualties and damage to civilian objects.[73]

The references to "everything feasible" and "feasible" precautions are a reminder of the fact that armed forces cannot be required to do what is objectively impossible.[74] It also leaves room for those acting in good faith to make mistakes, but those acting negligently can be held accountable.[75] Feasible precautions have been defined as "those precautions which are practicable or practically possible taking into account all circumstances ruling at the time, including humanitarian and military considerations".[76]

The obligation to take feasible precautions in the choice of means of warfare with a view to avoiding or minimizing civilian casualties and damage would require that the party planning an attack assess such factors as the importance of the target, the different weapon systems available, and the foreseeable impact of those weapons on civilians and civilian objects.[77] Although IHL does not dictate the kinds of weapons that are to be used in attacking particular targets, it is largely undisputed that if there is a choice of weaponry that could accomplish the same military task, the rule requires the use of that which would lead to fewer civilian casualties and damage when it is practically possible.[78]

In light of what is known about the severe humanitarian consequences that would arise from the use of nuclear weapons and the requirement to take constant care to spare civilians and civilian objects, the situations where nuclear weapons

71 ICRC Customary Law Study, above note 35, Rule 15, p. 51; AP I, above note 26, Art. 57(1).
72 ICRC Customary Law Study, above note 35, Rule 16, p. 55; AP I, above note 26, Art. 57(2)(i).
73 ICRC Customary Law Study, above note 35, Rule 16, pp. 56–60; AP I, above note 26, Art. 57(2)(ii).
74 Jean Francois Quéguiner, "Precautions under the Law Governing the Conduct of Hostilities", *International Review of the Red Cross*, Vol. 88, No. 864, 2006, pp. 809–810.
75 *Ibid.*
76 Protocol on Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices, as amended on 3 May 1996, Art. 3(10); Protocol on Explosive Remnants of War, 28 November 2003, Art. 5(1).
77 See, e.g., UK Ministry of Defence, above note 31, p. 83, discussing the factors to be considered in selecting the means and methods of attack under this rule.
78 See J. F. Quéguiner, above note 74, pp. 802–803, arguing that this rule would require the use of precision-guided weapons over other munitions when they are in a State's arsenal and it is practically possible. See also Michael N. Schmitt and Eric Widmar, "The Law of Targeting", in Paul Alphons Ducheine, Michael N. Schmitt and Frans P. B. Osinga (eds), *Targeting: The Challenges of Modern Warfare*, Asser Press, The Hague, 2016, p. 138.

could be the weapon of choice would seem to be very limited. The faithful application of the rule on precautions in attack would likely preclude the use of nuclear weapons in or near a populated area and would require the employment of a less destructive and harmful means of warfare. Some commentators note that, in light of recent developments in conventional weapons technology, "virtually any military objective for which [low-yield, 'tactical' nuclear] weapons might be used could also be addressed by conventional weapons".[79]

The prohibition on using weapons of a nature to cause superfluous injury or unnecessary suffering

IHL prohibits the use of means and methods of warfare which are of a nature to cause superfluous injury or unnecessary suffering. The basis for this rule was first articulated in the Preamble of the 1868 St. Petersburg Declaration Renouncing the Use, in Time of War, of Explosive Projectiles under 400 Grammes Weight. It later found expression in the 1899 and 1907 Hague Conventions with respect to the Laws and Customs of War on Land. Applications of the rule to specific weapons are found in the 1899 Hague Declarations on asphyxiating gases and expanding bullets and the 1925 Geneva Gas Protocol.[80] Its influence is also reflected in instruments such as the 1972 Biological Weapons Convention, the 1993 Chemical Weapons Convention, the 1980 Convention on Certain Conventional Weapons and the 1997 Anti-personnel Mine Ban Convention.[81] This rule differs from those discussed above in that it is primarily intended to protect combatants, rather than civilians, from injury and suffering that has little or no military purpose.[82]

The application of this rule as a legal constraint on the use of a particular weapon raises questions as to how "superfluous" injury and "unnecessary" suffering should be identified and assessed. With regard to weapons, there is wide agreement that this requires an assessment between the military need for the weapon and the nature of the injury or suffering expected from its use. Injury or suffering that exceeds what is required to achieve the military goal sought would violate the rule.[83] Like the assessment required by the rule of proportionality, the effects to

79 See Dakota Rudesill, "Regulating Tactical Nuclear Weapons", *Georgetown Law Journal*, Vol. 102, No. 99, 2013, p. 159, concluding that, as conventional weapons can now be effectively used for most of the military missions for which "tactical" nuclear weapons would previously have been designated, "[t]he battlefield role for [tactical nuclear weapons] is over". See also Charles Moxley, John Burroughs and Jonathan Granoff, "Nuclear Weapons and Compliance with International Humanitarian Law and the Nuclear Non-Proliferation Treaty", *Fordham International Law Journal*, Vol. 34, No. 595, 2011, p. 660.

80 ICRC Customary Law Study, above note 35, Rule 70, pp. 237–244; AP I, above note 26, Art. 35(2). For an overview of the history of this rule, see ICRC Commentary, above note 29, pp. 401–403.

81 ICRC Commentary, above note 29. Reference to the rule is specifically made in the Preamble of the 1997 Anti-personnel Mine Ban Convention.

82 ICRC Customary Law Study, above note 35, p. 240.

83 See, e.g., M. G. Cowling, "The Relationship between Military Necessity and the Principle of Superfluous Injury and Unnecessary Suffering in the Law of Armed Conflict", *South African Yearbook of International Law*, Vol. 25, No. 131, 2000, p. 142; C. Moxley, J. Burroughs and J. Granoff, above note 79, pp. 618–619. And see ICRC Customary Law Study, above note 35, Rule 70, pp. 240–241, which also cites the ICJ, in its Nuclear Weapons Advisory Opinion, para. 78, defining this as "harm greater than that unavoidable to achieve legitimate military objectives".

be taken into account in the application of the rule would logically be limited to those that are foreseeable.

As the ICRC Commentary to the Additional Protocols notes, however, neither a weapon's effects on combatants nor the relationship of these effects to military necessity has been "interpreted in a consistent and generally accepted manner", and as a result, the rule is somewhat "relative and imprecise".[84] The ICRC Customary Law Study also found that State views differ as to how it can actually be determined that a weapon causes superfluous injury or unnecessary suffering – although there is general agreement that suffering which has no military purpose violates the rule,[85] and that relevant factors include the inevitability of serious permanent disability or death.[86]

In the Nuclear Weapons Advisory Opinion, the ICJ cited this rule as one of the cardinal principles of IHL and identified it as having direct regulatory relevance for the use of nuclear weapons.[87] Despite this, the application of this rule to the use of nuclear weapons is seldom discussed in existing literature.[88] The primary concern with regard to nuclear weapons is the impact of radiation on the health of combatants. Given what is known about the intense radiation released by a nuclear detonation and its severe effects on human health, it would be reasonable to conclude that many combatants who may survive the immediate heat and blast effects of a nuclear detonation will fall victim to a slower death caused by radiation in the days, weeks and months that follow. Others would also be at increased risk of developing cancers, such as leukaemia and thyroid cancer, later in life. Such suffering, culminating in their slow death, is foreseeable and would need to be considered in the application of this rule.

A number of States – largely on the basis of this rule – have identified nuclear weapons as causing unnecessary suffering.[89] The ICRC also stated in 2015 that "[t]he horrific short- and long-term illnesses, permanent disability and suffering caused by radiation exposure raise serious questions about the compatibility of nuclear weapons" with the prohibition.[90] This conclusion has particular relevance to, and would appear to raise questions about, claims that low-yield nuclear weapons employed against combatants in locations far from civilian areas are consistent with IHL.

84 ICRC Commentary, above note 29, pp. 409–410. See also Simon O'Connor, "Nuclear Weapons and the Unnecessary Suffering Rule", in G. Nystuen, S. Casey-Maslen and A. Golden Bersagel, above note 48, pp. 129–147.

85 ICRC Customary Law Study, above note 35, Rule 70, p. 240.

86 *Ibid.*, p. 241.

87 Nuclear Weapons Advisory Opinion, above note 4, para. 78.

88 See S. O'Connor, above note 84, p. 129.

89 ICRC Customary Law Study, above note 35, Rule 70 n. 55, p. 244.

90 Helen Durham, ICRC Director of International Law and Policy, "The Use of Nuclear Weapons and International Humanitarian Law", statement to the Vienna Conference on the Humanitarian Impact of Nuclear Weapons, available at: www.bmeia.gv.at/fileadmin/user_upload/Zentrale/Aussenpolitik/Abruestung/HINW14/Presentations/HINW14_S4_Presentation_Helen_Durham.pdf.

It has been argued that the health effects of radiation are not to be considered when applying this rule because radiation is an inherent by-product of a nuclear explosion and is not an effect added to increase the suffering of combatants.[91] This view relies on an interpretation of the rule of unnecessary suffering as formulated in the 1907 Hague Regulations, which states that it is prohibited "to employ arms, projectiles, or materials *calculated to cause* unnecessary suffering" (emphasis added).[92] This "calculated to cause" formulation is seen as implying that the prohibition only covers situations where a weapon is designed or altered so as to intentionally aggravate the suffering of combatants.

However, the 1907 English-language version of this rule is widely considered to be an inaccurate translation of the authentic and authoritative French text, which used the phrase "*propres à causer des maux superflus*" and which is properly interpreted as having a broader scope and not requiring a specific intent.[93] When the rule was reaffirmed and negotiated in the context of AP I, the English version more closely followed the authoritative French text.[94] Thus, Article 35(2) of AP I prohibits the use of "weapons, projectiles and material and methods of warfare of *a nature to cause* superfluous injury or unnecessary suffering" (emphasis added). Similar wording ("of a nature to cause") is also used in the Statute of the International Criminal Court and in the equivalent rule under customary IHL.[95] The "of a nature to cause" phrasing reflects the formulation accepted by nearly all States today. The effect is that the rule is widely understood to apply not only to instances where a weapon is designed or intentionally altered to increase the suffering of combatants, but also to situations where the suffering is not intentional but is foreseeable as a result of the weapon's design and intended use. Thus, the impact of radiation and the injury and suffering it will cause must be weighed against the military objective being sought. As indicated above, the severe consequences of radiation exposure on the health of combatants raise serious concerns under this rule and appear to undermine arguments that nuclear weapons would be consistent with IHL when used away from populated areas.

Rules on the protection of the natural environment

IHL contains a number of rules intended to protect the natural environment from the effects of armed conflict. In this context, the natural environment is generally

91 Letter dated 20 June 1995, above note 49, pp. 28–29. See also C. Moxley, J. Burroughs and J. Granoff, above note 79, p. 651.

92 1907 Hague Convention IV Respecting the Laws and Customs of War on Land, 18 October 1907 (entered into force 26 January 1910), Art. 23(e).

93 Adam Roberts and Richard Guelff, *Documents on the Laws of War*, 3rd ed., Oxford University Press, Oxford, 2000, p. 77 n. 3.

94 S. O'Connor, above note 84, p. 132.

95 Rome Statute of the International Criminal Court, UN Doc. A/CONF.183/9, 17 July 1998 (entered into force 1 July 2002), Art. 8(2)(b)(xx); ICRC Customary Law Study, above note 35, Rule 70, p. 237.

understood in a broad sense and includes air, water, agriculture, livestock, forests, flora, fauna and other biological and climatic elements.[96]

The general rules of IHL regulating the conduct of hostilities protect the natural environment as a civilian object.[97] Thus, parts of the environment may be lawfully attacked only if they constitute a military objective. In addition, the destruction of any part of the environment is prohibited, unless it is required by imperative military necessity.[98] Incidental damage to the environment must also be taken into account as part of the proportionality assessment carried out for attacks directed at other military objectives. Such damage cannot be excessive in relation to the concrete and direct military advantage anticipated. Feasible precautions in the choice of weapons must also be taken to avoid or in any event minimize incidental environmental damage.[99]

IHL also has a specific rule that prohibits the use of means and methods of warfare which are or may be expected to cause "widespread, long-term and severe" damage to the natural environment.[100] As indicated above, the customary status of this rule has been disputed, with France, the United Kingdom and the United States asserting that the rule has not achieved customary status with regard to nuclear weapons.[101] Nevertheless, these provisions can still have relevance for the use of nuclear weapons for those States that are or may become a party to AP I and that have not submitted declarations excluding the application of this rule in such instances.

The main difference between this rule and the treatment of the environment as a civilian object is that the rule is an absolute prohibition. If widespread, long-term and severe damage is intended or expected, the means or method of warfare under consideration in that instance is prohibited.

The requirements for the damage to be "widespread, long-term and severe" are cumulative and as such fix a very high threshold. These terms were not specifically defined in AP I, but have been summarized as "major interference with human life or natural resources which considerably exceeds the battlefield damage to be regularly expected in a war".[102] Although the phrase "long-term" is generally understood to be measured in decades and not in months or a season,

96 ICRC Commentary, above note 29, para. 2126, p. 662.
97 ICRC Customary Law Study, above note 35, Rules 43, 44, pp. 143–151.
98 *Ibid.*, Rule 43, pp. 144–145.
99 *Ibid.*, Rule 44, p. 149.
100 ICRC Customary Law Study, above note 35, Rule 45, p. 151; AP I, above note 26, Art. 35(3). This rule is also reinforced in Art. 55(1) of AP I.
101 Specifically, Articles 35(3) and 55 of AP I, above note 26; see ICRC Customary Law Study, above note 35, pp. 154–155. For more views on this subject, see Erik Koppe, "Use of Nuclear Weapons and Protection of the Environment during International Armed Conflict" in G. Nystuen, S. Casey-Maslen and A. Golden Bersagel, above note 48, p. 259 n. 45. For a detailed critique, see Jeremy Marsh, "Lex Lata or Lex Ferenda? Rule 45 of the ICRC Study on Customary International Humanitarian Law", *Military Law Review*, Vol. 198, No. 116, 2008; Jean-Marie Henckaerts, "Customary International Law: A Response to the US Comments", *International Review of the Red Cross*, Vol. 89, No. 866, 2007, p. 482.
102 S. Oeter, above note 29, p. 126; see also German Federal Ministry of Defence, *Humanitarian Law in Armed Conflicts: Manual*, Joint Service Regulation (ZDv) 15/2, DSK AV230100262, May 2013, p. 61.

neither the commentary to AP I nor the ICRC Customary Law Study offer definitions of "widespread" or "severe".[103]

As indicated above, numerous studies have highlighted the serious consequences that the use of nuclear weapons would have on the natural environment. These include the destruction of flora and fauna by the detonation's release of blast forces and thermal radiation; contamination of land and water supplies by radioactive particles; and the dispersal of dirt and soot affecting the atmosphere and climate, with potentially serious consequences for humans, plants and wildlife.[104] The dispersal of dirt and soot is of particular concern because of the severe impact it can have on farming and food production, potentially putting many millions of people at risk of starvation.[105] It would equally have an impact on other plants and vegetation upon which animals and insects feed.[106] Although the scale and level of such consequences will vary with the yield of the particular weapon and the context in which it is used, they can be readily expected with the use of large nuclear weapons and even lower-yield weapons as part of a nuclear attack or exchange.

These consequences, like other foreseeable damage and effects, must be taken into account when applying the general IHL rules that seek to protect the natural environment. They have particular bearing on the rule on disproportionate attacks, as incidental damage to the environment or parts thereof must be included in the proportionality assessment. Given the extensive damage to the natural environment that would result in most instances, the military advantage expected from an attack employing nuclear weapons would have to be of very high value for the attack to be lawful. In addition, and in light of the powerful and long-lasting effects of nuclear weapons, the application of the rule on feasible precautions would seem to argue for the use of a conventional rather than a nuclear weapon in the vast majority of instances where one was available and the same military goal could be achieved. It is hard to imagine any conventional weapon causing the kind and level of environmental damage that would result from the use of a nuclear weapon.

Serious problems arise with the use of nuclear weapons under the prohibition on means and methods of warfare which may be expected to cause widespread, long-term and severe damage to the natural environment. The range and nature of the long-term environmental consequences highlighted above would, in most instances, seem to meet the severe, widespread and long-term

103 ICRC Commentary, above note 29, p. 417. These terms are used in the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD Convention), and although they only apply in that context, "widespread" is understood to encompass an area of several hundred square kilometres and "severe" to involve "serious or significant disruption or harm to human life, natural and economic resources or other assets". UN Environmental Protection Programme, *Protection of the Environment during Armed Conflict: An Inventory and Analysis of International Law*, 2009, p. 5. Under the ENMOD Convention, however, the terms are not a cumulative standard as is the case in AP I.

104 See the references cited at note 21.

105 I. Helfand, above note 22; British Medical Association, above note 11, pp. 92–100.

106 *Ibid.*

criteria set out in the prohibition. The fact that some nuclear-armed States have consistently rejected the application of this specific rule to the use of nuclear weapons serves to highlight its relevance as a limitation.

The use of nuclear weapons as a belligerent reprisal

Despite the legal issues and concerns highlighted above, it has been suggested that nuclear weapons may be used in an armed conflict as a belligerent reprisal.[107] Briefly stated, the law of belligerent reprisals permits (under certain conditions) acts that would normally be unlawful under IHL insofar as they seek to bring an adversary back into compliance with its IHL obligations.[108] Belligerent reprisals have been a traditional method of enforcing the law of armed conflict, but in recent decades the trend has moved towards prohibiting reprisals taken against the civilian population in the conduct of hostilities.[109] Article 51(6) of AP I explicitly prohibits "attacks against the civilian population by way of reprisals", and although it is not yet considered a rule of customary IHL, there is a strong movement in this direction.[110]

Although the requirements for a lawful reprisal are not comprehensively settled, customary IHL sets out a number of conditions and limitations.[111]

1. The reprisal must be in response to a serious violation of IHL and employed only for the purpose of restoring the opposing party's compliance. Thus, belligerent reprisals cannot be anticipatory or pre-emptive acts. In addition, the reprisal must be in response to a serious violation of IHL, and not a reaction to violations of rules deriving from other areas of law. Nor can an adversary against whom the reprisal is directed use that initial reprisal as a justification to employ its own reprisal in response – a so-called "counter-reprisal".
2. The reprisal must be a measure of last resort. This implies that other measures (e.g. political, diplomatic or economic measures) should be taken in advance of the reprisal in an effort to end the offending behaviour. It also appears to suggest that the adversary must be given due warning of the consequences of any repeat action before a reprisal is taken.
3. The reprisal must be proportionate to the original breach.
4. The decision to employ a reprisal must be taken at the highest level. This normally means high levels of the government or the military. The decision to employ a reprisal may not be made by local commanders.
5. The reprisal must cease once compliance is restored.

107 See S. Oeter, above note 29, p. 205. More generally, see Fritz Kalshoven, *Belligerent Reprisals*, 2nd ed., Brill Academic Publishers, Leiden, 2005.
108 S. Oeter, above note 29, p. 204.
109 ICRC Customary Law Study, above note 35, Rule 145, p. 513.
110 *Ibid.*, pp. 520–523.
111 ICRC Customary Law Study, above note 35, Rule 145, pp. 515–518; S. Casey-Maslen, above note 48, pp. 178–179; C. Moxley, J. Burroughs and J. Granoff, above note 79, p. 661.

These conditions would be applicable to the use of any nuclear weapon as a belligerent reprisal and would act as limitations on any such use.

As indicated above, one requirement for a belligerent reprisal is that it be in response to a serious violation of IHL. Thus, the use of a nuclear weapon against civilians or civilian objects as a belligerent reprisal could not be justified for a violation of *jus ad bellum* or rules deriving from other areas of law.[112] A surprise or unexpected attack in violation of a rule of *jus ad bellum* against a clear military objective, initiating an armed conflict, would not substantiate the use of nuclear weapons as a reprisal. Nuclear weapons may be used in response, but their use would need to strictly comply with the IHL rules discussed throughout this article.

In addition, the requirement that reprisals be proportionate to the original breach would appear to limit the use of nuclear weapons to a very small number of situations. Given their severe humanitarian consequences, the use of such weapons as a reprisal would logically require that the violation provoking the reprisal be of enormous severity. It is hard to imagine that a nuclear reprisal could be legitimately employed in response to an attack or attacks involving conventional weapons. More likely, the unlawful precipitating attack would need to involve the use of one or several nuclear weapons, or another weapon of mass destruction, against a populated area, resulting in an immense number of civilian casualties.[113] In this regard, it is highly unlikely that a nuclear-armed State, having been the victim of such an attack using weapons of mass destruction, would first seek to exhaust all relevant political, diplomatic, economic and other measures against the attacker before resorting to a reprisal in response – a necessity that is implied in the second limitation outlined in the list above. It therefore seems unrealistic that this criterion would be fulfilled or strictly applied in practice.[114]

Finally, while one may be able to envision a situation where a very limited number of low-yield nuclear weapons are used to compel a return to compliance with IHL, this would seem to be a very risky road to take. As has been noted in a number of military manuals, the use of reprisals has tended to escalate attacks on civilians rather than ending them.[115] Thus, one use or even a limited exchange of nuclear weapons runs a very real risk of nuclear escalation and further violations of IHL, with the potential for catastrophic consequences in humanitarian terms.

112 Christopher Greenwood, "The Twilight of the Law of Belligerent Reprisals", *Netherlands Yearbook of International Law*, Vol. 20, 1989, pp. 40–43; Stuart Casey-Maslen, "The Use of Nuclear Weapons as Reprisals", in G. Nystuen, S. Casey-Maslen and A. Golden Bersagel, above note 48, p. 184.

113 *Ibid.*, p. 186.

114 A point also noted by F. Kalshoven, above note 107, p. 340. See also Francoise Hampson, "Belligerent Reprisals and the 1977 Protocols to the Geneva Conventions of 1949", *International and Comparative Law Quarterly*, Vol. 37, 1988, p. 823.

115 See US Office of the General Counsel, *Department of Defense Law of War Manual*, June 2015, Chapter 18.18.4, p. 1099, highlighting many of the practical consequences to consider in the use of reprisals; C. Moxley, J. Burroughs and J. Granoff, above note 79, p. 664; ICRC Customary Law Study, above note 35, p. 522.

Concluding comments

This article has outlined the IHL rules governing the conduct of hostilities that must be taken into account if a party to an armed conflict were ever to consider the use of a nuclear weapon. It highlights the problems and concerns that arise in light of the severe and extensive consequences for civilians, civilian objects and combatants that the use of nuclear weapons would entail. As pointed out by the ICJ in its Nuclear Weapons Advisory Opinion, the combination and power of the blast, thermal heat and radiation forces that result from the explosion make nuclear weapons unique. Very few existing means of warfare have effects that impact so significantly across such a wide range of IHL rules. These are the factors that have led the International Red Cross and Red Crescent Movement to declare that it "finds it difficult to envisage how any use of nuclear weapons could be compatible with the rules of international humanitarian law, in particular the rules of distinction, precaution and proportionality".[116]

As highlighted in the introduction to this article, there is no treaty or rule of IHL that specifically prohibits the use of nuclear weapons. Nevertheless, it is difficult to reconcile their use in nearly every circumstance with the customary IHL rules that seek to protect civilians and civilian objects from the effects of military operations. This conclusion holds in respect of low- and higher-yield nuclear weapons, as each would have severe consequences for civilians at the moment of the attack and in the longer term due to the effects of radiation and radioactive fallout on human health. Given such effects, it seems reasonable to conclude that the use of a nuclear weapon in or near a populated area would constitute an indiscriminate attack.

The use of nuclear weapons outside of populated areas is also a concern despite the fact that there might be a possibility of fewer civilian casualties. The situations most regularly contemplated in this regard involve the use of nuclear weapons against vessels at sea or against enemy combatants located in the desert or in an otherwise isolated area.[117] It seems logical that these situations must be assessed on a case-by-case basis. As is clear from the discussion above, the application of the relevant IHL rules must take into account the immediate and long-term consequences on the health of combatants from exposure to radiation; the possible impact on the environment in the area of the attack; and the dangers to civilians outside the immediate area given the risk and likelihood that radioactive particles will travel. In addition, the arguments supporting the lawfulness of the use of nuclear weapons in these scenarios often posit the use of a single low-yield warhead and do not consider the cumulative effects if more than one weapon is used. If multiple nuclear weapons are meant to be integrated into the attack, their cumulative effects would also arguably need to be part of the assessment.

116 See Resolution 1 adopted by the Council of Delegates of the Red Cross and Red Crescent Movement, December 2011.

117 Statement of the Government of the United Kingdom to the ICJ, *The Legality of the Threat or Use of Nuclear Weapons*, June 1995, para. 370; Nuclear Weapons Advisory Opinion, above note 4, Dissenting Opinion of Judge Schwebel, pp. 320–321.

Also a concern, albeit not a legal one, is the risk of nuclear escalation and the accompanying consequences if one or more low-yield weapons were used against another nuclear-armed State, as well as the implications for further use if the seventy-year history of non-use of nuclear weapons were to be broken. Thus, the arguments in favour of the lawful use of nuclear weapons in these types of scenarios provide little comfort that the grave humanitarian consequences occasioned by the use of nuclear weapons will not occur again.

Based on what has been learned from extensive research on the humanitarian and environmental consequences of nuclear weapons, and their implications for IHL, it seems appropriate to propose – in addition to the conclusion outlined above regarding the use of nuclear weapons in or near populated areas — a presumption of illegality with regard to the use of such weapons outside populated areas. In theory, such a presumption could be overcome in relation to a specific instance of use.

But concrete scenarios with all the information necessary for a full assessment of the consequences of nuclear weapon use have not often been presented or made by the nuclear-armed States. This was highlighted by the ICJ itself in its 1996 Nuclear Weapons Advisory Opinion and it appears to remain true today.[118]

The potential use of nuclear weapons has long been a global concern. The increased attention given to their humanitarian consequences in the past few years has helped shed more light on their severe and long-lasting impact. This attention has also raised further questions as to the status of nuclear weapons under IHL, which this article has attempted to illuminate and inform. Though there is greater knowledge about the consequences of nuclear weapons in humanitarian terms, they remain a weapon the use of which is difficult to reconcile with existing IHL rules.

118 Nuclear Weapons Advisory Opinion, above note 4, para. 93.