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Relevance of Risk Analysis as it Relates to the Lawfulness of the Use of Nuclear Weapons

The law of armed conflict (LOAC), and specifically proportionality, requires decision-makers to evaluate the legality of a proposed weapon strike *ex ante*. Since the assessment is made prior to the act taking place, it must necessarily be based on probabilities. Given the uncertainties about various potential outcomes, this process involves a risk assessment where the decision-maker must ultimately determine whether a proposed course of conduct would violate the applicable standard set by the legal rule. I focus mostly on the rule of proportionality and make several conclusions about its applicability to nuclear weapons use. First, I argue that indirect or reverberating effects, including delayed radiation, as well as nuclear escalation implications, should be analyzed as legally relevant “collateral effects.” Military manuals related to nuclear weapons provide guidance to commanders to consider such factors. Presuming the likelihood of occurrence is above zero, or mere speculation, they likely meet the requisite threshold of “foreseeability” required for proportionality in light of the factual circumstances in which a nuclear weapon would be used. Additionally, inclusion of these factors into the analysis is supported by the underlying purpose of the LOAC which strives to preserve human life and strikes a necessary balance between humanitarian considerations and military objectives. There is disagreement with how the LOAC rules operate and with how they apply to nuclear weapons, so clearer guidelines should be established for the relevant decision-makers to feel confident making these determinations. Ultimately, the vagueness inherent in these rules, such as proportionality, makes me lean towards concluding that this framework is unable to adequately capture the unique scope of risks involved in the context of nuclear weapons.

Background

Nuclear weapons are obviously distinguishable from conventional weapons in several ways. Nuclear bombs, especially those with higher yields, release a much greater amount of energy than conventional weapons. The sheer destructive potential of just the immediate blast of a high-yield nuclear weapon dwarfs that of conventional weapons. For purposes of this paper, since I will be discussing various factors below that can influence the effects of a particular nuclear strike, I will start by mentioning the main effects. A nuclear explosion will release energy in the form of blast, heat, and radiation.¹ This immediate blast includes a shockwave that will kill anyone close to ground zero, while collapsing buildings and tossing objects and debris.² The heat wave vaporizes anybody close to ground zero and, depending on the yield, causes severe burns and fires for a considerable distance beyond ground zero.³ There is both prompt and delayed ionizing radiation.⁴ Depending on the level of exposure, effects of radiation can range from rapid death to cancer, genetic damage, cell damage, and mutations.⁵ Depending on the height of the burst, there may also be an electromagnetic pulse (EMP) effect which can

¹ See The International Campaign to Abolish Nuclear Weapons (ICAN), *Immediate Effects*, ICAN, https://www.icanw.org/catastrophic_harm_immediate_effects.

² *Id.*

³ *Id.*

⁴ See ICAN, *Blast Heat and Radiation*, ICAN, https://www.icanw.org/blast_heat_and_radiation.

⁵ *Id.*

potentially disrupt or destroy all electronics within a relatively close distance to ground zero.⁶ EMP effects are seen with large bursts at very high altitudes, but they are not as big of a concern with ground level bursts, where explosion and blast effects are expected to dominate over the EMP effects.⁷ Also, radioactive particles have the potential to travel many miles from ground zero. Many factors affecting the potential scope of dispersal must be considered.

Overview of Legal Principles

There appears to be an undisputed consensus that nuclear weapons are governed by the same body of law that governs conventional weapons—the law of armed conflict, or international humanitarian law (IHL). This paper will cite to U.S. military manuals and statements of the law from the 1996 I.C.J. Nuclear Weapons Advisory Opinion Case when discussing the U.S. position on various principles of the law of armed conflict. Although the U.S. does not consider military manuals binding, the manuals cite to various conventions and treaties to which they are a party and say that the manuals have “evidentiary value” as to custom and practice.⁸ Manuals are used to train members of the military and provide guidance as to applicable international law, so they are evidence of what the U.S. believes the law to be. The applicable body of international law is comprised of both written and unwritten sources which

⁶ See National Security Staff, Interagency Policy Coordination Subcommittee for Preparedness & Response to Radiological and Nuclear Threats, *PLANNING GUIDANCE FOR RESPONSE TO A NUCLEAR DETONATION*, 2d ed. at 36 (June 2010).

⁷ *Id.*

⁸ See U.S. DEP’T OF THE ARMY, *THE LAW OF LAND WARFARE: FIELD MANUAL NO. FM 27-10* (with change 1976) at 3.

are laid out in Article 38 of the I.C.J. Statute.⁹ The main sources of law include international conventions or treaties, international custom, as evidence of a general practice accepted as law, general principles of law recognized by civilized nations, and subsidiary sources such as judicial decisions and academic teachings.¹⁰ There is overlap amongst these sources. For example, international customs may become conventional law when nations expressly recognize those customs in the form of a convention or treaty.

I will first lay out formulations of some of the most relevant rules of customary international law that are applicable in armed conflict.¹¹ As mentioned earlier, the United States agrees that this is the relevant body of law that should be applied to the use of nuclear weapons, but it disagrees with how the rules should apply to the facts. The main rules are the rules of proportionality, necessity, and distinction.

The International Committee of the Red Cross (ICRC) defines the rule of proportionality as follows: “Launching an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be

⁹ See Article 38 of the Statute of the International Court of Justice (Annex to UN Charter), 59 Stat. 1031; TS 993.

¹⁰ *Id.*

¹¹ See generally, ICRC, Customary IHL Database, <https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1> (containing 161 rules of customary international humanitarian law (IHL) identified in volume I (rules) of the ICRC’s study on customary IHL).

excessive in relation to the concrete and direct military advantage anticipated, is prohibited.”¹²

The U.S. has the same general formulation.¹³ The CIL rule of proportionality, codified in Articles 51 and 57 of Additional Protocol I, prohibits an “attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.”¹⁴ This is some sort of balancing test which requires the decision-maker to weigh the “expected” collateral effects against the “expected” military advantage in order to determine whether a particular attack would comply with the rule. There are risks, or uncertainties inherent in both the collateral effects prong and the military advantage prong. Thus, the decision-maker must perform some type of probability or risk analysis, using the information reasonably available at the time, to determine whether a particular strike would comply with the rule of

¹² ICRC, Customary IHL Database, Rule 14. Proportionality in Attack, https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule14 (citing to Art. 51(5)(b) of Additional Protocol I).

¹³ See OFFICE OF GENERAL COUNSEL, DEPARTMENT OF DEFENSE, DEPARTMENT OF DEFENSE LAW OF WAR MANUAL (2015) at 241, § 5.12 [hereinafter DOD LAW OF WAR MANUAL] (stating the proportionality rule as: “Combatants must refrain from attacks in which the expected loss of life or injury to civilians, and damage to civilian objects incidental to the attack, would be excessive in relation to the concrete and direct military advantage expected to be gained.”).

¹⁴ Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts arts. 51(5)(b), 57(2)(a)(iii), 57(2)(b), 8 June 1977, 1125 U.N.T.S. 3 [hereinafter AP I].

proportionality. As I mention later, application of the laws of armed conflict utilize the “reasonable commander” standard, with the decision(s) viewed objectively in light of the facts that were known, or reasonably should have been known at the time the decision was made.¹⁵

The general formulation of the rule of distinction is that “the parties to the conflict must at all times distinguish between civilians and combatants. Attacks may only be directed against combatants. Attacks must not be directed against civilians.”¹⁶ Similarly to proportionality, this is a rule of reason based on the information available to the decision-makers at the time.¹⁷ The law does recognize that the use of a particular weapon directed at a military target may cause unintended collateral or incidental damage to civilians and objects, and permits such damage as long as it is unintended, and complies with the other laws of armed conflict such as proportionality.¹⁸ However, the U.S. recognizes the impermissibility of excessive anticipated incidental effects in the Department of Defense (DOD) *Law of War Manual* which states that:

“some weapons, though capable of being directed only at military objectives, may have otherwise uncontrollable effects so as to cause disproportionate civilian injuries or damage. Biological warfare is a universally agreed illustration of such an indiscriminate weapon. . . ‘Uncontrollable’ refers to effects which escape in time or space from the control of the

¹⁵ See *infra* note 24.

¹⁶ See ICRC, Customary IHL Database, Rule 1. The Principle of Distinction between Civilians and Combatants, https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule1.

¹⁷ See DOD LAW OF WAR MANUAL, *supra* note 13, § 2.5.2 at 63.

¹⁸ CHARLES J. MOXLEY, JR., *Nuclear Weapons and International Law in the Post Cold War World*, 122 – 23 (2d ed.), [hereinafter MOXLEY].

user as to necessarily create risk to civilian persons or objects excessive in relation to the military advantage anticipated.”¹⁹

The effects of a weapon must be controllable to comply with the rule of distinction. Uncontrollable, or indiscriminate weapons such as biological weapons are *per se* unlawful for this reason and are now codified in specific conventions. As far as controllability of effects and the rule of proportionality, the effects must be controllable in order for a decision-maker to evaluate the probabilities of collateral damage and achievement of the military objective. When applying the rule of distinction to nuclear weapons, the U.S. argues that nuclear weapons are not “inherently indiscriminate” and thus not *per se* unlawful under the rules of distinction or proportionality.²⁰ It is unclear to me how this position can be maintained. Either the U.S. believes technologically, radiation is controllable enough to distinguish a nuclear weapon from a biological or chemical weapon, or that collateral radiation effects are not relevant to the analysis. While my paper focuses mainly on proportionality, distinction and proportionality are nevertheless interrelated vis-à-vis the requirement to control the effects of a weapon.

The general rule of necessity provides that a state “may use only such a level of force as is ‘necessary’ or ‘imperatively necessary’ to achieve its military objective, and that any

¹⁹ See DOD LAW OF WAR MANUAL, *supra* note 13, § 6.7.4, footnote 158, at 342 (citations omitted).

²⁰ Legality of the Use by a State of Nuclear Weapons in Armed Conflict, Verbatim Record, 87 (Nov. 15, 1995), <http://www.icj-cij.org/files/case-related/95/095-19951115-ORA-01-00-BI.pdf> [hereinafter I.C.J. Hearing, Nov. 15, 1995].

additional level of force is prohibited as unlawful.”²¹ Like the other rules of the law of war, military necessity must be applied in the context of “the information available to [the relevant decision-maker] at that time.”²² It is a rule of reason just like the other rules and incorporates various principles such as the prohibition against unnecessary suffering, the rule of precaution, and the rule of controllability. A core issue is that the rule of necessity “precludes the use of a particular weapon if a less destructive weapon could reasonably be expected to achieve the [military] objective.”²³ Thus, before deciding to use a nuclear weapon, the decision-maker would have to see if conventional weapons could achieve the same military objective without having to resort to a nuclear weapon.

In sum, the aforementioned rules of the LOAC are rules of reason, or objective tests, which require a decision-maker to assess, in light of the reasonably available information, whether a particular use of a weapon would comply. How exactly does a person conduct such an analysis? Although very theoretical, this is extremely important because the lawfulness of any particular use of nuclear weapons turns on these very questions. The tough legal question is in light of the facts known at the time, what level of ‘likelihood,’ or ‘foreseeability’ of unlawful effects must be present for illegality to arise under the various rules of the law of armed conflict, such as proportionality?

Analysis

²¹ MOXLEY, *supra* note 18, at 97.

²² See DOD LAW OF WAR MANUAL, *supra* note 13, § 2.2.3.3 at 58.

²³ MOXLEY, *supra* note 18, at 97.

When conducting the balancing tests required by the law of armed conflict, a decision-maker must engage in some form of probability, or risk analysis. Since the assessment is being made in advance of any proposed strike, the decision-maker only has probabilities to work with. In theory, the wartime decision-maker performs the risk analysis, and is presented with a series of possible outcomes with varying probabilities and consequences associated with a particular course of action. He or she must then decide whether the action, if taken, would comply with the law of armed conflict by assessing those possible outcomes in the context of the principles discussed above, i.e. proportionality, necessity, distinction, or any other applicable rules. How does one determine whether there will be compliance with the law? What is essentially required is a good faith belief, based on the information reasonably available at the time, that the military action would comply with the laws of armed conflict.²⁴ This brings us full circle to the essential question—when deciding on the lawfulness of any particular use of a nuclear weapon under the laws of armed conflict, what level of likelihood of unlawful effects must be present for illegality to arise? There are many complicating factors. For example, this analysis is being done in advance, so we can't "wait and see" how the variables worked out. Considering the Comprehensive Nuclear Test Ban Treaty and the fact that the U.S. has not tested nuclear weapons since the end of the Cold War in 1992, our ability to accurately predict the outcomes of any proposed use may be impaired. Assumptions must be made about wind direction, percentage of a population likely to be sheltered, and other meteorological and topographic factors which

²⁴ See DOD LAW OF WAR MANUAL, *supra* note 13, at 249.

can have profound effects on the estimated casualties.²⁵ “Careless” use of the models to predict casualties from a nuclear strike can lead to estimated casualties that are off by more than a factor of 10.²⁶ Even in a perfect world where we had actual knowledge of all the meteorological and population factors, our reliance on computer modeling to predict the result means we don’t know for sure what the outcome will be and how specific variables impact the outcome. There will always be uncertainties involved.

Which effects are even relevant to the analysis? This is a crucial point with respect to nuclear weapons, where I conclude that “indirect, but foreseeable” effects, such as delayed radiation spread by nuclear fallout, must be included in the proportionality assessment. Furthermore, there is a subjective valuation problem. After analyzing all the relevant potential effects, how does someone value the different probabilities to make the determination that the expected collateral effects are not ‘excessive’ in relation to the anticipated military advantage? Given the position of the United States that nuclear weapons are not *per se* unlawful, and that lawfulness must be determined on an *ad hoc* basis in light of the available information, these are precisely the legal questions that must be answered.

Risk Analysis Generally

²⁵ See NATIONAL RESEARCH COUNCIL, *Effects of Nuclear Earth-Penetrator and Other Weapons*, THE NATIONAL ACADEMIES PRESS, at 63 (2005), available at <https://www.nap.edu/read/11282/chapter/7#63>.

²⁶ *Id.*

Risk analysis as a concept involves determining a range of possible outcomes, their likelihoods, and their consequence or impact.²⁷ Results can be expressed either quantitatively or qualitatively. A course of conduct is then proposed based on the risk tolerance or risk aversiveness of the decision-maker. In our context, the legal requirements under the LOAC draw a line between what is ‘permissible’ risk and what is ‘impermissible’ risk.

Risk is most generally categorized as a function of probability (P) and consequence (C). This necessarily involves making decisions under conditions of uncertainty. Traditional expected utility (value) theory says that a rational actor, when confronted with a range of choices with uncertain outcomes, should choose the act with the highest expected net utility.²⁸ The utility of an outcome is a measure of the extent to which that outcome is preferred, or preferable, to the alternatives.²⁹ After the utility of each outcome is identified, it is then weighted according to the probability that the act will lead to that outcome.³⁰ Thus, expected value theory provides an easy

²⁷ See generally, RAUSAND M., *RISK ASSESSMENT: THEORY, METHODS, AND APPLICATIONS*, 1–28 (2013).

²⁸ See Briggs, R.A., *Normative Theories of Rational Choice: Expected Utility*, THE STANFORD ENCYCLOPEDIA OF PHIL. (Aug. 2019), <https://plato.stanford.edu/entries/rationality-normative-utility/>.

²⁹ *Id.*

³⁰ *Id.*

conceptual tool for quantitative risk assessment.³¹ Expected value is calculated by multiplying the value of each possible outcome by its probability of occurrence and then summing the results.³² This type of calculation is done in various industries, using any parameters that are possible to measure, such as cost, price, duration, or number of units.³³ The decision-maker compares the alternative courses of action, and chooses the action that has the greatest net expected value. This approach is used a lot in the context of business decisions, including those involving insurance, capital expenditures, investment, marketing, and operations, with the value of outcomes usually specified in terms of potential monetary profit or loss.³⁴ Of course, this conceptual exercise becomes a lot harder in practicality when applied to policy decisions, or any decisions that require valuations of nonmonetary outcomes, such as potential deaths, or damage to the environment.³⁵ Even so, risk analysis is a common tool used by many industries to assist decision-makers. This idea of weighing risk and balancing potential benefits and harms is also a common practice across different areas of law and different legal systems.

³¹ See Lev Virine, *Practical Project Risk Management in 60 Minutes*, Conference Paper Presentation, PROJECT MANAGEMENT INSTITUTE, (Oct. 2011), <https://www.pmi.org/learning/library/risk-management-expected-value-analysis-6134>.

³² *Id.*

³³ *Id.*

³⁴ See Daniel E. Palmer, *Expected Utility Decision Theory*, BRITANNICA, <https://www.britannica.com/topic/expected-utility>.

³⁵ *See id.*

This is relevant to us because the LOAC rule of proportionality requires a decision-maker to determine in advance, based on probabilities of various outcomes, whether a proposed strike is legal. This involves a similar process of identifying the range of possible outcomes, their probabilities of occurring, and assigning weight to the various outcomes. While traditional expected value theory is premised on the assumption that a rational actor should pick the utility-maximizing outcome, the military risk assessment is done in order to determine legality, i.e. whether collateral damage would be “excessive” to the anticipated military advantage.

Generic US Military Risk Assessment

Before examining the probability analysis problem as it relates to the lawfulness of a particular use of a nuclear weapon, it is helpful to see how the military performs risk assessment generally.

The Joint Chiefs of Staff *Joint Risk Analysis Manual* applies to the Joint Staff Services, Combatant Commands, applicable defense agencies, and joint and combined activities.³⁶ It is the first formal and authoritative Joint Staff risk reference that supports the entire range of the Joint Strategic Planning System (JSPS).³⁷ The *Joint Risk Analysis Manual* formalizes a risk assessment method to provide consistency across processes to enhance decision-making.³⁸ Ultimately, “the methodology described in the manual, coupled with military judgment, help determine risk levels, mitigation strategies, and acceptable risk levels in relation to problem sets

³⁶ See CHAIRMAN OF THE JOINT CHIEFS OF STAFF MANUAL, JOINT RISK ANALYSIS (2016) at 1 [hereinafter 2016 JRAM].

³⁷ See *id.*

³⁸ *Id.* at 3.

and strategic objectives.”³⁹ This manual does not explicitly describe how risk analysis is conducted for legal determinations. It provides a uniform methodology to assess both strategic risk, or risk to national interests, and military risk, or risk to achieving military objectives.⁴⁰ This better enables the Chairman of the Joint Chiefs of Staff (CJCS) to make timely risk assessments and advise on risk management to Congress with respect to the National Military Strategy in support of title IX responsibilities.⁴¹

Risk is defined as “the probability and consequence of an event causing harm to something valued.”⁴² The joint risk assessment methodology (JRAM) framework consists of a four-step process: “problem framing,” “risk assessment,” “risk judgment,” and “risk management.”⁴³ During problem framing, the items, items, or interests that have “value” and have potential to be “harmed” are identified.⁴⁴ Then one must define both the probability (P)⁴⁵ of

³⁹ *Id.*

⁴⁰ *Id.* at C-3.

⁴¹ *Id.* See also

<https://ssl.armywarcollege.edu/dde/documents/jsps/terms/cra.cfm#:~:text=The%20Chairman's%20Risk%20Assessment%20is,in%20the%20National%20Military%20Strategy.>

⁴² *Id.* at B-1.

⁴³ See *id.* Figure 3, at B-2.

⁴⁴ *Id.*

⁴⁵ See *id.* Figure 4, at B-2 (a four-level table is used to designate the probability of an event occurring, ranging from “highly unlikely” (0-20%), “improbable” (21-50%), “probable” (51-80%), to “very likely” (81-100%).).

an event occurring and consequence (C), or expected severity of harm to the object of value.⁴⁶ Note that the two extremes of probability, “highly unlikely” (0-20%) and “very likely” (81-100%) are assigned smaller intervals than the middle ranges, to ensure that these categories are reserved for more certain outcomes.⁴⁷ In the risk assessment step, one must identify the sources and drivers of risk that will cause the harmful event (threats and hazards) and similarly determine the expected consequence (C) and probability of occurrence (P).⁴⁸ The manual states that “most quantification serves to bound, not measure risk. Risk judgment is ultimately a qualitative effort aimed at determining a decision-maker’s degree of acceptable risk.”⁴⁹ The risk judgment step include both risk characterization and risk evaluation⁵⁰, which involves establishing a risk level for each identified threat, plotting the probabilities and consequences on a risk contour graph,⁵¹ and then ultimately making a judgment about the acceptability of a given risk.⁵² Here, risk level is a function of the previously assessed probability (P) and consequence (C), or the general (P) x (C) formula used for risk analysis. The risk evaluation step requires subject matter experts, or decision-makers, with the aid of risk contour graphs, to decide on acceptability of the various

⁴⁶ See 2016 JRAM, *supra* note 36 Figure 5, at B-3 (a four-level table categorizes expected severity of harm as follows: “minor harm,” “moderate harm,” “major harm,” and “extreme harm.”).

⁴⁷ See *id.* Figure 4, at B-2.

⁴⁸ See *id.* at B-3 – B-4.

⁴⁹ *Id.* at B-4.

⁵⁰ See *id.*

⁵¹ See *id.* Figure 6, at B-5.

⁵² See *id.* at B4 – 5.

risks.⁵³ The manual states that decision-makers “may weigh probability or consequence more heavily; e.g., address more probable moderate impact threats over less likely extreme threats.”⁵⁴

In sum, risk judgment is a qualitative effort aimed at determining a decision-maker’s degree of acceptable risk, and when presented with quantifications which “serve to bound, not measure risk,” there is a subjective component where the decision-maker must ultimately choose how to weigh or value the different outcomes in order to decide on a course of conduct. While this JRAM method is not necessarily applied by military lawyers to determine legality, it provides insight into how the military conducts risk assessment generally. The military lawyer helps staff and commanders analyze proposed strikes to advise on whether taking it would comply with the laws of war.⁵⁵ For example, in a proportionality analysis, this includes applying a methodology to estimate collateral damage, including a “weaponizing” analysis to evaluate the best type of munition, calculate likely effects, and best angle to strike the target in order to minimize collateral effects.⁵⁶ The ultimate determination is made by the commander, with advisement from the military lawyer.⁵⁷

⁵³ *Id.* at B-5.

⁵⁴ *Id.*

⁵⁵ See Jennifer M. O’Connor, *Applying the Law of Targeting to the Modern Battlefield*, DEPARTMENT OF DEFENSE, p. 6 – 8, (Nov. 2016), transcript available at <https://dod.defense.gov/Portals/1/Documents/pubs/Applying-the-Law-of-Targeting-to-the-Modern-Battlefield.pdf>.

⁵⁶ See *id.* at 6.

⁵⁷ *Id.* at 7.

The Department of Defense 2015 *Law of War Manual* provides guidance on how the United States interprets the laws of armed conflict and lists some considerations. Recognizing the fact that targeting decisions and military strikes may have to be made with very limited time, the manual states that the law of war requirements, such as the principle of proportionality, do not preclude commanders from taking decisive action in doubtful cases.⁵⁸ Without nailing down what is meant by “doubtful cases,” the manual reiterates the general requirement that “commanders must make decisions in good faith on the basis of the information available to them.”⁵⁹

A few other things stand out with respect to the manual’s guidance on the rule of proportionality. Again, the relevant inquiry as stated in the manual is that “combatants must refrain from attacks in which the expected loss of civilian life, injury to civilians, and damage to civilian objects incidental to the attack would be excessive in relation to the concrete and direct military advantage expected to be gained.”⁶⁰ Focusing on the ‘harms’ side of the equation, the manual explains that this is generally understood to mean such “immediate or direct harms foreseeably resulting from the attack,” as opposed to remote harms which “do not need to be considered in applying this prohibition.”⁶¹ In the context of a nuclear weapon strike, this raises

⁵⁸ See DOD LAW OF WAR MANUAL, *supra* note 13, at 249.

⁵⁹ *Id.*

⁶⁰ *Id.* at 260.

⁶¹ See *id.* at 261–62 (stating that “if the destruction of a power plant would be expected to cause the loss of civilian life or injury to civilians very soon after the attack due to the loss of power at a connected hospital, then such harm should be considered in assessing whether an attack is

the question of what effects are considered “immediate or direct,” as opposed to “remote harms” for purposes of the legal analysis? How is radiation and potential fallout treated under this framework? If there was a low chance that weather conditions could carry radioactive fallout to neighboring cities far away from ground zero, is this considered in the analysis, or is excluded as a ‘remote harm?’ I argue below that radioactive fallout, as well as other delayed effects of nuclear weapons cannot possibly be excluded under the principle of proportionality, since they are reasonably foreseeable effects. Delayed radioactive effects, among others, may be considered “indirect, but foreseeable” effects, which I discuss below in a later section. The manuals themselves reference the need for commanders to consider these effects. U.S. manuals related to nuclear weapons use require commanders and planners to consider prompt and delayed radiation, related ‘cascading’ effects, as well as risks of enemy response and escalation.⁶² These will also be discussed below. The manual also explicitly states that “harm caused by enemy action, or beyond the control of either party, need not be considered” for purposes of the principle of proportionality.⁶³ Enemy acts are conceptualized as an intervening action, or superseding cause, the harms of which should not be attributable to the attacker.⁶⁴ This raises another issue in the context of a nuclear weapon strike. Given the substantial likelihood that if the U.S. were to use a

expected to cause excessive harm. On the other hand, the attacker would not be required to consider the economic harm that the death of an enemy combatant would cause to his or her family, or the loss of jobs due to the destruction of a tank factory.”).

⁶² See *e.g.*, *infra* note 74 at III-3.

⁶³ *Id.* at 262.

⁶⁴ See *id.* at 262–63.

nuclear weapon, it would be against another nuclear weapons state, wouldn't it be at least "reasonably foreseeable" that there would be a nuclear response? Manuals, for logical reasons, already direct commanders to consider nuclear escalation, so it should be another factor or "collateral effect" that is factored into the risk analysis.

As to the 'benefits' side of the proportionality equation, the manual states that the expected "concrete and direct military advantage" should be considered in the context of the overall war at a macro level.⁶⁵ Examples of potential military goals include: "(1) denying the enemy the ability to benefit from the object's effective contribution to its military action; (2) improving the security of the attacking force; and (3) diverting enemy forces' resources and attention."⁶⁶ The greater the expected military advantage in context of the total war effort, the more collateral damage that is permissible. On the key proportionality issue of determining whether expected incidental harm is "excessive" to the expected military advantage, the manual states that the requirement does not lend itself to quantitative analysis, and that the evaluation "intrinsically involves both professional military judgments as well as moral and ethical judgments evaluating the risks to human life."⁶⁷ Due to difficulties in weighing unlike values, the manual points out that some States have chosen to apply a "clearly excessive" standard for determining whether a criminal violation has occurred.⁶⁸ If it is this difficult to apply the

⁶⁵ See DOD LAW OF WAR MANUAL, *supra* note 13, § 5.12.2.1, at 264.

⁶⁶ *Id.* at 263 – 64.

⁶⁷ *Id.* at 265.

⁶⁸ See *id.* at 266 (citing Germany, Federal Court of Justice, Federal Prosecutor General, *Fuel Tankers Case*, Decision, Apr. 16, 2010, as reprinted and translated by the International Committee of the Red Cross at https://ihl.databases.icrc.org/customary-ihl/eng/docs/v2_cou_de_rule14_sectionb ("Even if the killing of several dozen civilians would have had to be anticipated (which is assumed here for the sake of the argument), from a tactical

“excessive” standard of the proportionality principle to conventional weapon strikes, then this may raise doubts that it can be applied to nuclear weapons, considering their unique effects.

Factors to Consider in Nuclear Weapon Context

The U.S. position on the lawfulness of use of a nuclear weapon under the law of armed conflict essentially says that legality is an *ad hoc* determination based on a number of factors that should be considered in light of the information that was available to the relevant decision-maker at the time. In its argument before the I.C.J., the U.S. asserted that the effects of nuclear weapons vary depending on a number of factors, including “the explosive yield and height of the burst of individual weapons, on the character of their targets, as well as on climatic and weather conditions.”⁶⁹ Other factors stated include “the technology that occasions how much radiation the weapon may release, where, in relation to the earth’s surface it will be detonated, and the military objective at which it would be targeted.”⁷⁰ In fact, attorney McNeill explicitly argued on

military perspective this would not have been out of proportion to the anticipated military advantages. The literature consistently points out that general criteria are not available for the assessment of specific proportionality because unlike legal goods, values and interests are juxtaposed which cannot be ‘balanced’ ... Therefore, considering the particular pressure at the moment when the decision had to be taken, an infringement is only to be assumed *in cases of obvious excess* where the commander ignored any consideration of proportionality and refrained from acting ‘honestly,’ ‘reasonably’ and ‘competently.’”).

⁶⁹ I.C.J. Hearing, Nov. 15, 1995 *supra* note 20 at 87 (citing the Secretary-General’s 1990 Report on nuclear weapons, p. 75, para. 290).

⁷⁰ *Id.* at 89.

behalf of the U.S. that these aforementioned factors, among others, “are critical to the appropriate legal analysis.”⁷¹

Various military documents have mentioned factors that are necessary for decision-makers to consider, due to their impact on the likelihood, severity, and scope of the different nuclear weapon effects. The *Doctrine for Joint Theater Nuclear Operations* describes collateral damage as including “dangers to friendly forces, civilians, and nonmilitary related facilities, creation of obstacles, and residual radiation and contamination.”⁷² As to the extent of damages, the manual states that damage will vary based on “the protective posture of civilians and friendly units, delivery system accuracy, weapon yield, and height of burst.”⁷³ It further states that collateral damage can be reduced by “reducing weapon yield, improving accuracy, adjusting the height of burst, and offsetting the desired ground zero.”⁷⁴ Finally, a consideration that I think is vital – “commanders and their staffs should consider the enemy’s capabilities and likely

⁷¹ *See id.* at 87.

⁷² JOINT CHIEFS OF STAFF, DOCTRINE FOR JOINT THEATER NUCLEAR OPERATIONS III-2 (Feb. 9, 1996), http://www.nukestrat.com/us/jcs/JCS_JP3-12-1_96.pdf [hereinafter DOCTRINE FOR JOINT THEATER NUCLEAR OPERATIONS].

⁷³ DOCTRINE FOR JOINT THEATER NUCLEAR OPERATIONS, at III-2.

⁷⁴ *Id.* at III-1 – 2; *See also* CHAIRMAN OF THE JOINT CHIEFS OF STAFF, JOINT PUBLICATION 3-72, NUCLEAR OPERATIONS, III-3 – III-4 (Jun. 11, 2019), https://fas.org/irp/doddir/dod/jp3_72.pdf (listing factors to consider, while not all-inclusive, such as: (1) Yield Selection, for its effects on blast wave, thermal effects, radiation, and size of the affected area; (2) Height of Burst, “a higher HOB may be selected to alter the weapons effects footprint or to avoid the production of fallout,” while EMP and other adverse effects on adjacent allies and partners, as well as the enemy, must be considered; (3) Fallout, in light of weather and atmospheric conditions; (4) Weapon System Selection; and (5) Law of War, noting that commanders responsible for the conduct of nuclear operations “must ensure their staff judge advocate is involved in nuclear operations planning and targeting processes.”).

responses to nuclear operations.”⁷⁵ The manual states that employment of nuclear weapons “signifies an escalation of the war”⁷⁶ and that “use of nuclear forces should be restrictive . . . so that the adversary will recognize the ‘political signal’ and not assume that the U.S. has moved to general nuclear war.” Is it even possible to leave this impression on the enemy considering the fog of war? Not only do U.S. military manuals include risk of escalation and likelihood of an enemy nuclear response as factors that should be considered, but Robert McNamara was quoted to the I.C.J. acknowledging that if one side were to cross the nuclear threshold, then “under such conditions, it is highly likely that rather than surrender, each side would launch a larger attack, hoping that this step would bring the action to a halt by causing the opponent to capitulate.”⁷⁷ Furthermore, if other countries have dead-hand control, automated release, or follow launch-on-warning protocols, then isn’t it more than ‘likely’ that a U.S. nuclear strike against a nuclear State could result in at least a proportional, if not greater nuclear response? Escalation risk is uniquely important in the nuclear context due to the additive effects of radiation spread which has the potential to spark nuclear winter.

The *Nuclear Supplement to the JSCP* (1996) lists out factors and effects that warfighters are directed to consider when planning Theater Nuclear Operations: “Probability of success,

⁷⁵ *Id.* at III-3.

⁷⁶ See DOCTRINE FOR JOINT THEATER NUCLEAR OPERATIONS, *supra* note 72, at III-1.

⁷⁷ See Legality of Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. 514, 35 I.L.M. at 909 [hereinafter Nuclear Weapons Advisory Opinion] (Weeramantry, J., dissenting); See also Nuclear Weapons Advisory Opinion, at 470, 35 I.L.M. at 893 (Weeramantry, J., dissenting) (stating that the target of a nuclear attack “will be so ravaged that it will not be able to make fine evaluation of the exact amount of retaliatory force required. In such event, the tendency to release as strong a retaliation as is available must enter into any realistic evaluation of the situation.”).

alternative means to achieve the objective, if any; estimated fatalities (prompt and fallout); likelihood and acceptability of probable enemy response on the U.S. or its allies; relationships to U.S. vital interests, treaty commitments, diplomatic agreements, and denial and escalation implications.”⁷⁸ Many of the same factors and others are discussed in different iterations of various guiding documents. It is clear that the U.S. military is instructed to consider estimated fatalities from prompt and fallout radiation, as well as escalation implications, and presumably the same negative effects of expected enemy nuclear strikes, when deciding whether to use a nuclear weapon in the first instance. While it is clear that military lawyers are present and advising decision-makers when these assessments are being made, it is unclear exactly which methodology is used to determine legality of a proposed action. Of course, as hard as this is to do with unlimited time, an additional complication is that these decisions are sometimes made in a time of crisis with limited time to deliberate. Assuming the relevant effects and factors are all quantifiable and a final list of potential outcomes is presented to the relevant decision-maker, how does one decide whether the strike would be unlawful? The following sections describe the proportionality assessment in greater detail and relates it to the nuclear weapons context.

Research on How Proportionality Principle is Applied

The key issues at the heart of the customary law proportionality analysis seem to be causation (a causal nexus between the strike and the effect that is not too attenuated),

⁷⁸ CHAIRMAN OF THE JOINT CHIEFS OF STAFF INSTRUCTION, NUCLEAR SUPPLEMENT TO THE JOINT STRATEGIC CAPABILITIES PLAN FOR FY 1996 (Feb. 12, 1996) at E-5 [hereinafter NUCLEAR SUPPLEMENT TO THE JSCP], accessed at https://www.nukestrat.com/us/jcs/98-53h_AnnexC96.pdf.

foreseeability, the valuation problem of assigning weight to the different harms, and the ultimate question of determining whether expected incidental harm is ‘excessive’ in relation to the expected military advantage. Again, while the blanket statement of the general principle codified in Additional Protocol I⁷⁹ seems easy to conceptualize, it should now be apparent that applying the rule can be incredibly complex.

Briefly, as to the anticipated military advantage, I noted earlier that for purposes of a proportionality assessment, the direct and immediate military benefit can be viewed in the context of the broader war effort. One could imagine a military objective that is extremely valuable and very likely, if successfully achieved, to result in a significantly advantageous position in the war for the attacker. On its face, the principle of proportionality would seem to allow for a large amount of collateral damage, but it is not clear how much, or if there is a limit.

On the ‘incidental harm side’ of the theoretical equation, the language “expected to cause” encompasses the criteria of causation and foreseeability. As far as causation goes, if an attack is expected to be the sole cause of the harm, then “incidental harm can be considered as caused by the attack if it is the outcome that was expected to occur from the attack in the

⁷⁹ See Protocol Additional to the Geneva Conventions of 1949, Additional Protocol I, Article 51(5)(b) (belligerents must refrain from attacks “which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.”).

ordinary course of events.”⁸⁰ Furthermore, harm can be considered even if it did not occur in a single causal step,⁸¹ such as when a strike destroys a large dam, or water purification systems, leading to deaths. This is still subject to the foreseeability requirement. The incidental harm to be considered seems to be “that which would not occur *but for* the attack – with one limitation: Harm that results from the conduct of an actor other than the one carrying out the attack, and does not arise from the physical effects of the attack, is excluded.”⁸² The “physical effects” limitation does not seem to have a basis. What this seems to exclude are any effects that are so attenuated from the strike that there cannot be a legally causal relationship between the strike and the effect. For example, if an enemy responds to a strike by executing civilians, the proportionality assessment would not consider those deaths to be caused by the initial striker.

‘Foreseeability’ for purposes of the proportionality assessment aligns with the much familiar reasonable person standard. The incidental harm relevant to the analysis is the “harm that a reasonable person in the place of the person planning or launching the attack should have foreseen.”⁸³ Relevant factors include belligerent capabilities and resources, the context in which the attack was planned and conducted, including time available, terrain, weather, and enemy

⁸⁰ Emanuela-Chiara Gillard, *Proportionality in the Conduct of Hostilities: The Incidental Harm Side of the Assessment*, CHATHAM HOUSE, at 14 § 42 (Dec. 2018) (citing to other areas of public international law).

⁸¹ *Id.*

⁸² *Id.* at 15.

⁸³ *Id.* at 16, (citing ICTY, *Prosecutor v Stanislav Galić*, Case No. IT-98-29, Judgment (Trial Chamber), 30 November 2003, para 58.).

activity.⁸⁴ Note that there is an obligation under the rule of precaution to gather information and to do everything feasible to verify that an attack would not violate the rule of proportionality.⁸⁵

As with other rules of reason, belligerents must rely on information that they have, or can reasonably be expected to have, from all sources in the circumstances.⁸⁶ In sum, on the harms side of the assessment, this leaves us with the following rule:

“The incidental harm to be considered is that harm which would not occur but for the attack, but excluding harm that results from the conduct of another actor . . . and which was reasonably foreseeable at the time the attack was planned or launched, on the basis of information that the attacker had or could reasonably have been expected to have in the circumstances.”⁸⁷

Nothing in the rule seems to suggest that cascading, reverberating or secondary harms (synonymous terms) should not be considered. In fact, although there is some disagreement, I agree below with scholars who claim that these effects are required in the assessment so long as they meet the requisite threshold of ‘reasonable foreseeability.’⁸⁸ Factors such as the time elapsed between the attack and the occurrence of injury, or the number of causal steps in the

⁸⁴ *See id.*

⁸⁵ *Id.*

⁸⁶ *Id.*

⁸⁷ *Id.* at 18 – 19.

⁸⁸ *See also* International Expert Meeting, *The Principle of Proportionality in the Rules Governing the Conduct of Hostilities Under International Humanitarian Law*, ICRC, at 45 (June 2016) file:///C:/Users/15166/Downloads/4358_002_expert_meeting_report_web_1.pdf (stating “the ICRC has expressed the view that reverberating effects that are foreseeable in the circumstances must be taken into consideration in the proportionality assessment of an attack.”).

chain may affect the probability of the harm occurring, and thus may be weighed differently in accordance, but they should not be omitted from the analysis.⁸⁹ For a nuclear weapon strike, this suggests that not only are the immediate effects of the initial blast and shockwave considered, but the deaths and serious injury due to delayed radiation and fallout, as well as potential EMP effects and any other ‘delayed’ effects should be considered as ‘incidental harm’ so long as they are reasonably foreseeable in light of the reasonably available information.

Treatment of Indirect, but “Foreseeable” Effects

A particular point of contention regarding the proportionality assessment is how to treat indirect effects. Obviously harms directly caused from an attack, such as injuries or damage from blast effects are relevant harms. What about indirect, yet still foreseeable effects – otherwise known as reverberating effects?⁹⁰ The *DoD Law of War Manual* takes the somewhat ambiguous position that “remote” harms shall not be considered since they are too attenuated, and it is too difficult to accurately predict all possible remote harms from an attack.⁹¹ But how ‘remote’ must the harm be to warrant exclusion from the analysis? The DoD’s position that collateral effects for purposes of proportionality is generally understood to mean “immediate or direct harms

⁸⁹ See Emanuela-Chiara Gillard, *supra* note 80, at 19.

⁹⁰ See Michael N. Schmitt & Major Michael Strauss, *Uncertainty in the Law of Targeting: Towards a Cognitive Framework*, 10 HARV. NAT’L SECURITY JOURNAL 148, 174 (2019) (citing CHAIRMAN, JOINT CHIEFS OF STAFF, JOINT PUBLICATION 3-60, JOINT TARGETING A-2 – A-3 (2013) at II-35 to -36).

⁹¹ See DOD LAW OF WAR MANUAL, *supra* note 13, at 261 – 62.

foreseeably resulting from the attack”⁹² improperly excludes everything else as “remote harms.” There does not seem to be a legal basis for excluding effects which, although indirect, are still foreseeable. For example, in the context of a nuclear strike, indirect damage and civilian casualties or injuries resulting from spread of radiation should not be excluded from the pre-use proportionality assessment on the basis that they are “remote” or not direct. So long as those effects are foreseeable enough to meet the legal threshold of “foreseeability” required under the rule, then they should be included. The floor for this threshold is somewhere above pure speculation, but something far less than certainty.⁹³ I agree with authors Schmitt and Strauss, adopting the minority position taken by the *Tallinn Manual* – “the degree of certainty that qualifying harm will occur affects the value of the collateral damage factored into the proportionality equation.”⁹⁴ In other words, reverberating harms must be included in the assessment, but the value placed on that qualifying harm will be adjusted to reflect the probability or likelihood that it will occur. This approach best reflects the purpose of IHL which strikes a balance between military necessity and humanitarian considerations:

“On the one hand, including harm that is unlikely, albeit not speculative, without considering the probability of that harm manifesting would unduly constrain the military necessity of conducting an attack and therefore skew the balancing. Yet, to ignore such harm altogether because it does not reach an objective threshold of certainty, wherever

⁹² *Id.* at 261.

⁹³ See Schmitt & Strauss, *supra* note 90, at 173 – 74 (“in this assessment, all civilian harm is ‘foreseeable’ collateral damage for the purposes of the proportionality calculation, excluding, of course, that which is purely speculative.”).

⁹⁴ *Id.* at 174.

that threshold might lie, would be to discount the humanitarian mandate by disregarding actual risk to civilians and civilian objects.”⁹⁵

This position is consistent with the argument I made at the end of the previous section. To reiterate, the standard for assessing these reverberating effects is that of a reasonably competent commander, in light of the factual circumstances. Decision makers must then assign values on both sides of the equation in order to assess whether expected collateral effects are “excessive” compared to the anticipated military advantage. The ICRC Commentary admits that the rule of proportionality “allows for a fairly broad margin of judgment.”⁹⁶ In determining the precise threshold for when one side is “excessive” to the other, I still have no better answer. The rule is imprecise because it is codifying IHL to further the objective of protecting humanitarian interests, while at the same time acknowledging the realities of military necessity. Thus, it is not a strict mathematical balancing test that says a 0.1% difference is enough to be considered legally “excessive.” In fact, that would certainly not be enough to satisfy the “excessive” criteria. Some deference is given to the reasonable military commander since he or she will not be held to this strict mathematical application of the rule. Ultimately, the threshold of “excessiveness” has to be something greater than a mere mathematical difference (0.1%), but less than the “clearly” excessive standard codified in the ICC Rome Statute. I agree with Schmitt and Strauss:

⁹⁵ *Id.*

⁹⁶ COMMENTARY ON THE ADDITIONAL PROTOCOLS OF 8 JUNE 1977 TO THE GENEVA CONVENTIONS OF 12 AUGUST 1949, para. 2210 (Yves Sandoz, Christophe Swinarski & Bruno Zimmermann eds., 1987).

“Excessiveness is characterized by a situation in which ‘there is a significant imbalance between the military advantage anticipated, on the one hand, and the expected collateral damage to civilians and civilian objects, on the other.’”⁹⁷

In sum, I believe that indirect, but foreseeable effects must be included in the IHL proportionality assessment. This may not include all indirect foreseeable effects, but surely it must include tangible effects of the weapon strike, such as downstream radiation spread. Not just the prompt radiation and blast effects at ground zero. I also argued above that other indirect, but foreseeable effects including nuclear escalation that are discussed in military manuals should be included. It would be troublesome from a policy and purposivist perspective to not include these risks, since it would be contrary to the humanitarian goal of IHL to exclude risks with grave consequences, even if the probabilities are low.

General Principles From Other Areas of Law re: Valuing Risk

How does one place a value on collateral damage for purposes of the proportionality assessment? The standard is the value which a reasonable attacker in the same or similar circumstances would accord it, in light of the information available at the time.⁹⁸

Other areas of law have general principles that set legal limits on what level of risk is acceptable. For example, the depraved heart or reckless indifference standard in U.S. criminal

⁹⁷ Schmitt & Strauss, *supra* note 90, at 175 (quoting PROGRAM ON HUMANITARIAN POL. AND CONFLICT RES., MANUAL ON INT’L L. APPLICABLE TO AIR AND MISSILE WARFARE, r. 10 (2009) at 98).

⁹⁸ *Id.* at 173 (stating “the vagueness inherent in the standard renders it difficult to apply with precision, but this standard is nevertheless widely accepted by practitioners and others assessing proportionality.”).

law punishes acts with even a very low probability of severe consequence (death to another), absent some social utility. The analogous doctrinal question to the proportionality assessment is “what level of ‘likelihood’ of prohibited consequence is necessary for recklessness to arise?”⁹⁹ On this point, one treatise concludes that “knowledge of bare possibility is sufficient to convict of recklessness if the conduct has no social utility, but that the slightest social utility of the conduct will introduce an inquiry into a degree of probability of harm and a balancing of this hazard against its social utility.”¹⁰⁰ In other words, there is no fixed mathematical amount of ‘likelihood’ of occurrence that will suffice for criminal culpability in each circumstance; it is a case-by-case basis. This is similar to Professor Geoffrey Corn’s proposed ‘sliding scale approach’ to determining ‘reasonableness’ in the Fourth Amendment context.¹⁰¹ The basic point is that reasonableness is contextual – “the more significant the [government] intrusion, the greater the quantum of information required to render the intrusion reasonable.”¹⁰² He also notes that “a deprivation of rights based on mere speculation or instinct is per se unreasonable . . .

⁹⁹ See MOXLEY, *supra* note 18, at 517.

¹⁰⁰ *Id.* at 519 (quoting GLANVILLE L. WILLIAMS, *CRIMINAL LAW, THE GENERAL PART* § 21, at 55 (1953)).

¹⁰¹ See Geoffrey S. Corn, *Targeting, Command Judgment, and a Proposed Quantum of Information Component: A Fourth Amendment Lesson in Contextual Reasonableness*, 77 BROOKLYN L. REV. 437, 441 – 42 (2012).

¹⁰² *Id.* at 476.

[and] the amount of information required beyond speculation to render such a deprivation reasonable is contingent on the extent of the deprivation or intrusion . . .”¹⁰³

Both provide useful analogies for applying the LOAC. For example, in a proportionality assessment, even ‘collateral effects’ that have significant consequences, albeit with a low probability of occurring, should be included in the assessment to be risk analyzed. As in the sliding scale approaches, lesser weight can be assigned depending on how low the probability is and what the severity of the consequence is. There may even be a point where the potential consequence is so severe that taking the risk at all cannot be justified. An additional complexity in the LOAC context is that the justification to balance (anticipated military advantage) is a strong justification. It is unclear what the rule of proportionality would say about the following scenario – a proposed strike against a very highly valued military target which poses a very low probability (in the range of 0.1 – 1%) of grave results (death or injury to hundreds of thousands, or even millions of citizens). Regardless, it is important to provide military decision-makers with better guidance on how to apply the legal rules to avoid an “I know it when I see it” approach.

Critique of the Standard

While the principles may seem clear, the difficulty in applying them to the facts of a particular case is clearly very high. As mentioned before with respect to proportionality, “legal evaluations may lead to different conclusions as to the proportionality of an attack, depending on

¹⁰³ *Id.*

the interpretation or weight given to each of the values at stake.”¹⁰⁴ Guidance from case law may be scarce or unhelpful in guiding how exactly this balancing should be conducted.¹⁰⁵ Critics have said that the customary law definition of proportionality, “By American domestic law standards . . . would be constitutionally void for vagueness.”¹⁰⁶ Perhaps because of this, some scholars argue that the addition of ‘clearly’ by the I.C.C. Statute to the phrasing of AP I ‘excessive’ “appears to be intended to make sure that only obvious cases of disproportionate attacks are punished . . . and it has been interpreted as such by the Office of the Prosecutor when looking into alleged breaches of the proportionality principle by British forces in Iraq.”¹⁰⁷

Conclusion

The main rules of the law of armed conflict, especially proportionality, require decision-makers to assess and weigh risks and uncertainties in order to meet the legal standard established to balance humanitarian considerations with necessary military justifications. In the context of

¹⁰⁴ See Rogier Bartels, *Dealing with the Principle of Proportionality in Armed Conflict in Retrospect: The Application of the Principle in International Criminal Trials*, 46 *ISR. L. REV.* 271, 276 (2013).

¹⁰⁵ See *id.* at 272, (stating that “no case law exists to which the International Criminal Court (ICC) . . . could turn were it to be seized of a case concerning alleged disproportionate attacks.”).

¹⁰⁶ See W Hays Parks, *Air War and the Law of War*, 32 *A.F. L. REV.* 1, 173 (1990).

¹⁰⁷ See Bartels, *supra* note 104, at 308 (citing ICC Office of the Prosecutor, Letter to Senders concerning the Situation in Iraq, 5-7 (Feb. 9, 2006), https://www.icc-cpi.int/NR/rdonlyres/04D143C8-19FB-466C-AB77-4CDB2FDEBEF7/143682/OTP_letter_to_senders_re_Iraq_9_February_2006.pdf

nuclear weapons, a proportionality assessment should include reverberating effects such as delayed radiation, even if the probability is low, so long as it is not merely speculative. As per guidance from various nuclear military manuals, I also argue that factors such as enemy response and risk of nuclear escalation should be legally assessed, given the uniquely destructive characteristics of nuclear weapons. With these factors taken into account, it seems very difficult for me to imagine a use that would comply with the laws of armed conflict.